Managing Terror

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Abstract

This paper analyzes al Qaeda in Iraq’s (AQI’s) 2007 decision to begin turning away foreign fighters. Foreign fighters can provide benefit to an insurgent group by introducing a novel set of preferences. This paper shows formally that if foreign fighters are effectively integrated into insurgent groups like AQI, then they can constrain domestic agents and prevent agency type problems. However, this ability to integrate foreign fighters effectively is endogenous to the counterinsurgency effort that the insurgent group faces. Through a cross-case analysis, this paper suggests AQI’s 2007 decision to turn away foreign fighters was a consequence of its security environment. The model also has general implications for counterinsurgency, implying that operations that target or isolate leadership can be used to create intra-group dysfunction. This paper empirically demonstrates this result, showing the killing of Abu Zarqawi disrupted AQI’s leadership and caused agency problems within the group. As a theoretical contribution, this paper introduces a novel contracting mechanism, an “organizational contract,” that formalizes strategic institutional design; its use here shows that organizational structure is not only useful for defining operational units, but it also can be a tool for resolving agency problems.

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1 Introduction

“What is the mistake of many of the Muhajirin fighters in Iraq, especially the one[s] in al-Anbar, who are sitting idle without being used even to make explosives or assigned within the sectors where mines are planted. They are becoming frustrated and incompetent from continually sitting idle and from remembering the repeated promises of glory for which many left their countries.”

Analysis of the State of ISI, 2007

"The doors are open for all mujahadeen who fight to apply Allah’s will... We are ready to receive all foreigners, including Arabs, who want to fight alongside us.”

Sirajuddin Haqqani on the Haqqani Network, 2009

Why do some insurgent groups welcome foreign fighters while others turn them away? In 2007, al Qaeda in Iraq (AQI) began preventing foreign fighters from joining its ranks (CTC, 2007c). Interestingly, the decision came at a time when the group was losing ground and influence in Iraq. In June 2006, Abu Musab al-Zarqawi, the leader of AQI was killed. Beginning March 2007, US and Iraqi Security Forces moved into Baquba to wipe out AQI’s established base of operations. These actions, in conjunction with the Anbar Awakening and the 2007 troop surge, presented AQI with a significant existential threat (Biddle et al., 2012; Smith and MacFarland, 2008; Montgomery and McWilliams, 2009). And yet, around this time, the group began turning away manpower. In contrast, the Haqqani Network, an insurgent group operating in Afghanistan and Pakistan, has welcomed foreign fighters into its ranks over the course of its forty year history (Brown and Rassler, 2013; Dressler, 2012).

To understand why some groups bring in foreign fighters, it is crucial to understand how foreign fighters benefit insurgent groups. A growing consensus suggests that terror and insurgent groups struggle with agency problems stemming from the misalignment of preferences within the group (Berman and Laitin, 2008; Weinstein, 2006; Kalyvas, 2006; Shapiro, 2013). Within insurgent groups, members’ preferences and reasons for mobilization are shaped by their personal background and the opportunities that arise during an insurgency (Bueno de Mesquita, 2005; Dal Bo and Dal Bo, 2011; Dube and Vargas, 2013; Humphreys and Weinstein, 2008; Sambanis, 2001; Gates, 2002; Kalyvas, 2006). This implies that lower-level

1 CTC (2007c).
2 Translated in Brown and Rassler, 2013.
3 Regarding the decision to turn away foreign fighters and general background on the groups, the Appendix provides a more detailed discussion. Regarding nomenclature, this paper will refer to the insurgent group founded by Abu Musab al-Zarqawi that operated in Iraq between 2004-2013 as “al Qaeda in Iraq” or as simply “AQI.” While on 15 October 2006 AQI declared itself to be the “Islamic State of Iraq” or “ISI,” for ease this paper will not use this labeling unless absolutely necessary. It is then useful to discuss the resurgent AQI that currently exists in Iraq and Syria as the “Islamic State of Iraq and Syria,” or ISIS.
4 The Historical and Mathematical Appendix contains a brief history of the two groups.
5 Discussion on the complexities for motivations are discussed in Blattman and Miguel (2010).
actors may possess preferences for types and patterns of violence that are different from those in the leadership, despite fighting on the same side of the overarching conflict. In this setting, foreign fighters can be valuable because they possess a different background and set of preferences for actions than domestic fighters. This paper presents a principal-agent model showing if foreign fighters can be integrated into a terror or insurgent group, then they can moderate domestic fighters and limit agency type problems.

The model shows the decision to bring in foreign fighters is dependent upon the leadership’s ability to integrate foreign fighters into the group, which in turn is dependent upon the pressure counterinsurgency puts on group leadership. In other words, the ability to organize effectively and bring in foreign fighters is endogenous to the security environment that the insurgent groups face. When the leadership finds it too costly to ensure that the group integrates local and foreign fighters, the operational units will self-assemble, group members will exhibit homophily, the leadership may begin excluding foreign fighters, and agents will at times subvert.

The model also has implications for counterinsurgency. The model shows that counterinsurgency that targets leadership can create dysfunction and subversion within insurgent groups. This appeared to be important to the Iraq case. Within AQI, subversion took the form of lower level members engaging in criminal and violent behavior at the expense of the greater insurgency movement. These actions succeeded in alienating the Iraqi Sunni population, as interviews with the participants of the Anbar Awakening cited AQI’s excessive violence as justification for breaking ties with the group (Montgomery and McWilliams, 2009). Thus, to the extent that Coalition force operations put pressure on AQI’s leadership, these operations indirectly influenced the winning of hearts and minds of the Sunni population.

The implications for counterinsurgency are tested through an event study. Utilizing the MNF-I SIGACT III and the Iraq Body Count datasets, this paper estimates the impact of the June 6, 2006 killing of Abu Zarqawi, an event which both experts and insiders have identified as pushing the group to decentralization (Fishman, 2009a; Kirdar, 2011; Al-Mukhtar, 2008). Under the assumptions lined out in Section 8, an estimation procedure finds, as a lower bound, the killing of Zarqawi and following organizational decentralization led to a 0.06 increase in the ratio of subversive killings to total violence committed by AQI. Through a back-of-the-envelope estimation described below, it appears this figure exceeds the number of civilian casualties committed by coalition forces for the three months including and following Zarqawi’s death.

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6 This will be discussed further later, but for a summary see Fishman (2009a).
7 This figure is statistically significant at the 10% level.
This paper formalizes the connection between counterinsurgency tactics and insurgent group efficacy with implications for policy and future theoretical work. There is a long history of insurgent movements failing to achieve their goals due to infighting, schisms, and organizational dysfunction. Given that groups like the Islamic State, Boko Haram, the Pakistani Taliban, and others continue to destabilize their home countries and threaten the United States’ security interests abroad, understanding how violent insurgent groups organize and operate is a first order concern. This paper provides novel insight into the agency problems facing insurgent groups, how organizational design can prevent these types of problems, and how certain types of counterinsurgency can disrupt and undermine insurgent groups from within.

This topic is also theoretically important. To better consider the choices leadership makes in designing organizations with multiple types of agents (here foreign and domestic), this paper introduces a novel contracting mechanism, an “organizational contract,” that allows for endogenous institutional design. Through the use of this contract, it is shown that organizational structure is not only a means for defining operational units, but it also can be a tool for mitigating agency problems. Furthermore, the organizational contract outlined below is unique in that it can successfully align incentives in environments with limited information about preferences. These factors make the organizational contract not only useful for understanding terror and insurgent groups, but also for understanding government bureaucracies, firms, and other types of organization.

The paper proceeds as follows. Section 2 is a literature review. Section 3 will identify and discuss a prevalent type of agency problem facing terror and insurgent groups. Section 4 will give a verbal-walkthrough of the model; the model is useful for understanding how organization can be used to overcome the agency problem facing insurgent groups, and how outside pressure on these groups can make this solution infeasible. Sections 5 and 6 will discuss the model and equilibrium. Section 7 discusses the comparative statics on the model and produces testable implications from the model. Section 8 tests these implications using reduced form and structural estimations. Section 9 concludes.

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8 There are too many to include, but some groups include: Tamil Tigers, PIRA, the Abu Nidal organization, the PLO (Hamas and Fatah), groups in the Spanish Civil War, the groups that participated in the Libyan Civil War, and many others. Several academic articles discussing factious rebel groups include: Fjelde and Nilsson (2012); Kenny (2010); Cunningham et al. (2012); Bakke et al. (2012).

9 Two examples are included in the Mathematical and Historical Appendix.
2 Related Literature

2.1 Most Similar Research

This paper is most similar to Abrahms and Potter (2015), but has several important distinctions. First, theoretically, this paper characterizes the details of the agency problems facing the Haqqani Network and AQI. It can therefore analyze how violence towards civilians as agency problems arise, how the presence of leadership is able to prevent agents from acting out, and the mechanics behind preventing subversion through the use of organizational methods. Second, empirically, this paper validates the findings of Abrahms and Potter by showing that leadership decapitation does lead to an increase in violence against civilians, but does so in a way that makes it possible to derive the precise lower-bound effect of a high-profile decapitation event on AQI’s subversive activity. Furthermore, while data limitations prevent this paper from claiming to have achieved causal identification, endogeneity concerns are given extensive treatment below.

2.2 Foreign Fighters

This paper identifies why some insurgent groups integrate foreign fighters. Existing studies suggest that foreign fighters can be valuable for the financial or human capital contribution they make (Malet, 2010), while others claim that Islamic foreign fighters can be detrimental to an insurgency by introducing a radical ideology that may alienate the population (Bakke, 2014; Rich and Conduit, 2014). This paper shows that foreign fighters can be valuable to groups like AQI and the Haqqani Network specifically because they introduce an alternative set of preferences to the group. This result is consistent with Lazear (1999a) and Lazear (1999b), which show there are both benefits and costs to utilizing a diverse workforce as well as to recent studies showing that organizational practices can reduce the costs and accentuate the benefits of diversity within organizations (Kochan et al., 2003; Hjort, 2014). This paper is unique because it provides a model of the interaction between organization and diversity, showing that without any sort of production complementarities or assumed added-knowledge gains from diversity, firms can benefit from utilizing a diverse labor force.

2.3 An Organizational Approach to Terror

By examining the subversion and agency problems withing AQI and insurgent groups more generally, this paper is part of a growing body of literature that approaches terror and insurgent groups as economic organizations. This approach, initially proposed in Crenshaw (1987),

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10 A recent review of the literature present a more nuanced picture, suggesting that underlying differences in race, ethnicity, gender or age tend to have negative effects on a group’s ability to function effectively, while differences in background, education, or personality can have positive effects (Mannix and Neale, 2003).
and first formalized by Chai (1993), treats insurgent groups not as homogenous masses of like-minded radicals, but rather as organizations composed of self-interested actors.\footnote{A subsample of this work includes: Bueno de Mesquita (2005), Siqueira (2005), Shapiro and Siegel (2007), Berman and Laitin (2008), and Dal Bo and Dal Bo (2011).} This treatment has been justified through its explanatory power; in addition to a large empirical literature documenting agency problems within insurgent groups\footnote{There are too many to cite, but some sources include: Shapiro (2005), Kalyvas (2006), Fishman (2009a), Staniland (2012), and Weinstein (2014).} organizational models have demonstrated success in explaining a wide range of puzzling behaviors ranging from bureaucratic record keeping (Shapiro and Siegel 2007), the high education levels of terrorists (Bueno de Mesquita 2005), and club-model type behaviors (Berman and Laitin 2008).

This paper allows organizational structure to be endogenous to the tactics of counterinsurgency. Baccara and Bar-Isaac (2008) and Enders and Jindapon (2010) make the same assumption, also demonstrating that organizational structure strategically shifts with counterinsurgency tactics. This connection between organizational structure and counterinsurgency undermines large set of influential theoretical literature that has been dedicated to determining optimal counterinsurgency policies given an exogenous network structure.\footnote{Or a stochastic evolving network structure. As a testament to the spread of these ideas, some findings of this literature can be found in the 2014 Army Field Manual on Counterinsurgency (Army, 2014). Some papers that take the exogenous organizational design approach are: Carley et al. (2003), Carley (2006), Carley et al. (1998), Farley (2003, 2007), Tsvetovat and Carley (2005), Latora and Marchiori (2004).} This paper, Baccara and Bar-Isaac, and Enders and Jindapon strongly undermine the results of the exogenous-structure literature, and suggest that any counterinsurgency strategy that does not take into account how an organization will adapt to the counterinsurgency will at best be identifying a short-run optimum and at worst could make these groups more entrenched and difficult to destroy.

Finally, the organizational approach to resolving agency problems discussed here has roots in both canonical signaling models and the contracting literature. In signaling models like those in Dewatripont and Tirole (1999) and Battaglini (2002), the principal uses the divergent preferences between agents to obtain a better representation of the world. Additionally, the contracting literature has explored the topic of principal-agents modeling with a particular emphasis on the role of externalities between agents.\footnote{Beginning with Holmstrom’s demonstration of how uncertainty over production accountability make first-best, balanced budget contracting impossible (1982), a series of papers followed demonstrating how dividing tasks (Holmstrom and Milgrom 1991), side contracting (Tirole 1986, Holmstrom and Milgrom 1990, 1994), different forms of compensation (Holmstrom and Milgrom 1990, 1994), and externalities in general (Segal 1999) can impact the contracting problem facing the principal. Recent work goes beyond allowing side transfers amongst agents and has shown cooperation within the team can arise without transfers and through repeated interactions (Che and Yoo 2001). See Gibbons and Roberts (2013) for a review, especially chapters 1, 12, 15 and 19.} However, these papers tend to assume an exogenously determined organization structure; to the best of the author’s knowledge, this is the first paper where the principal has the option to construct an organization for the sake of resolving agency problems or to allow the organization to form organically.
2.4 Tactics of Counterinsurgency

This paper addresses an ongoing debate on the value of leadership decapitation as a tactic of counterinsurgency. In cross-national studies on the value of leadership targeting, there are mixed results on the success of decapitation as a tactic (Price, 2012; Jordan, 2009). To address endogeneity concerns in (Price, 2012; Jordan, 2009), Johnston (2012) compares the impact of successful leadership decapitation attempts to unsuccessful leadership decapitation attempts; Johnston (2012) finds that successful leadership decapitation increases the mortality rate of insurgent organizations, but does not identify the mechanism for how leadership decapitation degrades the group. In within-state studies of the Pakistan drone strike campaign and leadership decapitation in Mexico, Abrahms and Potter (2015) and Calderón et al. (2015) (respectively) show that leadership decapitation is correlated with attacks against the local population. These studies provide an explanation for the Johnston (2012) result, arguing that leadership decapitation erodes a group’s command structure and aggravates infighting and agency type problems, but these studies lack the exogenous variation necessary to make causally identified claims. This paper provides further evidence for the Abrahms and Potter (2015) and Calderón et al. (2015) results, finding evidence killing Zarqawi in Iraq caused AQI to decentralize which led to the manifestation of agency problems within the group.

In demonstrating a connection between leadership decapitation and organizational dysfunction, this paper contributes to a larger debate on the value of population-centric tactics in counterinsurgency. On one side of the debate, proponents of population-centric counterinsurgency emphasize the value of protecting the civilian populations and engaging in nation-building as tools for winning hearts and minds and fighting an insurgency (Galula, 2006; Nagl, 2012; Kilcullen, 2009). On the other side of the debate, criticisms on the use of aid during counterinsurgency and the relative value of population-centric tactics to tactics directed at insurgents have been raised (Choharis and Gavrilis, 2010; Wilder, 2009; Gentile, 2009). This paper advocates a middle ground by suggesting a connection between kinetic operations and winning hearts and minds. The model and empirical evidence here suggests that military operations directed at targeting and isolating leadership can lead to a dysfunctional organization that alienates itself from the civilian population, and this may contribute to the insurgent group undermining its own efforts.
3 Managing Terror: The Agency Problem

This section will identify a specific type of agency problem facing terror and insurgent groups, which will be referred to as “subversion.” It will then discuss subversion in the context of AQI and later in the Haqqani Network.

3.1 Subversion

Agency problems can be classified as one of two types: “shirking” or “subverting.” Several models of terror groups explore the phenomena of shirking, where agents do too little and select an effort or funding level that is below the principal’s optimal (or first-best) allocation. This paper will instead explore subverting, which occurs when agents perform an action that the principal prefers the agents had not taken. Despite widespread evidence of subverting occurring within terror and insurgent groups, there is currently only a single other model of terror groups that explores subverting.

Subversion arises when three conditions are in place. Taken together, these conditions define the agent’s means, motives, and opportunity for subversion. First, the agents must possess the freedom of choice over a set of $N > 1$ elements (means). Second, the principal must have uncertainty over the value of an agent’s actions; this implies that the principal’s utility mapping from the agents’ actions to the principal’s value of actions cannot costlessly be resolved (opportunity). Third, the utility mappings of the principal and agents are such that unless the principal intervenes, in some settings, the agents will act in a manner that the fully-informed principal would perceive as non-optimal (motive).

These three conditions were endemic to AQI.

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15 This section benefited greatly from the resources produced by the Combating Terrorism Center’s Harmony Program, which publishes declassified and translated primary documents from al Qaeda and affiliate groups, as well as a number of secondary sources analyzing these primary documents including: Felter and Fishman (2007), Fishman (2009a), Moghadam and Fishman (2010).

16 The general early work on the economics of agency problems utilizes models that do not distinguish shirking from subverting (see Ross (1973)). In this paper, it is assumed that while the principal receives disutility from subversion, other agents can receive positive externalities from subversion. This would be different from models of shirking (like Enders and Jindapon (2010)), where agents incur a disutility from other agents shirking.

17 For evidence, see Footnote 11. For the model, see Shapiro (2013). This differs from the model below because Shapiro assumes that the leadership knows what the lower level members should be doing. For reasons discussed below, this assumption is viewed as too strong for the AQI and Haqqani cases. The subverting literature has received some attention within the corporate finance literature with respect to the phenomena of “empire building” within firms (for examples, see: Grossman and Hart (1982); Zwiebel (1996); Leland (1998).

18 Thanks to Jonathan Bendor for suggesting this framing.
3.2 Conditions for Subversion within AQI

3.2.1 Decentralization: The means and opportunity for subversion

In 2007, AQI embraced a “Multi-divisional form” hierarchy, where autonomous geographic units conducted operations overseen by sector emirs (CTC 2007c; Montgomery and McWilliams 2009; Bahney et al. 2010). While this structure had the benefits of giving regional units a better ability to respond to the situation on the ground, to strike against multiple fronts, and to maintain operations despite lines of communication being cut, it also gave these autonomous units the freedom of action necessary to subvert.

The M-form hierarchy also distanced AQI’s leadership from what the autonomous geographic units experienced day-to-day; AQI’s decentralization provided the opportunity for subversion by introducing information asymmetry over what precisely local agents should be doing. As an example of this, consider the interactions between AQI members and other insurgent groups. Cooperation between AQI and other insurgent groups was beneficial for overthrowing the Iraqi government and fighting Coalition forces. However, should the Coalition forces leave and the Iraqi government fall, the insurgent groups would then be in direct competition with each other for ruling Iraq. This long-run consideration can create conflict between insurgent groups that are ostensibly working towards same goals, even before the government has fallen (Krause 2014; Bakke et al. 2012; Cunningham et al. 2012; Fjelde and Nilsson 2012). This already complicated relation between insurgent groups in Iraq was further obscured by fears of other insurgent groups cooperating with Americans. From these considerations, the leadership of AQI would want its members to attack other insurgent groups if these groups were cooperating with Americans or if there was a good strategic reason for doing so. However, because the leadership did not possess the same information that the lower-level agents possessed, it may be unable to determine ideally how a cell should behave.

In addition to insurgent-insurgent interactions, the leadership would also posses uncertainty over proper treatment of civilians and over what types of operations should be conducted.

3.2.2 Divergent Preferences: Motives for subversion

This section will describe how the backgrounds of foreign and local fighters and the opportunities that arise during conflict can shape the preferences of domestic and foreign agents differently. It is unlikely that every domestic and foreign agent’s preferences are as defined here. Instead, this paper will suggest that the preferences of domestic and foreign agents may generally be as described below, to the extent that it motivates the assumptions of the

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19 This issue was discussed in: CTC “Attack Explanation Letter to a Sheik”
Preferences of Domestic Agents

Two factors will be discussed as shaping domestic AQI members’ preferences for violence in Iraq. First, local fighters possessed a pre-existing social network and connection to the local population. When AQI took control of an area, they took over smuggling channels, began enforcing Sharia law, and became involved with racketeering activities (Fishman 2009b). While fighting with AQI provided all fighters the opportunity to settle grievances, seek fortune, and pursue power, these opportunities would be more salient or numerous for domestic fighters possessing stronger ties to the population. Second, it is not clear how indoctrinated domestic members of AQI were to the manifestation of Islam endorsed by the leadership of al Qaeda and AQI. While the growth of Islam in Iraq began before and continued through the initiation of Saddam’s 1993 Faith Campaign (Baram 2011), internal documents from AQI suggest that many members with the group did not seem to ascribe to fundamentalist Islam; biographical records of several individuals identified as fighting for AQI stated that they had not memorized any verses of the Koran or Hadith’s of Prophet Muhammad. If it was the case that domestic fighters did not share the same religious beliefs as al Qaeda leadership, then these individuals might place less weight on protecting Muslim lives and attacking Americans.

Taken together, these factors could have shaped domestic actors’ preferences for violence. During the Iraq insurgency, AQI was one of many insurgent groups operating. This presence of other rival groups would diminish the rents that could be extracted and limit the authority AQI had over a locality. Also, while committing violence against Iraqi civilians may have been against the general interests of the insurgency, it could also be done with the intent to secure short-term local power, thereby benefiting lower level agents in that area. Finally, while engaging Coalition forces was important to AQI’s overall strategy, a local actor might prefer to neglect these duties and instead focus on eliminating regional political rivals and settling old grievances.

Preferences of Foreign Agents

This paper will utilize the perspective put forth in Hegghammer (2010) and Hegghammer (2010). The documents being mentioned are part of the CTC’s Harmony Database. For example, see CTC (2007f). Here of 20 AQI fighters, 11 reported memorizing some verses of the Koran or Hadith’s of Prophet Muhammad, 3 reported not memorizing any, and 6 responses were not recorded. Also, while it is difficult to identify if the individuals who did not memorize religious texts were Iraqi, most scholarship on foreign fighters in Iraq suggests that these individuals were fairly radicalized (Hegghammer 2010; Felter and Fishman 2007).
which highlights the importance of ideological factors for foreign fighter mobilization. The Sinjar Records, which contain biographical information on foreign fighters, supports the viewpoint that many foreign fighters entering Iraq were fairly radicalized; of the sample of foreign persons entering AQI, 56.3% (out of 389) designated their preferred type of work as “martyr,” “martyrdom,” or “suicide bomber” \cite{Felter2007}. Thus, it is assumed that foreign individuals who joined AQI sufficiently endorsed Al-Qaeda’s viewpoint on jihad, which is summarized in a public statement made by Shaikh Ayman al-Zawahiri \cite{Al-Mukhtar2008}. This document highlights the importance of attacking Americans, a point further bolstered in statements by bin Laden, and the importance working with the local population and Islamic insurgent groups to create a unified force for jihad.

It will be assumed that this ideology shaped foreign fighters’ preferences for violence. Whereas local fighters might be tempted to pursue local political power at the expense of engaging Americans, the ideology of foreign fighters would make them less willing to engage in violent local political clashes against other Muslims and more willing to attack Americans\cite{McChrystal2008}. It should be noted that this would not necessarily make these agents immune from agency type problems; as discussed earlier, the Iraq insurgency would require a balance between securing local power and engaging American forces. If foreign fighter’s preferences are generally as defined here, they could be less willing to take measures to secure local control.

### Preferences of Leadership

It will be assumed that AQI’s leadership possessed preferences that were more in line with local Iraqi fighters than with foreign fighters. AQI’s leadership possessed ambitious goals. The group was attempting to expell Coalition forces from Iraq, overthrow the Iraqi government, and, after these two goals were achieved, emerge as the top insurgent group in the country. Domestic fighters’ preferences for local power are consistent with these three goals, as Coalition forces, the Iraqi government, and other insurgent groups infringe on the local power of the group. Furthermore, while foreign fighters do have preferences to attack Western forces, foreign fighters also tend to be viewed as young idealouges, who may be less willing to compromise on their beliefs for the greater insurgency movement.

\footnote{With the vast majority of remaining fighters identifying as more traditional fighters.}

\footnote{In his memoir, retired general Stanley McChrystal reaches a similar but more blunt conclusion: “Unlike aggrieved Iraqis, [foreign fighters] had no indigenous stake in the future of Iraq... They came to hurt and kill Americans.”}
3.3 Evidence of Subversion

“We have called your attention several times before to the conduct of some of the individuals who belong to your group who greatly mistrusted our brothers to the extent of issuing misleading statements and accusing heresies...Some of the individuals legitimized killing those who are in disagreement with this [joining of the ISI]. Indeed, after these announcements, they carried out their threat and killed our brothers (as we mention in our previous letter). We have the evidence and we know their names.”

Letter from Ansar al-Sunnah to the ISI, 2007

The public statements and internal correspondences of AQI portray a dysfunctional organization. Looting and theft by members of AQI was so prevalent that the group issued a public statement disavowing members that engaged in this practice. Furthermore, as the quote above indicates, while the leadership of AQI was reaching out to Iraqi insurgent groups like Ansar al-Sunnah to form alliances, the cells of AQI were attacking and killing members of these same groups. In addition to the letter above, a collection of documents taken from AQI demonstrates the leadership’s general inability to control its members with regards to killing insurgents. These include: a letter from AQI to another insurgent group requesting an end to violence between the groups; a statement from the Islamic Army in Iraq shaming AQI over it’s killings of Sunnis; a letter from AQI to Ansar al-Sunnah apologizing for inter-group killings; a letter instructing an AQI cell leader to control his personnel and to cease killing civilians and members of other groups; and two letters from lower-level group members justifying their attacks on other insurgent groups.

Importantly, as this was occurring, foreign fighters were being underutilized and turned away.

3.4 Effective Organization

AQI was ineffective in constraining the subversive tendencies of its lower level members. However, as the model below will demonstrate, the leadership of AQI possessed the ability to prevent subversion, but lacked the capacity to do so. Foreign and local fighters possess

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See: CTC “Letters to the Leadership of ISI about Issues of Single-party Control.”
See: CTC “Agreement Between ISI and Another Group to Stop Violence.”
See: CTC “Agreement Between ISI and Another Group to Stop Violence.”
See: CTC “Letters between Abu Hamza and a member of al-Ansar.”
See: CTC “Instructions to Abu Usama.”
different and offsetting sets of preferences. If foreign fighters are properly integrated with local fighters, through repeated interactions these two groups can constrain each other and prevent subversion. However, if given the choice, local fighters will not voluntarily integrate and will at times subvert. While the leadership of AQI had these foreign fighters available, it appeared the security environment was such that they were not able integrate them into the organization. As evidence within AQI, the local fighters marginalized the foreign fighters, conducted operations with other Iraqis, and subverted.

In contrast, the Haqqani Network was successful in integrating foreign fighters and experienced less subversion than AQI.

### 3.4.1 Counterpoint: The Haqqani Network

The agents within the Haqqani Network also possessed the means, motives, and opportunities for subversion. Regarding means and opportunities, the Haqqanis also implemented a decentralized structure, using quasi-autonomous fighting columns whose command and control hierarchy was integrated with local actors [Brown and Rassler 2013]. Regarding the diversity of preferences that create the motives for subversion, the Haqqanis consisted of locals from the Loya Paktiya region as well as ethnic Arabs, Chechens, and Uzbek. Furthermore, over the course of the group’s history, the Haqqanis fought alongside and integrated with al Qaeda, the Afghan Taliban, the Pakistani Taliban, civilians in the Loya Paktiya region, and Pakistan’s Inter-Services Intelligence [Dressler 2010 Brown and Rassler 2013].

There is little evidence of subversion within the Haqqani Network. The sparsity of evidence of subversion does not necessarily imply that subversion was not occurring; admittedly, there is limited information on the general activities of the Haqqani Network, making it possible that acts of subversion are simply not documented. However, if acts of subversion occurred within the Haqqani Network, it is likely they would have become visible. The Haqqanis operated and continue to operate in a precarious political space by collaborating with a wide range of regional actors (listed above). By working with and alongside groups that are in conflict with each other (the Pakistani Taliban and Pakistan’s Inter-Services Intelligence are technically at war), the Haqqanis are in a position where agents acting out could very easily turn these allies against them. Therefore, if subversion was as commonplace within the Haqqani Network as it was within AQI, then there would likely be observable implications.

How were the Haqqani’s able to resolve the subversion problem? Evidence suggests the

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31 There are two instances described in [Brown and Rassler 2013]. One occurred when a foreign fighter reneged on being a suicide bomber. The other is described when a foreign fighter was wasting ammunition.
Haqqanis developed an organizational solution to this problem. The Haqqanis took care to integrate foreign fighters into their group, even at times promoting foreign fighters in their command structure (Brown and Rassler, 2013). By requiring interactions between local and foreign fighters, the Haqqani leadership was able to facilitate cooperation within the group and ultimately prevent subversion.

The model below formalizes how organization can be used to align incentives.

4 Modeling Issues

This section will discuss the intuition behind the model.

4.1 Game Structure

The decision to utilize foreign fighters is modeled as a two-stage principal-agent model. In the first stage, the terror group is organized. The group consists of a principal, who represents the leadership of the terror group, and a two-member terror cell, comprised of a terror cell leader and a terror cell member. In the first stage, the group leader (modeled as the principal) will propose contracts, and the terror cell leader will recruit the terror cell member. In the second stage, the terror cell leader and the terror cell member (modeled as the agents) will conduct attacks.

The agents’ utilities are a function of their actions, their cell partner’s actions, and their type. Here type corresponds to whether an agent is a local fighter or a foreign fighter. Local agents possess a preference for conducting attacks to secure local power, and foreign fighters possess a preference for conducting attacks against Westerners. Each agent also prefers their cell partner conducts the type of attack they prefer. These preferences lead to an important aspect of the model: without the principal’s interference, terror cell leaders will partner with agents that have a similar type, both agents in the cell will act based on their latent preferences, and these actions will, at times, be acts of subversion.

The principal’s utility is a function of the agents’ actions and the state of the world. The state of the world represents the situation on the ground and captures the set of actions that the principal prefers the agents take. For example, in certain neighborhoods, rival insurgent groups might be attacking local members of AQI; here the state of the world implies that

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32 Type does not need to refer to the local-foreign dichotomy. It may be the case that at the individual level, some foreign fighters prefer securing regional power and some local fighters prefer attacking Americans. However, it is assumed for the model that foreign and local fighters have the preferences defined here.
the leadership of AQI prefers the cell take action against these rival insurgent groups. In other settings, insurgent groups in Iraq might be cooperating with AQI; here the state of the world implies that the leadership of AQI would not want its cell to take action against other insurgent groups and instead attack Coalition forces. When agents select actions that differ from the state of the world, they are subverting.

The principal lacks information on the state of the world and on the composition of the terror cell. It is assumed that the principal cannot observe the state of the world, but the agents are able to do so. This follows naturally because a terror cell operating autonomously has a better understanding of the situation on the ground than the central leadership. Also, the principal cannot costlessly observe the types of all agents in the cell. While the principal communicates with cell leadership, by their nature autonomous cells do not create a regular opportunity for leadership to interact with lower-level group members. Therefore, the principal knows the type of the cell leader, but must pay a cost to learn the types of other agents in the organization.

4.2 Preventing Subversion

The principal can prevent subversion through two approaches. First, the principal can offer financial transfers conditional on the actions of the agents. These transfers make the agents more willing to act against their preferences when they contradict the state of the world. This type of contract is standard in the economics literature and will be referred to as “transfer contracting.” Second, the principal can require cell composition to take a specified form. If terror cells have both domestic and foreign members, through repeated interactions these agents will work together and will choose the actions that coincide with the principal’s preferences. Essentially, the principal can group a set of agents with misaligned preferences together, constructing an operational cell with aligned preferences. This will be referred to as “organizational contracting.”

The principal could also take the “no contracting” approach. Here the principal will allow the terror cell to self-organize, and the cell will at times subvert.

To preview the Comparative Statics section, the principal’s decision can be depicted graphically as a function of two primitives. As shown in Figure 1 below, when a terror group faces both high monitoring costs and high financial constraints, the group will select the “no contracting” outcome. As it becomes less costly for the principal to monitor the composition of the terror cell, the principal will arrive at a cutpoint where the benefits of preventing sub-
version exceeds the costs of monitoring to prevent subversion. At this point, the principal will use organizational contracting and require heterogeneous terror cells to form. A similar story can be told for financial constraints and the use of transfer contracting.

This idea is formalized in Section 5.

![Figure 1](image.png)

**Figure 1.** This image depicts the tradeoff the principal faces over her strategy set. When the costs of monitoring are low, the principal can prevent subversion through organizational contracts. When the group has less financial constraints, the principal can prevent subversion through transfer contracts. When monitoring costs are high and financial constraints are binding the principal may will choose to allow subversion and will not offer contracts.

## 5 Model

### 5.1 Actors and Organization

In the game, the principal offers contracts to agents within a terror cell. Feminine pronouns refer to the principal, and masculine pronouns refer to the agents. Within the cell, there are two classifications of agents. One agent is classified as the “terror cell leader.” The terror cell leader will select another agent, the “terror cell member,” to act as a partner, and these two agents will repeatedly conduct operations.

Each agent has a type, denoted $y \in \{d, f\}$, which corresponds to if an agent is domestic ($y = d$) or foreign ($y = f$). It is assumed the terror cell leader is a domestic type. Thus, when the cell leader selects a partner, either he forms a homogenous cell by selecting a type

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33. This assignment was determined by a randomizing procedure and is done entirely for convenience.
34. This framing should not only be considered for the foreign-local fighter dichotomy. It can also be thought, more generally, of two types of agents possessing different and offsetting preferences.
35. While this model assumes this is not a strategic choice, even if the principal could select this, she would be weakly worse off by letting an agent of type $y = f$ act as terror cell leader.
$y = d$ agent as partner, or he forms a heterogeneous cell by selecting a type $y = f$ agent as partner. The terror cell leader’s choice is denoted by $a \in \{d, f\}$, where $a = d$ is forming a homogeneous cell and $a = f$ is forming a heterogeneous cell.

Crucially, while the principal knows the type of the terror cell leader, the principal does not costlessly observe the type of the terror cell member (in other words, the principal does not costlessly observe $a$). If the principal chooses to learn the type of the terror cell member, she must incur a cost, denoted by $\psi > 0$.

5.2 Actions

In the first stage, the principal and agents construct a terror cell. In the second stage, the game enters an infinitely repeated stage game where agents conduct operations. Periods in the second stage will be denoted by $t \in \{1, 2, 3, ...\}$. Both stages 1 and 2 are summarized in Figure 2.
5.2.1 Stage 1 Actions (Organizational Stage)

First the principal makes the monitoring decision and offers contracts. The principal’s monitoring decision is denoted by $i \in \{0, 1\}$, where $i = 1$ indicates that the principal incurs cost $\psi$ and learns the terror cell leader’s selection of $a$. Regarding contracts, one form of contracting has the principal offer a utility transfer to the agents in the terror cell. In period $t$, a transfer to the terror cell leader is denoted by $g_{l,t} \geq 0$, and a transfer to the cell member is denoted by $g_{m,t} \geq 0$. The set of transfers given to the terror cell leader and terror cell member in period $t$ is $g_t$.

Next, the terror cell leader selects his partner’s type by setting $a \in \{d, f\}$.

Finally, before the second stage begins, the principal makes the walk-away decision. After the terror cell is formed, the principal has the ability to break ties with the terror cell. The principal’s choice is denoted by $b \in \{r, nr\}$, where $b = r$ corresponds to the principal rejecting the cell and $b = nr$ corresponds to the principal not rejecting the cell. If the principal rejects the cell, all agents and the principal receive their reservation utility (denoted $U^0_a$ and $U^0_p$ respectively) in each iteration of Stage 2.

5.2.2 Stage 2 Actions (Terror Operations Stage)

So long as the principal sets $b = nr$ in the first stage, in each period of stage 2 nature sets the state of the world and agents in the terror cell conduct operations.

The state of the world is denoted by random variable $\rho_t$ with support $[0, 1]$, which identifies the action profile that the principal most prefers at period $t$. It is assumed $E[\rho_t] = \bar{\rho} \in (0, 1)$.\footnote{This assumption is justified in the discussion earlier on the leadership’s preferences.} realizations of $\rho_t$ are independently and identically drawn from a fixed distribution, and the agents observe the state of the world but the principal does not. When $\rho_t$ is low, the conditions on the ground are such that AQI leadership would prefer its agents take more actions directed against domestic actors to secure local power. The reverse holds for $\rho_t$ being high and attacks against Coalition forces.

After nature determines the state of the world, each agent in the terror cell selects an action. The terror cell leader’s action is denoted by $x_{l,t} \in [0, 1]$ and the terror cell member’s action is denoted by $x_{m,t} \in [0, 1]$. The principal observes these selections. When agents
select low values of \( x_{m,t} \) and \( x_{l,t} \), this represents the agents selecting operations targeting domestic actors. When agents select high values of \( x_{m,t} \) and \( x_{l,t} \), this represents the agents selecting operations targeting coalition forces. The actions are aggregated to determine \( x_t \), which denotes the profile (or average type) of violence being carried out by the terror cell. The following equation determines \( x_t \):

\[
x_t = \frac{x_{m,t} + x_{l,t}}{2}
\]

(1)

This implies perfect substitutability between the actions of the terror cell leader and terror cell member.

5.3 Stage Game Utilities

After each iteration of the infinitely repeated stage game, utilities are realized.

5.3.1 Agent Stage Game Utilities

The utility functions for the stage game are presented then described below. For the terror cell member, the utility function of a domestic type agents is:

\[
U_{m,t}(x_{m,t}, \rho_t, g_m, y = d) = -\beta x_t - (1 - \beta) * |x_{m,t} - \rho_t| + g_{m,t}
\]

(2)

And for a foreign type terror cell member:

\[
U_{m,t}(x_{m,t}, \rho_t, g_m, y = f) = -\beta (1 - x_t) - (1 - \beta) * |x_{m,t} - \rho_t| + g_{m,t}
\]

(3)

First consider the \(-\beta x_t\) term in the utility function of the domestic type agent. The domestic agent prefers taking actions that secure local power and prefers other agents within their terror cell do the same. Therefore, as the profile of violence \( x_t \) moves further away from the domestic fighter’s ideal point of \( x_t = 0 \), he incurs a disutility. The \( \beta \) term can be thought of as a utility weight the agent places on the value of actions he prefers relative to the cost of conducting actions. This similarly holds for the foreign fighters, whose ideal violence profile is \( x_t = 1 \).

The \(- (1 - \beta) * |x_{m,t} - \rho_t|\) term captures the inefficiency from deviating from the state of the world. Because \( \rho_t \) represents the most efficient action profile for conducting an insurgency, any deviation from \( \rho_t \) generates a cost borne by the agent.\footnote{This assumption could be relaxed and the cost of one agent deviating from \( \rho_t \) could also be borne by both members of the}
The $g_{m,t}$ term denotes transfers.

The terror cell leader (who is always a domestic type) has utility:

$$U_{l,t}(x_{l,t}, \rho_t, g_t) = -\beta x_t - (1 - \beta) * |x_{l,t} - \rho_t| + g_{l,t}$$

(4)

It is assumed $\beta \in (\frac{2}{3}, 1)$. This assumption implies an important feature: for a single iteration of the stage game, the Nash equilibrium outcome has agents match action to their ideal point rather than the state of the world.

5.3.2 Principal Stage Game Utilities

The principal’s stage game utility is:

$$U_{p,t}(x_{l,t}, x_{m,t}, \rho_t, g_t) = -|x_{l,t} - \rho_t| - |x_{m,t} - \rho_t| - \theta g_t - i\psi$$

The $-|x_{l,t} - \rho_t|$ and $-|x_{m,t} - \rho_t|$ terms captures the disutility the principal receives when agents select actions that differ from the state of the world. The $\theta$ term (with $\theta > 0$) is a constant capturing the relative cost of transfers to the agents. The $\psi$ term (with $\psi > 0$) is a constant capturing the information cost of learning the terror cell member’s type.

5.4 Supergame Utilities and Strategies

The variable $X$ denotes the sequence of actions played in the stage game, or $X = \{(x_{l,1}, x_{m,1}) (x_{l,2}, x_{m,2}), ...\}$. Similarly, $\rho$ denotes the sequence of realized values of $\rho_t$, or $\rho = \{\rho_1, \rho_2, ...\}$. The variable $G$ denotes the sequence of realized transfers, or $G = \{g_1, g_2, ...\}$. Finally, the variable $\delta$ denotes the discount rate of the agents and principal. Conditional on the principal not selecting $b = r$, the utilities of the agents in the terror cell are:

$$U_l(X, \rho, G, d) = \sum_{t=1}^{\infty} \delta^{t-1}U_{l,t}(x_{l,t}, \rho_t, g, d)$$

$$U_m(X, \rho, G, y) = \sum_{t=1}^{\infty} \delta^{t-1}U_{m,t}(x_{m,t}, \rho_t, g, y)$$

changing this assumption does not radically change the model and will therefore not be considered.

38 It is worthwhile to mention why this is being assumed. First, it is assumed the $\bar{\rho} < 0.5$, which implies that if the principal had a choice, the principal would require the terror cell leader to be domestic. Second, this assumption is fairly innocuous, as it does not change significantly change the transfer and organizational contracting outcomes. Third, if this was not the case, there was a foreign type leader, and no contracts were being used to align incentives, this would imply that domestic members would be excluded from the terror cell.
And the principal’s utility is:

\[ U_p(\mathcal{X}, \rho, \mathcal{G}, i) = \sum_{t=1}^{\infty} \delta^{t-1} U_{p,t}(x_{l,t}, x_{m,t}, \rho_t, g_t) \]

An agent’s strategy is a mapping from all information sets to action profiles. For the first stage, this is relatively straightforward. For the iterated second stage, a strategy is a mapping from the period number \( t \), the state of the world \( \rho_t \), and the t-history (denoted \( h(t) \))̂ into an action profile for period \( t \). The mapping \( S_l \) will denote the strategy for the terror cell leader, \( S_m \) will denote the strategy for the terror cell member, and \( S \) will denote the strategies for both agents in the terror cell. This implies the utility functions can also be written as \( U_l(S, \rho, \mathcal{G}, y) \) and \( U_m(S, \rho, \mathcal{G}, y) \).

The principal can use two possible strategies to control subversion. The first is a “transfer contract,” which is a transfer conditional on the actions conducted in period \( t \). The second is an “organizational contract,” where if the principal sets \( i = 1 \), she can condition the walk-away decision \( b \) on the terror cell leader’s partnering decision \( a \in \{d, f\} \). As will be shown, by requiring the formation of a heterogeneous terror cell, the principal can create a cell that self-regulates as a means to prevent subversion.

# 6 Principal’s Strategies

## 6.1 Equilibria and Parameter Space Refinements

This paper will only consider subgame perfect Nash equilibria. Additionally, this paper will define “efficient” outcomes, and then introduce a refinement:

**Definition:** Strategy \( S \) is **efficient** if there does not exist strategy \( S' \) such that for \( i, j \in \{l, m\}, i \neq j \) denoting the agents in the terror cell:

\[ U_i(S', \rho, \mathcal{G}, y) > U_i(S, \rho, \mathcal{G}, y) \text{ and } U_j(S', \rho, \mathcal{G}, y) \geq U_j(S, \rho, \mathcal{G}, y). \]

**Efficiency Refinement:** This paper will only consider efficient strategies.

This is Pareto-efficiency applied to the agents in the terror cell. The refinement implies if two agents are interacting repeatedly, the outcome will not be such that one player could be made better off without making the other player worse off.

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39The t-history can be defined as the summary of action profiles, transfers, and states of the world for the past \( t-1 \) periods, or: \( h(t) = \{(x_{l,1}, x_{m,1}, \rho_1, g_1), (x_{l,2}, x_{m,2}, \rho_2, g_2), \ldots, (x_{l,t-1}, x_{m,t-1}, \rho_{t-1}, g_{t-1})\} \)
This paper will also introduce **Condition 1**:

**Condition 1:** When **Condition 1** is in place, $U_a^0 = U_p^0 = -1$.

This condition ensures all actors are better off when the principal does not walk-away from the terror cell ($b = nr$). While relaxing **Condition 1** could speak to the agents’ and principal’s decision to join into the terror group, this is outside of the scope of the question motivating this paper.

The following subsections will describe the strategies the principal selects from.

### 6.2 No Contracting Strategy

Consider the setting when the principal offers no contracts. Due to subgame perfection, the terror cell leader determines that forming a terror cell with another domestic type agent is optimal. When the cell has formed, both domestic agents will match their actions to their ideal points. Subgame perfection also implies the principal knows subversion will occur, but **Condition 1** ensures the principal will set $b = nr$. Thus, when principal offers no contracts, she will neither pay to learn $a$ nor walk-away from the terror cell.

**Definition:** The **No Contracting Strategy** has the terror cell leader form a homogeneous terror cell, and both agents will always select their ideal point ($x_{l,t} = x_{m,t} = 0$).

For this strategy and all remaining strategies, the full equilibrium is included in the Mathematical Appendix.

### 6.3 Transfer Contracting Strategy

Consider the setting where the principal uses transfer payments to get agents to match their action to the state of the world. For simplicity, **Condition T** is in place:

**Condition T:** It is possible for the principal to make take-it-or-leave-it (TIOLI) contracts to the agents in the terror cell.

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40 Two papers that explore the importance of the outside option for terror groups are Bueno de Mesquita 2005 and Berman and Laitin 2008.

41 While generally pushing aside the issue of credible commitment should be viewed with caution, there are two reasons why, in this setting, assuming the possibility of binding contracts is actually fairly benign. First, while this game is only concerned with a single terror cell, in reality AQI or the Haqqani Network uses many cells for conducting operations. By reneging on
With \textbf{Condition T} in place, the principal can commit to pay a transfer to agents after observing the action profiles. Consider what a transfer schedule of \( g_l(x_{l,t}, x_{m,t}) = (\tfrac{3}{2} - 1)x_{l,t} + \tfrac{\beta}{2}x_{m,t} \) and \( g_m(x_{m,t}, x_{l,t}) = (\tfrac{3}{2} - 1)x_{m,t} + \tfrac{\beta}{2}x_{l,t} \) would accomplish for two domestic type agents. For the terror leader, the new utility function can be written as \( U_{l,t} = \beta \rho_t - \rho_t \).

This transfer schedule makes the terror cell leader indifferent over his own actions and the actions of his partner. With this transfer schedule, it is equilibrium behavior for the terror cell leader to partner with a domestic type agent and to match action to the state of the world.

\textbf{Definition:} The \textbf{Transfer Contracting Strategy} has the principal offer transfer schedules of \( g_l = \left( \tfrac{3}{2} - 1 \right)x_{l,t} + \tfrac{\beta}{2}x_{m,t} \) and \( g_m = \left( \tfrac{3}{2} - 1 \right)x_{m,t} + \tfrac{\beta}{2}x_{l,t} \). The terror cell leader will partner with a domestic type agent, and both agents will always match action to the state of the world.

\section{Organizational Contracting Strategy}

An organizational contract can be defined as follows:

\textbf{Definition:} An \textbf{organizational contract} is a TIOLI offer made to one or more agents dictating composition of the terror cell.

The principal can use organizational contracting to require a heterogeneous terror cell to form. To implement this, the principal must first invest to learn the type of the terror cell member in the first stage (set \( i = 1 \) and pay information cost \( \psi \)). With \textbf{Condition T} in place, the principal can condition her “breaking ties” decision on the realization of \( a \). The organizational contract defines that if the agents do not form a heterogeneous cell, then the principal will leave the group (\( b = r \)). While the mechanics behind how this controls subversion is somewhat complicated, the intuition is similar to that of a repeated prisoner’s dilemma or oligopoly game. To explain what occurs, the folk theorems provide a great deal of insight.

agreements for a single cell, these groups would damage their reputation which could lead to systemic repercussions throughout the organization. Second, in the case when the contract defines a transfer payment conditional on an action (as it is here), a high enough discount rate can make the principal’s contract self-enforcing. Therefore, assuming credible commitment is possible is a technical simplification.

If the \( \tfrac{\beta}{2}x_{m,t} \) term was not included in the transfer schedule, agents would be indifferent over their action profiles, but would have their utilities decreasing in the action profiles of their partner; without the \( \tfrac{\beta}{2}x_{m,t} \) term, the efficiency refinement would imply both agents setting \( x_{l,t} = x_{m,t} = 0 \) would be the equilibrium.

A different transfer contracting strategy exists where the agents form a heterogeneous terror cell and the principal offers contracts to make them indifferent. While this different outcome is technically very similar, it does highlight the fact that foreign fighters can be used in the transfer contracting setting.

Naturally an organizational contract can be used to define organizational features beyond team composition, including features like an agent’s role in an organization and the hierarchical structure of the group. Considering the organizational contract for these other settings remains an open research topic.

Consider the strategies if period \( t = 1 \) was a one-shot game, \( \rho_1 = \tfrac{1}{2} \), and a heterogeneous terror cell formed. In this game,
Introducing the folk theorem in use here requires some notation. Let $S^{NE}$ denotes the iterated stage game equilibrium for a heterogeneous cell. This is simply both agents selecting their most preferred action profile ($x_{l,t} = 0$ and $x_{m,t} = 1$ for all $t$). Let $EU_l[S^{NE}]$ and $EU_m[S^{NE}]$ denote the expected per-period payoffs for the terror cell leader and member when they implement the stage game equilibrium. The expected-payoff convex hull as: 

$$V = \text{convex hull}\{(v_l, v_m) \mid \exists (x_{l,t}, x_{m,t}) \text{ with } EU_l(x_{l,t}, x_{m,t}) = v_l \land EU_m(x_{l,t}, x_{m,t}) = v_m\}.$$ 

The $V$ term can be thought of as the set of feasible per-period payoffs, in expectation. Finally, $\delta$ denotes the discount rate for the principal and agents.

**Folk Theorem:** For any $(v_l, v_m) \in V$ with $v_l > EU_l[S^{NE}]$ and $v_m > EU_m[S^{NE}]$, there exists a $\bar{\delta}$ such that for all $\delta \in (\bar{\delta}, 1)$ there is a subgame-perfect equilibria with payoffs $(v_l, v_m)$.

Proof: See Mathematical Appendix.

When this is combined with the efficiency refinement, it implies that for a sufficiently high discount rate, agents will select from a set of efficient action profiles that exceeds each player’s stage-game Nash equilibrium payoff. It will be assumed that the discount rate is sufficiently high that agents will reach the feasible and efficient set. This can be beneficial for the principal; for a heterogeneous terror cell and under certain parameters, one of these efficient and feasible strategies has the agents always matching action to the state of the world. This can be depicted graphically in Figure 3.

the Nash equilibrium has both agents matching action to their type ($x_{l,t} = 0$ and $x_{m,t} = 1$). This is inefficient because if both players could commit to setting $x_{l,t} = x_{m,t} = 1/2$, then the cell would be committing the same violence profile without paying the inefficiencies of not matching the state of the world. In a repeated setting where $\rho_t$ always equals $\frac{1}{2}$, a repeated prisoner’s dilemma type game arises, and the Folk Theorems imply that for a certain strategy profile and sufficiently high discount rate, always setting $x_{l,t} = x_{m,t} = 1/2$ is a subgame perfect equilibrium. While $\rho_t$ does not always equal $\frac{1}{2}$ in the game here, through repeated interactions the same intuition can be applied.
Figure 3. The set of efficient and feasible strategies for parameter values $\beta = 0.8, \bar{\rho} = 0.4$ and a realization of $\rho_t = 0.4$.

The horizontal striped and gray areas show the convex hull of possible payoffs for the agents in a heterogeneous terror cell created through mixed strategies. The gray area represents the set of feasible action profiles which exceed each agent’s minmax payoff (the dotted line B designates each agents static equilibrium payoff). The heavy black line (denoted by C) is the set of efficient and feasible action profiles, with hollow dot D denoting the principal’s most preferred outcome.

Even when used with the efficiency refinement, the Folk Theorem ensures there will be a multitude of feasible equilibria. For the sake of comparing the principal’s expected payoffs from Organizational Contracting to her strategies of No Contracting and Transfer Contracting, this paper will adopt the following two-part approach. First, it will assume for tractability the entire feasible and efficient set is possible. This is equivalent to assuming a discount rate that approaches one. Second, it will only consider the setting where the agents select the principal’s least preferred action profile. With these two parts in place, the payoffs considered here represent the worst the principal can do when Organizational Contracting

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46 This paper will not consider state-contingent mixing, which is when agents put different probability weights on different action profiles for different realizations of $\rho_t$. While this could make the principal slightly worse, doing so makes the equilibrium strategies much less intuitive and does not offer further insight into the tradeoffs defined in Proposition 1.
Before discussing the strategy, a set of definitions and a proposition must be established.

**Definition:** This paper will refer to the three action profiles by their specified number:

- **Action Profile 1:** \( x_{l,t} = 1, x_{m,t} = \rho_t \) for all \( t \).
- **Action Profile 2:** \( x_{l,t} = \rho_t, x_{m,t} = \rho_t \) for all \( t \).
- **Action Profile 3:** \( x_{l,t} = \rho_t, x_{m,t} = 0 \) for all \( t \).

With this in place, the following Proposition 0 can be introduced.

**Proposition 0:** If \( \delta \to 1 \) and a heterogeneous terror cell is formed, the set of efficient SPNE strategies are constructed by mixing over Action Profiles 1 and 2, or over Action Profiles 2 and 3.

Proof: See Mathematical Appendix.

This proposition is depicted in Figure 4 below, demonstrating the feasible and efficient set is reached by mixing between Action Profiles 1, 2 and 3. As is shown in the Mathematical Appendix, for a sufficiently high \( \delta \), of the efficient and feasible set of strategies the agents can play, the principal will achieve her lowest payoffs when agents mix between Action Profile 1 and Action Profile 2 in such a manner that they approach the boundary of the feasible set. This is depicted by the hollow red dot. As a point of comparison between payoffs for the principal, this paper will calculate the principal’s utility when the bound is reached, and will designate this the payoff from the “Worst-Case Organizational Contracting.”
**Figure 4:** Parameter values $\beta = 0.8, \bar{\rho} = 0.4$ and $\rho_t = 0.4$. The dark, solid line depicts the feasible and efficient set, and the hollow dot depicts the principal’s worst case outcome on the feasible and efficient set.

**Definition:** When $\delta \to 1$, the **Worst-Case Organizational Contracting Strategy** has the principal learn the type of the terror cell member and require agent 1 to form a heterogeneous cell. The agents will play Action Profile 1 with probability $\alpha = \frac{-4\beta + \beta + 2\bar{\rho}}{(\beta - 2)(\bar{\rho} - 1)}$ and Action Profile 2 with probability $1 - \alpha$.

The justification for the value of $\alpha$ is in the Mathematical Appendix; $\alpha$ defines the upper bound on probability weight that the agents can place on Action Profile 1. There are two reasons for considering the worst-case. First, because the Folk Theorem offers no insight as to which equilibrium will be selected, the principal faces uncertainty in the sense that she has no priors on probabilities of equilibrium play. Therefore, considering the worst-case here is equivalent to the minmax heuristic. Second, because organizational contracting is a new contracting technology, it is useful to show that even in the worst possible case of its use, it can be optimal.

### 6.4.1 On Existence and Comparative Statics within Organizational Contracting

The Folk Theorem above with the proof of **Proposition 0** (demonstrating that the Nash stage game outcome is not Pareto efficient) implies that there exists a discount rate that has

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47 If the principal is expecting the worst-case scenario, she could use transfers to increase the probability that the agents match action to the state of the world. This paper will not consider these hybrid-contracts, as they do not provide insight over what is discussed below.

48 This notion of uncertainty and the minmax heuristic is discussed in [March and Simon](1958).
agents selecting strategies on the Pareto frontier. An example of this is included in the online appendix in the section proving the Folk Theorem. This section also contains a discussion on how varying $\beta$ and $\bar{\rho}$ affect the feasibility of organizational contracting.

6.5 Principal's Decision

The principal maximizes her expected utility by deciding to use transfer contracts, organizational contracts, or no contracts at all. Using the payoffs from the respective strategies gives Proposition 1 (which is also depicted graphically below):

**Proposition 1:** Suppose Condition 1 and Condition T hold, and $\delta \to 1$. If organizational contracts lead to the worst-case for the principal, then an equilibrium exists where the principal selects:

- Transfer Contracting Strategy if $\psi + \alpha(1 - \bar{\rho}) > \theta(4\beta - 2)\bar{\rho}$ and $2\bar{\rho} > \theta(4\beta - 2)\bar{\rho}$,
- Worst-Case Organizational Contracting Strategy if $\psi + \alpha(1 - \bar{\rho}) \leq \theta(4\beta - 2)\bar{\rho}$ and $2\bar{\rho} > \psi + \alpha(1 - \bar{\rho})$,
- No Contracting Strategy otherwise.

Proof: This follows from payoffs above.

6.6 Technical Considerations and Model Extension

6.6.1 Notes on the Feasibility of Transfer Contracts

For transfer contracts to be feasible, the following must be assumed:

1. The principal is able to provide transfers to both agents in the terror cell (despite not knowing the type of one agent).
2. The principal knows the exact utility function of both agents (in other words, the precise value of $\beta$ and $\bar{\rho}$).
3. The principal observes the actions of agents without bias.

If any of these three conditions fail, then transfer contracting will be strictly worse than the “No Contracting” outcome.\footnote{It will be strictly worse because the agents will either match action to 0 or 1, and the principal will be making a non-negative transfer to accomplish this.}

In contrast to transfer contracting, the organizational contracting strategy works in low-information environments. So long as the principal knows generally that agents have offsetting preferences and the principal is able ensure these agents work together in a terror cell,
organizational contracting will be successful in limiting subversion. Note that here, unlike settings where transfer contracts are being used, the principal does not need to be aware of the actions the agents are doing.

Despite concerns regarding the feasibility to transfer contracts, this paper will proceed under the assumption that transfer contracts remains possible.

6.6.2 Model Extension

The paragraph below describes an extension to the model that is included in the Mathematical appendix.

The model contains two features which may be seen as undesirable. First, the principal is able to costlessly observe her utility after each iteration of the stage game. Hypothetically, the principal then could determine if the agents subverted and may decide to implement some punishment. Second, in this game, once a terror cell is constructed, it remains a mixed or homogenous terror cell throughout the remainder of the game. It may be assumed that if the monitoring costs were to increase over time, the principal would stop overseeing the group and the composition would change. Both these issues are addressed in the Model Extension. The Model Extension has nearly identical results as the model above, only the Model Extension has the principal implementing an auditing scheme for reviewing cell type when her utility realization (which is now noisy) is low. Because the Model Extension is slightly more complicated and unsurprising if the reader has a familiarity with auditing models like those in Banks (1989), this extension is left in the Appendix.

7 Comparative Statics

7.1 Principal’s Decision

The principal will maximize her expected utility by using transfer contracts, organizational contracts, or by not using contracts. This tradeoff is expressed formally above in Proposition 1, and for fixed parameter values, graphically in Figure 5.
Figure 5: Parameter values $\beta = 0.8$ and $\tilde{\rho} = 0.4$.

When the costs of monitoring, denoted by $\psi$, and the costs of financial transfers, denoted by $\theta$, are both sufficiently high, the principal will select the “No Contracting” strategy. However, if costs of monitoring ($\psi$) decrease, the principal will change from the “No Contracting” strategy and begin using “Organizational Contracting”. Similarly, if financial constraints ($\theta$) decrease, the principal will change from the “No Contracting” strategy and begin using “Transfer Contracting.”

This tradeoff provides information on the use of foreign fighters, the extent of subversion, and the actions being conducted. These are summarized in Table 0.

Table 0.

<table>
<thead>
<tr>
<th></th>
<th>Use foreign fighters?</th>
<th>Extent of subversion</th>
<th>Action profile (attacking westerners versus locals)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transfer Contracting</strong></td>
<td>Sometimes$^{50}$</td>
<td>Non-existent</td>
<td>Mixed attacks</td>
</tr>
<tr>
<td><strong>Organizational Contracting (Worst-Case)</strong></td>
<td>Yes</td>
<td>Very low</td>
<td>Mixed attacks</td>
</tr>
<tr>
<td><strong>No Contracting</strong></td>
<td>No</td>
<td>High</td>
<td>Primarily locals attacked</td>
</tr>
</tbody>
</table>

Table 0: Principal’s strategies and observable implications.
7.2 Comparing AQI and the Haqqani Network

One feature that distinguished the Haqqani Network from AQI was that the Haqqani Network faced lower monitoring costs ($\psi$). After the US invasion of Afghanistan, the Haqqani Network possessed a relative safe haven in the North Waziristan region in Pakistan. This safe haven is commonly identified as one of the primary difficulties ISAF forces faced in handling the group, and for many years, the Haqqani Network was able to plan logistics, train, and monitor its organization with limited pressure from the outside world (Brown and Rassler, 2013; Dressler, 2010, 2012). In contrast, AQI had no such cross-border safe haven, and from 2004-2014 the leadership inhabited the front lines of the insurgency.

Given the difference in $\psi$, the model suggests that AQI may have been operating using the No Contracting strategy, while the Haqqani Network may have been operating using the Organizational Contracting strategy. The data seems to support this hypothesis. AQI began turning away foreign fighters in 2007 when subversion was reported as rampant throughout the group. Additionally, documentation on the group’s finances would suggest that it was not using transfer contracts.\footnote{This is discussed in Bahney et al. (2010).} In contrast, the Haqqani Network was documented as integrating foreign fighters into leadership roles and displayed few instances of subversion.

The rise of the Islamic State in Iraq and Syria provides suggestive evidence supporting the role of operational safe havens on the ability to effectively integrate foreign fighters. The newest manifestation of AQI, the Islamic State, became resurgent with the outbreak of civil war in Syria. During this resurgence and at this time, the group has begun soliciting foreign fighters to join and fight. Given the new operational safe haven in Syria, the theory would suggest that ISIS now is effectively bringing in and integrating foreign fighters, and there are fewer instances of subversion within the group.\footnote{Admittedly while these new foreign fighters were no longer traveling to Iraq to fight Americans, they could still be used to offset the subversive preferences of the local fighters with regional preferences.}

7.3 On Counterinsurgency Tactics

The model suggests that counterinsurgency tactics can affect subversion within terror groups. Two corollaries define this relationship.

\textbf{Corollary 1:} Consider a terror group that suffers from subversion. Decreasing monitoring costs ($\psi$) or financial constraints ($\theta$) individually are sufficient to reduce subversion within the group.
**Corollary 2:** Consider a terror group that suffers from minimal subversion. Increasing monitoring costs ($\psi$) or financial constraints ($\theta$) individually may (or may not) be sufficient to create subversion within the group; increasing both will result in subversion within the group.

**Corollary 1** considers a group occupying the “No Contracting” strategy space (for example, in Figure 5, let $\theta = 4, \psi = 0.7$). Here subversion would be prevalent. By decreasing monitoring costs $\psi$ (to $\theta = 4, \psi = 0.2$), the principal would switch to adopt organizational contracting, which would eliminate the subversion problem. Similarly, by decreasing financial constraints $\theta$ (to $\theta = 0.5, \psi = 0.7$), the principal would switch to adopt transfer contracting, which would eliminate the subversion problem.

**Corollary 2** is more nuanced. If a group is observed to be using organizational contracting, increasing monitoring costs $\psi$ would not necessarily lead to subversion. For example, moving from the point where $\theta = 1$ and $\psi = 0.1$ to the point where $\theta = 1$ and $\psi = 0.7$ would result in the principal switching to transfer contracting, which still controls subversion. Therefore, increasing both monitoring costs and financial constraints would be necessary to create subversion within a terror group.

The ability of counterinsurgency tactics to vary the ability to monitor $\psi$ presents a different perspective to a “hearts and minds” approach to counterinsurgency. Because activities like drone strikes, targeting operations against leaders, or disrupting rebel bases increase the costs of monitoring, these tactics can prevent insurgent groups from organizing effectively and handling subversion. In the case of AQI, the pressure applied by Coalition forces prevented AQI from handling subversion within its ranks, and these acts of local violence and thuggery accelerated AQI’s disconnect from the local population. In interviews with Sunni Iraqis who participated in the Anbar Awakening, excessive violence and crime were cited as reasons for why individuals broke ties with AQI and instead forged an alliance with Coalition forces and the new Iraqi government (Montgomery and McWilliams, 2009). The theory above would suggest that military action directed against the leadership of an insurgent group can make the alienation between insurgent groups and the local population more salient; in other words, military operations that foster disconnect between leadership and lower-level members can indirectly contribute to winning hearts and minds.

The most recent events involving the Haqqani Network support this hypothesis. The full details are still coming to light, but analysts claim that Pakistan’s operations in North
Waziristan and the recent killing or capture of much of the Haqqanis’ top commanders have pushed the group to the verge of collapse. Notably, one article cites the Haqqanis’ recent targeting of civilians as contributed to its decline. While more information on this is needed, this is suggestive evidence that without the operational safe haven, the Haqqanis, like AQI, may not be able to organize effectively and control subversion.

This idea is explored in depth for AQI in the empirical section.

8 Empirical Evidence: Counterinsurgency and Subversion

The theory above maps a connection between counterinsurgent activity and subversion within terror groups. This has implications for AQI. AQI was composed of many quasi-autonomous operational units scattered throughout the country. While subversion was described as prevalent throughout the organization, it is reasonable to assume the group was heterogeneous with respect to monitoring its cells—i.e. some cells were monitored while others had the freedom to subvert. For the monitored cells, if Corollary 2 is correct and transfer contracts are not being considered, then counterinsurgency activity that makes organizational oversight more difficult (raising $\psi$) would result in a more decentralized organization; this in turn would lead to more instances of subversion.

In an ideal setting, this paper would test the impact of exogenous counterinsurgency activity on AQI’s level of internal monitoring; it would then determine if the changes in the degree of internal monitoring generated by the counterinsurgency activity led to increases in subversion by AQI’s lower level members.

This ideal estimation is not possible because there is no direct measure of the level of AQI’s organizational oversight. This presents a challenge to inference. If the number or rate of incidents of subversion increases after an exogenously-timed counterinsurgency strike, then this could have arisen due to the decentralization mechanism defined in the model; however, there would be no direct way to show that the increase was not due to some other mechanism or a random walk. To speak to (but admittedly not resolve) this identification issue, the following section demonstrates that the counterinsurgency activity being analyzed is statistically atypical, and precipitated within governorate effects consistent with AQI’s decentralization. Additionally, the following section addresses potential alternative explana-

---

53 For example, see: http://centralasiaonline.com/en_GB/articles/caii/features/2015/03/09/feature-03
54 The challenges of implementing transfer contracts is included in the Appendix. Also, evidence would suggest AQI was not using transfer contracting (Bahney et al., 2010).
55 The issues arising from estimating subversion are described in detail later and are resolved through the structural estimation.
tions that would support the same empirical finding.

The counterinsurgency activity that will be analyzed is the killing of AQI’s leader, Abu Zarqawi. The strike that ended Zarqawi’s life was a significant success of the US military’s targeting program against the leadership of AQI. Since 2004, Zarqawi was a top-priority in the Coalition targeting operation designed to identify the leaders of AQI and to undertake missions to capture or kill these leaders. The circumstances leading to the airstrike that took Zarqawi’s life is detailed in retired General Stanley McChrystal’s memoirs, but the complicated sequence of events beginning with the April 9, 2006 capture of twelve AQI operatives in Yusufiyah, Iraq and ending with the death of Zarqawi June 7, 2006 would suggest that the timing of this event is plausibly random.

Both experts and insiders identify the killing of Zarqawi and the post-Zarqawi takeover of AQI by Abu Ayyub al-Masri as accelerating the group’s decentralization (Fishman, 2009a; Kirdar, 2011; Al-Mukhtar, 2008). The shift from Zarqawi’s heavy-handed management style to al-Masri’s more conservative style is described as breaking down central oversight, decreasing intra-group communications, and increasing the autonomy of mid-level leadership. This push to decentralization follows logically from the targeting of Zarqawi. The death of Zarqawi would bring to the forefront concerns regarding the resilience of AQI to leadership targeting; the decision to decentralize and empower mid-level leaders would make the organization more robust to future instances of targeting. Additionally, personal concerns for survival may have driven the organization to decentralize, as the killing of Zarqawi would make the future risk of leadership targeting more salient. Finally, by being AQI’s leader for several years, it may have been that Zarqawi possessed a lower $\psi$ than Abu Ayyub al-Masri (Zarqawi’s successor), who may not have been as effective at overseeing the organization.

There is an ongoing and pervasive debate over the usefulness of targeting operations (Jordan, 2014; Price, 2012; Abrahms and Potter, 2015; Calderón et al., 2015). This paper finds evidence suggesting that AQI decentralized after Zarqawi’s death. Additionally, if the assumptions of the estimation procedure are valid, this paper finds the killing of Zarqawi caused an increased AQI’s ratio of subversive acts by at least 0.06 over a three month period. While data limitations imply that this paper cannot claim to have identified the true effect, the result and techniques discussed below can still inform future research on this important topic.

8.1 Data

This paper utilizes declassified data, drawn from the MNF-I SIGACTS III Database and
provided to the Empirical Studies of Conflict (ESOC) project. The total dataset details 193,264 “significant activity” (SIGACT) reports by Coalition forces in Iraq occurring between 4 February 2004 and 5 July 2008, and includes the location (longitude-latitude), date, and type of attack for a wide range of incidents. A heat-map of all SIGACTs in Iraq is included below as Figure 6.

![Heat map of Significant Activities in Iraq, 2004-2008. This map was constructed using the MNF-I SIGACTS III Database and a National Geographic basemap.](image)

The paper also utilizes data from the Iraq Body Count (IBC) dataset, which was created as part of a multi-year collaboration between the Iraq Body Count Foundation, a non-profit organization that collects and publishes data on civilian casualties suffered in the Iraq War, and ESOC. The data were first used in Condra and Shapiro (2012), and identify, for incidents geocoded at the governorate level, details regarding civilian casualties.

Classified elements of the MNF-I data were also used to construct a declassified map which identifies regions where AQI operated. This map is included in the Appendix as Figure A1.

The primary dependent variable is constructed using two types of records. The first are events when coalition forces were “fired upon.” The record of “fired upon” events are constructed using the SIGACTs dataset and are classified as direct fire, indirect fire, suicide
attacks, or IED attacks against coalition forces. The second are “local killings.” These are the number of casualties recorded in the IBC dataset that were committed by Iraqis that were not collateral damage from insurgent-Coalition force clashes. Summary statistics for governorate-month measures are included in Table 1 below. Additionally, these measures are summed across governorates where AQI operated and plotted monthly in the top two trends of Figure A2 located in the Appendix. The third trend line is the ratio of local killings over the sum of fired upon and local killing counts (this measure will be discussed in the Econometric Strategy section).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Killings</td>
<td>143.821</td>
<td>292.406</td>
</tr>
<tr>
<td>IEDs, DF, &amp; IDF</td>
<td>367.63</td>
<td>467.534</td>
</tr>
<tr>
<td>IDF-SIG</td>
<td>9.651</td>
<td>29.806</td>
</tr>
<tr>
<td>IDF-IBC</td>
<td>1.679</td>
<td>3.897</td>
</tr>
<tr>
<td>Coalition Caused CivCas</td>
<td>5.235</td>
<td>9.090</td>
</tr>
<tr>
<td>Insurgent Caused CivCas</td>
<td>19.015</td>
<td>23.283</td>
</tr>
<tr>
<td>N</td>
<td>324</td>
<td></td>
</tr>
</tbody>
</table>


8.2 Reduced Form Evidence of Subversion Post-Zarqawi

One technique for estimating the level of subversion within AQI is to treat violence against civilians as a proxy for subversion. Using this technique, it is possible to estimate if the killing of Zarqawi led to more subversion by: (1) constructing sampling frames of levels of local violence per governorate before and after the death of Zarqawi, and (2) testing for a mean shift in violence across these sampling frames. The first row of Table 3 in the Appendix utilizes this method.

The first row of Table 5 (Local Killings) reports the difference in means for local casualties as reported in the IBC dataset. The first column uses governorate-month records of violence for three months before and three months after and including the killing of Zarqawi (thus creating two samples of governorate-month measures). The first row and first column entry reveal the killing of Zarqawi precipitated an average increase in 85.15 local killings per governorate-month when the three-month window is used. These numbers grow to 99.61 local killings per governorate-month using the six month windows, and 103.7 using the nine month window. While the result is only reported as statistically significant at the 10% level in the full sample for a nine-month treatment window, re-testing the difference of means for Baghdad and non-Baghdad governorate samples yield, for all treatment windows, increases
that are statistically significant at the 1% level (shown in columns 4-9). Because subversion conducted by AQI would take the form of local killings, this increase is suggestive of an increase in instances of subversion conducted by AQI.

8.3 Estimation Model Structure

While the reduced form evidence is suggestive that the death of Zarqawi led to an increase in subversion, this claim should be taken with caution. Only accounting for a mean shift in local killings does not consider the general increase in all types of violence levels in Iraq around the time of Zarqawi’s death. Additionally, the means above are reported for all violent actors in Iraq, not just AQI; ideally, an estimation would determine how many instances of subversion the killing of Zarqawi caused. For these reasons, this paper adopts a structural approach.

For ease, a summary of notation is introduced here:

<table>
<thead>
<tr>
<th>Econometric Estimation Notation Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>(Fired upon)<em>{i,t}, (Local Kill)</em>{i,t}</td>
</tr>
<tr>
<td>(Fired upon)<em>{i,t}, (Local Kill)</em>{i,t}</td>
</tr>
<tr>
<td>(Fired upon)<em>{i,t}, (Local Kill)</em>{i,t}</td>
</tr>
</tbody>
</table>

8.3.1 Primitives and Assumptions

One observed variable is (Fired upon)_{i,t}, which denotes the number of significant activities committed against coalition forces in a given governorate-month (denoted by i and t, respectively). The other observed variable is (Local Kill)_{i,t}, which denotes the number of local killings. It should be noted that these observed variables include attacks that are not committed by AQI, and the (Local Kill)_{i,t} variable includes killings that may not qualify as subversion.

The variable (Fired upon)_{i,t} denotes the number of attacks against coalition forces committed by AQI. The variable (Local Kill)_{i,t} denotes the number of local killings committed by AQI. The (Local Kill)_{i,t} variable can be decomposed into attacks against local Iraqis by AQI that would qualify as subversion, and attacks against local Iraqis by AQI that would not qualify as subversion, or:

\[
(Local \text{ Kill})_{i,t} = (Not \text{ subversion})_{i,t} + (Subversion)_{i,t}
\]

For the purposes of estimation, the model assumes a separable error structure. This is de-
fined in **Assumption 1**: 

**Assumption 1:** The observed violence relates to the level of violence conducted by AQI by the following equation:

\[
\frac{\hat{\text{Local Kill}}_{i,t}}{\hat{\text{Fired upon}}_{i,t} + \hat{\text{Local Kill}}_{i,t}} = \frac{\text{Local Kill}_{i,t}}{\text{Fired upon}_{i,t} + \text{Local Kill}_{i,t}} + \psi_{i,t} \tag{6}
\]

With \(\psi_{i,t} = \bar{\psi}_i + \mu_{i,t}\), \(\mathbb{E}[\mu_{i,t}] = 0\), \(\text{Var}[\mu_{i,t}] < \infty\), and \(\text{Cov}[\mu_{i,v}, \mu_{i,s}] = 0\) for months \(v \neq s\).

The \(\psi_{i,t}\) variable is an error relating the observed ratio of local killings to AQI’s ratio of local killing. The expected value of this error is allowed to vary across governorates and there is no correlation between error terms across time. The governorate-fixed constant in this term (\(\bar{\psi}_i\)) refers to a bias in the relationship between the observed local killing ratio and the local killing ratio conducted by AQI. For example, due to circumstances in a given governorate, AQI may be conducting more local violence than the aggregated, observed local violence ratio; in this case, the \(\bar{\psi}_i\) term would be negative.

Referencing the model, \(\rho_{i,t}\) denotes the principal’s preferred profile of violence in a given governorate-month. In the setting without subversion, the preferred number of attacks against local Iraqis is denoted \((\text{Not subversion})^\ast_{i,t}\), and the preferred number of attacks against Coalition forces is denoted \((\text{Fired upon})^\ast_{i,t}\). Therefore, \(\rho_{i,t}\) can be expressed as:

\[
1 - \rho_{i,t} = \frac{(\text{Not subversion})^\ast_{i,t}}{(\text{Fired upon})^\ast_{i,t} + (\text{Not subversion})^\ast_{i,t}} \tag{7}
\]

For estimation, two other assumptions are necessary. First, an assumption is made on subversion. It is assumed that when members of AQI decide to subvert, they do so at the expense of attacking Coalition forces, and that there is a one-to-one tradeoff between subversion and attacking coalition forces. It is simplest to express this in relation to the principal’s preferred number of attacks:

**Assumption 2:** It is assumed:

\[
(\text{Not subversion})_{i,t} = (\text{Not subversion})^\ast_{i,t} \tag{8}
\]

\[
(\text{Fired upon})_{i,t} = (\text{Fired upon})^\ast_{i,t} - \chi(\text{Subversion})_{i,t} \tag{9}
\]

With \(\chi = 1\).

\(^{57}\text{This symbol takes a different meaning here than in the model.}\)
The assumption that members of AQI subvert at the expense of attacking Coalition forces follows from the observation that agents instigating the attacks prefer attacking locals to attacking Coalition forces; because the variable \((Not_{\text{subversion}})_{i,t}\) denotes attacks against locals, it is unlikely agents would not also partake in these activities.\(^{58}\)

Using the one-to-one tradeoff, it is useful here to define the “operational constraint.”

**Definition:** \(K_{i,t} \in \{0, 1, 2, ..., \bar{K}\}\) defines an operational constraint. In month \(t\) and governorate \(i\), AQI is only able to conduct a finite number of attacks, or:

\[
K_{i,t} = (Not_{\text{subversion}})_{i,t} + (Subversion)_{i,t} + (Fired\text{up}on)_{i,t}
\]

This one-to-one tradeoff implies perfect sustainability between attacking coalition forces and killing locals. Note that the one-to-one tradeoff also implies that \(K_{i,t} = (Fired\text{upon})_{i,t} + (Not_{\text{subversion}})_{i,t}\).

Finally, **Assumption 3** is made regarding the realizations of \(\rho_{i,t}\).

**Assumption 3:** \(\rho_{i,t} = \bar{\rho}_{i} + \epsilon_{i,t}, \mathbb{E}[\epsilon_{i,t}] = 0, \text{Var}[\epsilon_{i,t}] < \infty \text{ and } \text{Cov}[\epsilon_{i,v}, \epsilon_{i,s}] = 0 \text{ for } v \neq s\)

This assumption implies that the realizations of \(\rho_{i,t}\) are centered around mean \(\bar{\rho}_{i}\) for each governorate. More crucially, it also assumes for the defined panel, realizations of \(\epsilon_{i,t}\) are uncorrelated across time. A natural concern is that events occurring in Iraq might produce correlated realizations of \(\rho_{i,t}\). For example, comparing governorate-months before and after the February 22, 2006 bombing of the al-Askari Mosque in Samarra would not satisfy this condition, as after the bombing AQI leadership would expect its members to engage in more local violence if only to protect themselves from Shia retribution. Because the treatment variable of interest is a dummy variable denoting months including and after Zarqawi’s death, the uncorrelated error assumption is necessary for the treatment to be exogenous. To accommodate this assumption, the window of analysis around the death of Zarqawi is limited. This paper limits itself to the month including the bombing of the Great Mosque of Samarra (February 2006) and up to the outbreak of the Awakening (August 31, 2006).\(^{59}\)

\(^{58}\) The one-to-one tradeoff assumption is relaxed in a discussion on robustness below.

\(^{59}\)There is some debate as to when the Anbar Awakening began: this paper follows Biddle et al. (2012) and identifies it as being underway September 2006.
Implicit in this assumption is that the killing of Zarqawi did not produce a shift in the principal’s preferred level of violence.  

Additionally, the paper only considers governorates where AQI operated (9 governorates total).

### 8.3.2 Estimation Model

The estimation model is:

$$
\frac{(Local\ Kill)_{i,t}}{(Fired\ upon)_{i,t} + (Local\ Kill)_{i,t}} = (Zarqawi)_{t}\beta_1 + X_{i,t}\beta_2 + FE_i + \omega_{i,t} 
$$

(11)

Where $(Zarqawi)_t$ is an indicator variable the months including and following the killing of Zarqawi. The variable $X_{i,t}$ denotes control variables, and will be discussed later. $FE_i$ denotes district fixed-effects (which captures $\bar{\rho}_i + \bar{\psi}_i$), and $\omega_{i,t} = \mu_{i,t} + \epsilon_{i,t}$.

Due to Assumptions 1, 2, and 3, $\beta_1$ captures the effect Zarqawi’s death had on the share of instances of subversion. Here the expectation of $\beta_1$ is equivalent to:

$$
E[\beta_1] = E\left[\frac{(Subversion)_{i,post-Zarqawi}}{K_{i,post-Zarqawi}}\right] - E\left[\frac{(Subversion)_{i,pre-Zarqawi}}{K_{i,pre-Zarqawi}}\right]
$$

(12)

The Mathematical and Estimation Appendix derives this using a single governorate, two-period example.

### 8.4 Estimation Results

Table 2 contains the estimation results of the model presented in (11) run on governorates where AQI operated. The first column presents the basic OLS results with standard errors clustered at the governorate level. The second column introduces governorate fixed effects. The third column builds on column two and introduces first-differenced insurgent and coalition casualty levels. These variables capture the difference in coalition or insurgent collateral damage in month $t$ and month $t-1$. Following Condra et al. (2010) and Condra and Shapiro (2012), differences in per-period insurgent and coalition civilian casualties capture shocks to the level of civilian support which could be expected to influence realizations of $\rho_{i,t}$. The forth column includes the differenced civilian casualties, but for periods $t-1$ and period $t-2$. The fifth column includes the controls from columns three and four.

---

The map in the Appendix includes Sulaymaniyah as a governorate where AQI operated. This paper will not include this governorate in the analysis because there were no recorded sectarian violence incidents that occurred in this district over the window of analysis; while including this measure would reduce the estimators’ standard errors and leaves the coefficients unaltered, this reduction in standard errors is highly artificial.

---

60 This is a stronger assumption than necessary. So long as the killing of Zarqawi did not make the realized state more likely to favor attacks against Iraqis (lowering $\rho_{i,t}$ through a mean shift or autocorrelation), then the estimation procedure will not overestimate results. In fact, it would probably be assumed that the killing of Zarqawi produced a positive change in $\rho_{i,t}$ in favor of attacking Coalition forces, as these were the forces that inflicted significant harm on AQI; if this was the case, this would imply that the estimates below would be a lower bound on effect.

61 It should be mentioned that this model does not utilize a difference-in-differences design comparing governorates where AQI operated to governorates where AQI did not operate. This will be discussed in Section 9.

62 The map in the Appendix includes Sulaymaniyah as a governorate where AQI operated. This paper will not include this governorate in the analysis because there were no recorded sectarian violence incidents that occurred in this district over the window of analysis; while including this measure would reduce the estimators’ standard errors and leaves the coefficients unaltered, this reduction in standard errors is highly artificial.
Under all specifications, the killing of Zarqawi created a statistically significant increase (at the 10% level) in the local violence ratio. These results are consistent with claims above that eliminating Zarqawi led to decentralization and an increase in subversive acts by members of AQI. Furthermore, this result has an intuitive interpretation: in expectation, AQI experienced a 0.06 increase in the ratio of subversive behavior by the members of its organization per governorate.\footnote{All estimates assume that the killing of Zarqawi did not shift the underlying distribution of $\rho_{i,t}$. In practice, this may be unrealistic: in killing Zarqawi and continuing operations against AQI, Coalition forces demonstrated themselves as committed to routing AQI. If the targeting of Zarqawi did produce a mean-shift in $\rho_{i,t}$ in the months after his death, then the estimates presented in this paper are a lower-bound on the treatment effect, implying that the magnitudes of the effect would be under-reported.}

<table>
<thead>
<tr>
<th>Table 2: Estimation Model Results: Change in Subversion Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>Zarqawi Targeting</strong></td>
</tr>
<tr>
<td>(0.0267)</td>
</tr>
<tr>
<td><strong>First Dif Insurgent Civcas</strong></td>
</tr>
<tr>
<td>(0.000359)</td>
</tr>
<tr>
<td><strong>First Dif Coalition Civcas</strong></td>
</tr>
<tr>
<td>(0.000651)</td>
</tr>
<tr>
<td><strong>Lag F.D. Insurgent Civcas</strong></td>
</tr>
<tr>
<td>(0.000323)</td>
</tr>
<tr>
<td><strong>Lag F.D. Coalition Civcas</strong></td>
</tr>
<tr>
<td>(0.000425)</td>
</tr>
<tr>
<td><strong>Year FE</strong></td>
</tr>
<tr>
<td><strong>R-Squared</strong></td>
</tr>
<tr>
<td><strong>N</strong></td>
</tr>
</tbody>
</table>

Standard errors in parentheses
Note- P-values calculated using robust standard errors, clustered by governorate. Units are aggregated to the governorate-month level. Sample is limited to months February-August 2006 and governorates where AQI operated.

\[ p < .15, \ast p < .1, \ast\ast p < .05, \ast\ast\ast p < .01 \]

8.5 Incidents of Subversion

Using the results in Table 2, Equation (12), and a procedure described in the Estimation Appendix, it is possible to estimate a lower bound on the causal effect of Zarqawi’s death on the number of subversive incidents committed by AQI. While this should be viewed as a
back-of-the-envelope estimation, it can still be informative.

In order to estimate this number, assumptions must be made on the share of violence committed by AQI relative to the other insurgent groups. Based on details given in Pincus (2006), AQI accounted for roughly 5% of the insurgent population in Iraq. Assuming members of AQI were no more productive in committing violence than other insurgent groups, this would imply that AQI accounted for 5% of the violence committed in governorates where it operated. If AQI was responsible for 5% of violence in AQI governorates, the results from Table 2 imply that killing Abu Zarqawi resulted in at least 57 incidents of local killings that would qualify as subversion.

Two comments should be made on this figure. First, assumptions on ρ_{i,t}, χ (discussed below), and the procedure used to generate this figure imply this number is a lower bound. Additionally, the assumption that members of AQI and non-insurgent members of AQI generated violence at similar rates likely also diminishes the value of the estimates. Because AQI was known to be one of the most violent of the insurgent groups operating in Iraq at the time, it may be more appropriate to assume that AQI members were two or three times more productive in producing violence as non-AQI members, which would in turn imply 108 or 148 subversive killings (respectively). While this would still be a small share of the local killings that did occur over the three months following the death of Abu Zarqawi, the estimate arising from the 3:1 ratio would exceed the number of coalition caused civilian casualties over this same period (115 civilian casualties). Second, the impact of this type of unwarranted or unnecessary violence should not be discounted; though the August 15, 2006 killing and disposal of Sheikh Abu Ali Jassim is attributed to sparking the Awakening, interviews with Anbaris also highlight the impact of the perpetual insecurity and violence AQI created for the local population (Montgomery and McWilliams, 2009).

9 Robustness Checks

9.1 Alternative Explanations

Below is a list of alternative explanations that would generate the same empirical results as above.

1. After the killing of Abu Zarqawi, AQI’s new leadership preferred shifting the profile of violence away from attacking Coalition forces and towards attacking local Iraqis (implying \( \bar{\rho} \) decreased after Zarqawi’s death).
2. The death of Abu Zarqawi led to infighting within AQI, and the sectarian casualties recorded are members of AQI.

3. The death of Abu Zarqawi led other insurgent groups to challenge AQI and attack the group.

4. Zarqawi was a charismatic leader; after his death, lower level members simply began attacking more Iraqis because they felt less committed to the organization and less concerned about the long-run success of the group.

5. Instead of an organizational solution to handling subversion, some other form of contracting was used that would become more efficient with improved access to information on the ground (i.e. auditing or transfer contracts in a hidden action setting).

6. The results above are the result of a random walk.

Any of these alternate explanations could be consistent with the empirical results above. However, some explanations are less plausible than others. On the first point, while it is impossible to know the preferences of leadership, it seems unlikely that after Coalition forces killed the leadership of AQI, the new leadership would view Coalition forces as a reduced threat. On the second and third points, there is no evidence that either of these occurred.

This section addresses the forth point by analyzing data on leadership targeting May 2007-April 2008. During this time, MNF-I press reports documented the successes of the Coalition force targeting program designed to capture or kill key leaders in AQI. This is described below, but this data reveals that after Zarqawi cell-level leadership seemed to play a key role in constraining lower level operatives and preventing violence against civilians.

To the best of the author’s knowledge, there is no evidence available that would disprove the fifth point. Essentially this assume that agency problems within AQI took the form of local violence, and that Zarqawi was able to do a better job monitoring the group than the incoming leadership. Two comments should be made on this. First, while this theory is consistent with the empirical section, it is inconsistent with the discussion earlier on the preferences of foreign fighters who were less interested in pursuing local power and violence. While it is difficult to reconcile the role of foreign fighters in five (and in explanation four), if foreign fighters were also present in the group and also subverting (but doing so by attacking Americans), it would imply that there would be an even larger increase in instances of subversion after Zarqawi’s death. Second, if the fifth point is correct, then the empirical section is still advancing the notion that leadership targeting can create dysfunction within
insurgent groups.

On the sixth point, the remainder of this section is dedicated to showing the empirical result does not seem to be a random walk.

### 9.2 Uniqueness of Zarqawi Treatment

The first check will demonstrate that the killing of Zarqawi produced a mean shift in the governorate-month local killing ratio that was atypical, and therefore less likely to have arisen as part of a random walk. For the Zarqawi treatment to stand out as an important event for AQI and violence in Iraq, it should be that the effect of treatment is statistically atypical. Figure 6 shows this to be true.

![Hypothetical Treatment Statistics](image)

**Figure 7.** This figure re-estimates the full estimation model reported in Table 2, as well as estimating a series of counterfactual treatments. The model in Table 2 utilizes a seven month treatment window (February-August 2006) with treatment (Zarqawi’s death) occurring in the fifth month. The figure reports the coefficient magnitude, 95% confidence interval (both in the top graph), and t-statistic (in the bottom graph) for this treatment, and highlights it in blue. The model is then re-estimated by utilizing a seven month treatment window with treatment occurring in the fifth month, but shifts the beginning of the treatment window forward (or back) between one and ten months. These graphs show that the effect of the Zarqawi treatment appears atypical against these other hypothetical treatments.
The estimation in Table 2 utilizes a seven-month treatment window, comparing the local killing ratios for the four months before the killing of Abu Zarqawi to the three months including and after. In Table 2, treatment begins June 2006. Figure 7 utilizes this seven-month testing window with treatment occurring in the fifth month, but creates counterfactuals by shifting the month of treatment. Each x-value within Figure 9 denotes a counterfactual treatment occurring on the designated month. For example, when the x-value is “2006 m10,” the model is re-run estimating the difference in ratios between samples June, July, August and September 2006 (pre), and October, November, and December 2006 (post). Figure 7 displays the treatment effect magnitudes with confidence intervals and t-statistics for each month, for twenty counterfactual months centered around the actual treatment.

These results show that the killing of Abu Zarqawi was, in fact, unique. Comparing the magnitudes of the treatment effects, only two hypothetical treatments (out of 21) exceed the Zarqawi magnitude; comparing t-statistics against the hypothesis that the treatment effect is zero, only a single hypothetical treatment (out of 21) exceeds the Zarqawi treatment. Given the distribution of sample counterfactual magnitudes and and t-statistics, the Zarqawi treatment stands out as a tail-event.

9.3 Outliers and Possible Misspecifications

Tables 6 and 7 in the Appendix below address the possibility of outliers by seeing if any one governorate is driving the results in Table 2. Table 6 re-estimate the baseline model with fixed effects (comparable to Table 3, column 2) and Table 7 estimates the full model with violence controls (comparable to Table 2, column 5). Each column in Tables 6 and 7 identifies a governorate that is excluded from the sample (first column Anbar, second Babylon, etc.). In both tables, all estimated effects remain positive, though some results are only statistically significant at the 15% level. Additionally, Figure A3 reports the local violence ratio per governorate (and is included in the Appendix).

There also may be concerns over the assigned testing window. Regarding the 1 September 2006 cutoff, there may be concerns that the Awakening had already begun in August, and this month should be excluded. Alternatively, there may also be concerns that the September cutoff is too conservative and $\hat{\rho}_i$ would not be expected to have a mean shift until October. Similar concerns may arise for the outbreak of sectarian violence around the February. Table 10 in the Appendix is in place to address these concerns.

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64 Similar (though less robust) results arise in the full 2004-2008 sample as well. The Zarqawi treatment coefficient is greater than 39/48 counterfactual treatment coefficients, and the t-statistic is greater than 47/48 counterfactual treatment t-statistics.
Table 10 reports the magnitudes and p-values for each possible combination of a January, February, or March start date with a July, August, or September termination date. All coefficients are positive, and, excluding the (March, July) pairing, all coefficients are statistically significant at the 15% level. Notably, the (March, July) pairing has the smallest number of governorate-months, which may contribute to the large standard errors.

Finally, there may be a concern regarding the use of governorate-months as the unit of analysis. Because the level of violence between governorates varied significantly, a natural concern would be that smaller governorates may be driving the results. These issues are unwarranted for two reasons. First, similar results hold when comparing monthly violence levels for AQI governorates pre- and post-Zarqawi. Aggregated across governorates, for the four months before the death of Zarqawi the average local killing ratio is 0.304, and for the three months including and after the death of Zarqawi the average local killing ratio is 0.353. Second, Table 11, which is included in the Appendix, reports the local killing ratio differences pre- and post- Zarqawi by governorate. Excluding Wassit, all governorates experienced an increase in local killing ratio (though by varying degrees).

9.4 Evidence of Subversion Following Cell Leader Targeting

9.4.1 Data Description

This section analyzes the impact of leadership decapitation within AQI May 2007 to April 2008, using a new dataset on 396 successful leadership targeting events in Iraq. The leadership targeting data was constructed using approximately one year of MNF-I press briefings, and, to the best of the author’s knowledge, is the most detailed dataset documenting leadership strikes to emerge from Iraq. The dataset details, for most entries, the governorate where the targeting events occur, the leader’s hierarchical level within the organization (cell level, city level, regional level, or senior), and the leader’s functional role in the organization. The cross-tabulation of location, role, and hierarchy are in the Mathematical/Historical/Estimation Appendix. The average governorate-month levels of leadership targeting in Anbar, Baghdad, Diyala, Ninewa, Salah al-Din, Sulaymaniyah and Tameem are included in the summary statistics below. The variables in Table 3 are defined as as:

“Military, Cell” refers to the average number targeting events taken against military, security, or VBIED cell leaders in AQI. These individuals are responsible for leading actual operations.

“Military, Upper” refers to the average number targeting events taken against military, security, or VBIED leaders in AQI at the city, regional, or senior level. These individuals would

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65 This data was compiled and graciously provided by Patrick Ryan of Second Front Systems.
tend to oversee the cell leaders.

“Emir” refers to the average number of targeting events taken against AQI’s central leadership.

“Facilitator/Finance” refers to the average number of targeting events taken against AQI’s members responsible administration, recruiting, administration, logistical support, and other support structure.

“Media” refers to the average number of targeting events taken against AQI’s members responsible tracking and recording attacks and producing elements for production.

“Sharia” refers to the average number of targeting events taken against AQI’s members responsible for building relationships with local religious leaders, starting recruiting efforts, and blessing off on targets.

Table 3: Summary Statistics of Leadership Targeting Events in Iraq per Governorate-Month, Select Governorates, May 2007-April 2008

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
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<tr>
<td>Military, Cell</td>
<td>0.221</td>
<td>0.641</td>
</tr>
<tr>
<td>Military, Upper</td>
<td>0.558</td>
<td>0.98</td>
</tr>
<tr>
<td>Emir</td>
<td>0.416</td>
<td>0.656</td>
</tr>
<tr>
<td>Facilitator/Finance</td>
<td>0.792</td>
<td>1.49</td>
</tr>
<tr>
<td>Media</td>
<td>0.13</td>
<td>0.522</td>
</tr>
<tr>
<td>Sharia</td>
<td>0.052</td>
<td>0.223</td>
</tr>
<tr>
<td>N</td>
<td>77</td>
<td></td>
</tr>
</tbody>
</table>

The most relevant leadership targeting events are the targeting of cell leadership. Both experts and insiders claim the killing of Zarqawi and the post-Zarqawi takeover by Abu Ayyub al-Masri accelerated the group’s decentralization (Fishman 2009a; Kirdar 2011; Al-Mukhtar 2008); the multi-divisional form hierarchy that AQI adopted post-Zarqawi meant that cell leaders would be determining what sorts of activities cells would be undertaking. Thus, in AQI post-Zarqawi, where local lower-level agents possessed a preference for local violence, organizational contracting would require cell leadership to have the preferences that would constrain these members. Therefore, if these leaders are removed, organizational contracting breaks down, lower-level agents may act out, and the local killing ratio would increase.
9.4.2 Empirical Strategy

This paper follows (Condra and Shapiro, 2012) and utilizes a first-difference estimation procedure. A full description of this estimation and its benefits can be found in textbooks describing econometric techniques for panel data, but in short, this estimation procedure produces results that are unbiased by unobserved time-invariant omitted variables. Using notation $\Delta z_{i,t}$ to denote the change in variable $z$ for governorate $i$ between month $t$ and month $t - 1$ (formally $\Delta z_{i,t} = z_{i,t} - z_{i,t-1}$), this paper will estimate the model:

$$\Delta y_{i,t} = \Delta x_{i,t} \beta_1 + \Delta controls_{i,t} \beta_2 + \Delta \epsilon_{i,t}$$

The dependent variables in use are the first-differences in attacks against coalition forces, attacks against the local population, and the ratio of local violence to total violence (abbreviated as Fired Upon, Sect, and Sect Ratio, respectively). The most relevant dependent variable is the Sect Ratio, as it captures the tradeoff members of AQI face (conduct operations against coalition forces or conduct operations against local Iraqis).

The primary independent variables are the first-differences in number of leadership targeting events, separated by role. These include Sharia coordinator (Sharia), media coordinator (Media), individuals in charge of finance or facilitation (Facilitator/Finance), Emirs (Emir), or individuals leading military operations at the cell (Military, cell) or upper levels (Military, Upper).

The controls in use here are first-differenced and lagged first-differences in coalition and insurgent caused civilian casualties. The first-differenced variables capture the difference in coalition or insurgent collateral damage in month $t$ and month $t - 1$. Following Condra et al. (2010) and Condra and Shapiro (2012), differences in per-period insurgent and coalition civilian casualties capture shocks to the level of civilian support, which could be expected to influence the profile of violence in governorates.

Additionally, this paper limits its analysis to governorates where leadership decapitation strikes were taking place. This includes Anbar, Baghdad, Diyala, Ninewa, Salah al-Din, Sulaymaniyah, and Tameem.

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66 One difference between this and the (Condra and Shapiro, 2012) procedure is their model uses lagged independent variables (the change in civilian causalities the previous week). Because the leadership decapitation and local violence data is only available at the month level, this variable is not lagged as doing so might miss some of the increase in violence occurring that month.

67 Military leadership refers to leaders classified as responsible for matters related to the military, VBIED, or security and intelligence, and “upper level” is defined as city, regional, or senior level.

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Finally, as a caveat, the results below should be taken with some degree of caution. While the first-difference procedure does eliminate time invariant unobserved bias, it does not resolve time invariant omitted variable bias. While ultimately this paper cannot claim to have identified a causal effect, these results are consistent with the Zarqawi estimation as well as other papers examining the effects of leadership decapitation (Abrahms and Potter, 2015; Calderón et al., 2015).

9.4.3 Leadership Targeting Results

Table 4 shows the results from the estimation model above, with different columns denoting different models. As discussed, Sect Ratio, Fired Upon, and Sect refer to the local violence ratio, the number of attacks against coalition forces, and local killings (respectively) as the dependent variable in use. Sect Ratio I denotes the model with no civilian casualty controls, and Sect Ratio II denotes the model with civilian casualty controls (similar for all dependent variables).

The first two columns examine the local violence ratio. The results from the full model suggest removal of cell military leadership is correlated with a statistically significant increase (at the 5% level) of 0.0296 in the ratio of local violence for the month of the leadership decapitation event. Because agency problems within AQI took the form of violence against local Iraqis, this increase is consistent with an increase in agency problems and dysfunction within AQI.

The result from the removal of cell military leadership is further examined in columns (3) through (6), which explores the impact of leadership removal on attacks against coalition forces and local violence. What is important here is that columns (3) and (4) suggest a decrease in attacks on coalitions forces, and columns (5) and (6) suggest an increase in attacks against local Iraqis (both which are statistically significant at 5% level). To the extent that these figures capture AQI’s involvement, these results suggest that AQI shifted its profile of violence away from Coalition forces and towards locals following the targeting of cell military leadership.

There are two points to consider when interpreting this analysis. First, there are likely unobserved factors contributing to the target selection or how the targeting was reported in press briefings. Second, it seems likely that the leadership targeting events may have
had unintended side effects that did not appear in the data (i.e. killing or capturing other individuals that were not reported). Thus, to the extent that these other factors played a significant role in biasing the results, the results above should be taken with caution. However, the result that leadership targeting leads to an increase in local violence is consistent with the Zarqawi event study above, Abrahms and Potter (2015), and Calderón et al. (2015) which would at least suggest an empirical regularity supporting the model.

Finally alternative explanations and robustness checks are included in the Historical/Mathematical/Estimation Appendix.

### 9.5 Evidence of Decentralization After Zarqawi’s Death

The estimation in Table 2 showed the killing of Abu Zarqawi precipitated an increase in the ratio of local killings. To provide evidence this arose through the decentralization mechanism, this section will demonstrate other changes that occurred in the profile of violence around the time of Zarqawi’s death that also suggest AQI’s decentralization.
Evidence of AQI’s move to decentralization is suggested through the increase in indirect fire attacks. The relationship between decentralization and a rise in indirect fire attacks is explained through the willingness to accept risk by lower level insurgents. Indirect fire represents a lower-risk means of engagement than directly attacking Iraqis or Coalition forces relative to direct fire attacks or ambushes. However, indirect fire attacks are also less precise and more likely to kill innocent bystanders. Therefore, a shift in the attack profile that favors indirect fire represents passing risk from insurgents onto civilians, which would be consistent with lower level fighters gaining more operational autonomy.

The rows of Table 8 (in the Appendix) provide evidence for decentralization after Zarqawi’s death. Rows one and two show that the mean number of indirect fire SIGACTs (IDF-SIG) and Iraqi casualties caused by indirect fire (IDF-IBC) per governorate-month increased after the killing of Zarqawi for 3-month, 6-month, and 9-month treatment windows. These differences are statistically significant at the 5% level for the 6- and 9-month treatment windows. Additionally, for similar reasons expressed above over using reduced form measurements on local killings, concerns may arise over using raw values of indirect fire SIGACTs and civilian casualties. For this reason, two ratios are used. First is the IDF-Ratio-SIG, which is the number if indirect fire significant activities over the sum of direct fire, indirect fire, IED and suicide significant activities per governorate month. Second is the IDF-Ratio-IBC, which is the ratio of indirect fire civilian casualties over the sum of indirect fire, direct fire, or bombing civilian casualties. As rows three and four demonstrate, both ratios experienced an increase after the death of Abu Zarqawi (excluding the three month treatment window for IDF-Ratio-SIG, but this negative change is not statistically significant).

9.6 Varying Assumption 2

In the econometric model, Assumption 2 claims that $\chi = 1$, or that each attack against coalition forces is substitutable for a single killing of local Iraqis.

The argument could be made that $\chi < 1$? This would assume that for every forgone instance of AQI attacking coalition forces, AQI could kill several local Iraqis. There are several reasons to believe this would be the case. First, the methods of attacks AQI used (IEDs, indirect fire, coordinated firefight) tended to kill several civilians at a time; therefore, it might be assumed each attack by Iraqis against locals carried with it a body count greater than one. Second, it is easier to commit violence against Iraqi civilians (or even other insurgent

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68 As it was with the local killings, the columns are labeled by the number of months used in the pre- and post-Zarqawi treatment windows.
groups) than Coalition forces. By virtue of training and equipment alone, Coalition forces stood a better chance at resisting attacks. This would imply more effort would need to be put into attacking Coalition forces, skewing the trade-off further. Importantly, by virtue of the estimation procedure, if $\chi < 1$, the estimates above in Table 2 are producing a lower bound on the actual increase in the ratio of subversion.

9.7 Difference-in-Difference

Using the image in Figure A1, it is possible to construct a difference-in-differences model that utilizes non-AQI governorates as the control group. The results of this estimation are included in Table 9 in the Appendix.

These results find that when an indicator for the treatment months are included, the interaction term between treatment months and AQI governorates becomes negative. This would imply that relative to the trend in non-AQI governorates, the killing of Zarqawi decreased the ratio of civilian casualties. Therefore, these results present a threat to the conclusions drawn above and would suggest a country-wide trend in sectarian violence happened to coincide with the Zarqawi targeting.

However, the validity of the difference-in-differences model relies on defining a proper control group. For the difference-in-differences model to be appropriate, it must be the case that killing of Zarqawi would not have impacted non-AQI regions. While Figure A1 utilizes MNF-I data to delineate Iraq into areas where AQI operated and areas where AQI did not operate, the Iraq Body Count and open source data present a different delineation. From 2005-2007, there were large-scale suicide attacks aimed at Shia Muslims in Basrah, Kerbala, Najaf, Qadissiya, Khanaqin, and Sadr City, all areas that fell outside the red outlines in Figure A1. These types of attacks were a hallmark of AQI, which would suggest AQI had a greater operational reach than presented in the MNF-I data.

With this knowledge, only utilizing governorates denoted by MNF-I as containing and AQI presence seems most appropriate; because the MNF-I data used to prepare the Figure A1 map was conducted by Coalition forces, presumably the areas in red define the areas where AQI was engaging coalition forces. Because the estimation model assumes that AQI members experienced a tradeoff between attacking Coalition forces and locals, utilizing the governorates where AQI was engaging Coalition forces is likely the best fit. For the non-red areas where Coalition forces did not experience AQI violence but where AQI was still operating, AQI would not be concerned with attacking Coalition forces and taking ground because Special
Group (Shia paramilitary) presence would be too strong. Thus, the difference-in-differences model seems improperly suited for this type of analysis.

10 Conclusion

This paper has four primary contributions.

First, it presents a new perspective on foreign fighters. By inviting foreign jihadis to join radical Islamist insurgent groups, the group leadership introduces a new set of preferences to the terror organization. Outside of providing manpower and funding, these foreign jihadis are valuable because, if they are properly integrated, they can offset the misalignment of preferences between terror group leadership and local lower-level members.

Next, this paper presents a new perspective on organizational structure that falls outside the existing literature on both terror groups and organizational economics. Organizational contracting embodies a simple yet unexplored idea for contracting: in settings where monitoring operational units and learning about personnel is possible, groups will organize more effectively. In this setting, effective organization entails integrating fighters with diverse and at time conflicting preferences into operational units. While these ideas are essential to understanding what occurred within the Haqqani Network and AQI, there exists several applications for this type of framing beyond the study of terror groups. The Historical Appendix includes a listing of scenarios where this integrated organizational structure was implemented.

Third, this paper speaks to the greater question of why some terror groups are more effective than others. By considering the inner-workings of AQI and other groups, this paper has shown that for the issue of resolving agency problems, organization matters. AQI was unable to monitor their group and create an effective organization. Within the ranks, local fighters acted out and killed allies of the group, and foreign fighters sat idle, were used improperly, and, at some points in time, were turned away from the group. The theory both formalizes the dysfunction AQI experienced and suggests the reasons behind their recent resurgence.

Fourth, this paper formalizes a new way for thinking about kinetic counterinsurgency operations, specifically those that destabilize group leadership. As a conservative estimate, the killing of Zarqawi destabilized AQI and this led to a 0.06 increase in the share of subversive acts committed by AQI. While it may be impossible to know how this translates into raw
figures, this is not likely a trivial statistic given the influence of the group and the sequence of events that followed. Importantly, this paper shows that kinetic operations can lead to decentralization, this decentralization can lead to subversion, and that this subversion can eventually lead to winning hearts and minds.

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A Appendix Figures

A.1 Figure A1.
**Figure A1**: “This map represents al-Qaeda Iraq’s presence in December of 2006. The dark red areas represent areas in which al-Qaeda enjoyed freedom of movement and safe haven. The light red areas represent areas of population influence. The image on the bottom right is a hand drawn al-Qaeda map that was captured by Coalition Forces. It outlines their strategy of using the belts around Baghdad to expand their presence in the capital.”

- Institute for the Study of War.

Additionally, the Long War Journal reports that this data was constructed using the MNF-I data (Roggio, 2014).

A.2 Figure A2

![Figure A2](image-url)

**Figure A2.** Time trend of local killings (recorded in Iraq Body Count database), attacks against coalition forces recorded in the MNF-I SIGACTS III Database (Fired Upon SIGACTs), and the ratio of local killings to the sum of sectarian killings and fired upon SIGACTs. These figures are recorded for governorates where AQI operated. The red line denotes the date when Zarqawi was killed.
Figure 8. Local killing ratio is equivalent to \( \frac{\text{local killing}_{i,t}}{\text{local killing}_{i,t} + \text{fired upon}_{i,t}} \). The red line denotes the date when Zarqawi was killed.

B Appendix Tables
### Table 5

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<td>9 month</td>
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*p*-values in parentheses

+ *p* < .15, * *p* < .01, ** *p* < .05, *** *p* < .01

### Table 6

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<td>0.0501*</td>
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</tr>
<tr>
<td>Violence Controls</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.122</td>
<td>0.109</td>
<td>0.105</td>
<td>0.137</td>
<td>0.0969</td>
<td>0.0957</td>
<td>0.0945</td>
<td>0.0648</td>
<td>0.193</td>
</tr>
<tr>
<td>N</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
</tr>
</tbody>
</table>

*p*-values in parentheses

+ *p* < .15, * *p* < .01, ** *p* < .05, *** *p* < .01
Table 7

Table 7: Estimation Model Results: Change in Subversion Ratio, Dropping Governorates, Full Controls

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zarqawi Targeting</td>
<td>0.0744*</td>
<td>0.0616+</td>
<td>0.0676*</td>
<td>0.0738*</td>
<td>0.0506+</td>
<td>0.0606+</td>
<td>0.0620+</td>
<td>0.0502+</td>
<td>0.0813***</td>
</tr>
<tr>
<td></td>
<td>(0.065)</td>
<td>(0.108)</td>
<td>(0.079)</td>
<td>(0.054)</td>
<td>(0.104)</td>
<td>(0.112)</td>
<td>(0.105)</td>
<td>(0.118)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>Year FE</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>
<td>Yes</td>
</tr>
<tr>
<td>Violence Controls</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>
<td>Yes</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.133</td>
<td>0.123</td>
<td>0.116</td>
<td>0.143</td>
<td>0.110</td>
<td>0.111</td>
<td>0.108</td>
<td>0.0722</td>
<td>0.204</td>
</tr>
<tr>
<td>N</td>
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<td>53</td>
<td>56</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
<td>53</td>
</tr>
</tbody>
</table>

*p-values in parentheses

+ p < .15, * p < .1, ** p < .05, *** p < .01
Table 8: Impact of Zarqawi’s Death on Indirect Fire Attacks in AQI Governorates: Mean Comparison Test

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 month</td>
<td>6 month</td>
<td>9 month</td>
</tr>
<tr>
<td>IDF-SIG</td>
<td>1.259 (0.163)</td>
<td>2.759*** (0.001)</td>
<td>2.407*** (0.000)</td>
</tr>
<tr>
<td>IDF-IBC</td>
<td>0.667 (0.384)</td>
<td>1.611** (0.035)</td>
<td>2.173*** (0.001)</td>
</tr>
<tr>
<td>IDF Ratio: SIG</td>
<td>-0.00116 (0.537)</td>
<td>0.00526+ (0.104)</td>
<td>0.00411* (0.060)</td>
</tr>
<tr>
<td>IDF Ratio: IBC</td>
<td>0.0126 (0.271)</td>
<td>0.0232** (0.031)</td>
<td>0.0321*** (0.001)</td>
</tr>
<tr>
<td>Observations</td>
<td>54</td>
<td>108</td>
<td>162</td>
</tr>
</tbody>
</table>

*p-values in parentheses

+ p < .15,  * p < 0.1,  ** p < 0.05,  *** p < 0.01
Table 9

<table>
<thead>
<tr>
<th></th>
<th>(1) Base w/ FE</th>
<th>(2) Full Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Zarqawi Targeting</strong></td>
<td>-0.0627</td>
<td>-0.0608</td>
</tr>
<tr>
<td></td>
<td>(0.0449)</td>
<td>(0.0460)</td>
</tr>
<tr>
<td><strong>Treatment Window</strong></td>
<td>0.126***</td>
<td>0.127***</td>
</tr>
<tr>
<td></td>
<td>(0.0360)</td>
<td>(0.0373)</td>
</tr>
<tr>
<td><strong>First Dif Insurgent Civcas</strong></td>
<td>-0.000430</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.000771)</td>
<td></td>
</tr>
<tr>
<td><strong>First Dif Coalition Civcas</strong></td>
<td>-0.000522</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00162)</td>
<td></td>
</tr>
<tr>
<td><strong>Lag F.D. Insurgent Civcas</strong></td>
<td>-0.000650</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00120)</td>
<td></td>
</tr>
<tr>
<td><strong>Lag F.D. Coalition Civcas</strong></td>
<td>0.00115</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00202)</td>
<td></td>
</tr>
<tr>
<td><strong>Year FE</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.0828</td>
<td>0.0866</td>
</tr>
<tr>
<td>N</td>
<td>118</td>
<td>118</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

Note- P-values calculated using robust standard errors, clustered by governorate. Units are aggregated to the governorate-month level. Sample is limited to months February-August 2006 and governorates where AQI operated.

+ $p < .15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

---

Table 10

<table>
<thead>
<tr>
<th>End Date \ Start Date</th>
<th>July 31, 2006</th>
<th>August 31, 2006</th>
<th>September 31, 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 1, 2006</td>
<td>0.0937**</td>
<td>0.0682**</td>
<td>0.0672**</td>
</tr>
<tr>
<td></td>
<td>(0.049)</td>
<td>(0.030)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>February 1, 2006</td>
<td>0.0900*</td>
<td>0.0644*</td>
<td>0.0649**</td>
</tr>
<tr>
<td></td>
<td>(0.072)</td>
<td>(0.059)</td>
<td>(0.042)</td>
</tr>
<tr>
<td>March 1, 2006</td>
<td>0.0824*</td>
<td>0.0607*</td>
<td>0.0614*</td>
</tr>
<tr>
<td></td>
<td>(0.151)</td>
<td>(0.133)</td>
<td>(0.088)</td>
</tr>
</tbody>
</table>

p-values in parentheses.

+ $p < .15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Table 11

<table>
<thead>
<tr>
<th>Governorate</th>
<th>Difference in Local Killing Ratio, Before and After Zarqawi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erbil</td>
<td>0.25</td>
</tr>
<tr>
<td>Tameem</td>
<td>0.1833</td>
</tr>
<tr>
<td>Babylon</td>
<td>0.126</td>
</tr>
<tr>
<td>Salah al-Din</td>
<td>0.0760</td>
</tr>
<tr>
<td>Ninewa</td>
<td>0.0744</td>
</tr>
<tr>
<td>Baghdad</td>
<td>0.0495</td>
</tr>
<tr>
<td>Diyala</td>
<td>0.0192</td>
</tr>
<tr>
<td>Anbar</td>
<td>0.007</td>
</tr>
<tr>
<td>Wassit</td>
<td>-0.107</td>
</tr>
</tbody>
</table>

C Historical/Mathematical/Estimation Appendix

[Link to remaining appendix](https://www.dropbox.com/s/myo9l4ka7s6vi59/schram_managing_terror_online_appendix.pdf?dl=0)