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1 Introduction

Since 2001, the United States has engaged in an ongoing campaign to detect, disrupt, and dismantle Al Qaeda and Al Qaeda-affiliated terrorist networks. The nature of the Al Qaeda (AQ) threat has required a novel and evolving military and counterterrorism response. No longer could the United States depend on its Cold War tactics—while the Soviet threat was “stationary, observable, and conventional,” Al Qaeda operations are “agile, unconventional, and stealthy, wag[ing] war with Microsoft, machetes, AK-47s, and tribal drums.”

The Obama Administration has extensively used targeted killings as part of its counterterrorism strategy against Al Qaeda. Targeted killings, as defined by the UN special report on the topic, are intentional, premeditated acts of lethal force by states against specific individuals outside the states’ custody. The term “targeted killings” was popularized in 2000 after Israel made public its policy of targeting militants in Palestinian territories. Targeted killings can come in many forms, from sniper fire to submarine cruise missiles; however, the Obama Administration has primarily used drone and air strikes to target Al Qaeda and Taliban leadership in Afghanistan, Pakistan, Yemen, and Somalia.

Although Pakistan remains the primary theater for drone warfare, the US has significantly increased air strikes and drone operations in Yemen to target the homegrown AQ affiliate, Al Qaeda in the Arab Peninsula (AQAP). Top US counterterrorism officials currently regard AQAP as the “most operationally active

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1 Renwick and Treverton 2008.
3 Ibid.
franchise” of Al Qaeda.⁴ The group has attempted several attacks against the United States, including most recently the plot against the American embassy in August 2013 that resulted in the closure of over 22 other international embassies across the MENA region.⁵ However, despite its high-profile plots against the West, AQAP also operates as a domestic insurgency within Yemen. It regularly assassinates Yemeni government officials and has carried out many large-scale bombings against civilian and military targets in the past. Furthermore, the Yemeni state currently stands most vulnerable to AQAP violence due to a recent coup d’état by a Shiite rebel group that overthrew the sitting president and disbanded the parliament. As Yemen descends into political chaos, AQAP grows more opportunistic, seeking to establish sanctuaries amongst tribal factions, carry out violence against the weakening state, and brew an insurgency that desires legitimacy through political and territorial means.⁶

With a destabilizing Yemen, it is important to question whether current US counterterrorism measures in the region sufficiently address the threat posed by AQAP. While there is little empirical research on the effectiveness of US involvement in Yemen, an alternative small body of academic work does study the impact of American drone strikes in Afghanistan and the Federally Administered Tribal Areas (FATA) of Pakistan. Most of these studies are working papers; nevertheless, they reveal some preliminary insight into the procedures political scientists use to evaluate the effect of US drone policy in this region.

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⁴ Shaughnessy 2010.
⁵ The Mercury 2013.
⁶ Holtz 2015.
For example, Smith and Walsh measure the impact of drone strikes on Al Qaeda’s propaganda output, which acts as a proxy for AQ’s capacity to organize political action. They argue that creating propaganda requires a cadre of experienced producers, media workers, and ‘stars;’ thus, if drone strikes degrade this “cadre,” we would see observable changes in Al Qaeda’s propaganda yield. Relying on regression analysis, the study finds that drone strikes might be associated with more—not less—Al Qaeda media output, suggesting that current US counterterrorism policy is doing little to degrade the Al Qaeda propaganda machine. However, since the study solely measures the impact of drone strikes on a single dependent variable, it does not capture the effect of this policy on other outcome variables—such as terrorist attacks, recruitment, fundraising—that could be a more holistic representative of the strength of the Al Qaeda organization.

A recent RAND study by Johnston and Sarbahi attempts to include these additional variables that capture Al Qaeda’s strength in its analysis. The authors rely on a two level fixed-effects model: (1) controlling for time invariant factors by “agency” fixed effects and (2) controlling for temporal variation using month fixed-effects. Under this framework, they use regression analysis to model the impact of drone strikes on three different measures of terrorist violence: number of terror incidents, number of casualties from terror incidents, and number of tribal leaders killed from terror incidents. Their study finds with statistical significance that drone strikes are associated with a reduction in militant violence in the FATA regions on all three outcome variables.

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7 Smith 2013.
8 Johnston 2015.
9 Agency is the third-order division of administrative regions in FATA. It is comparable to a “county” in the US.
The results of the RAND study convey that drone strikes are an effective counterterrorism measure in Pakistan—which aligns with the core of US policymakers’ arguments about their continued use—while the Smith and Walsh study implies the opposite conclusion. However, since both of these studies focus on Al Qaeda central, I question whether these results could be replicated in Yemen. With Yemen becoming critical to US national security, an assessment about the success of US counterterrorism policy in the region is necessary for officials and critics alike to evaluate the tradeoffs associated with drone warfare. Given the dearth of empirical research on this topic, my thesis will attempt to investigate the effectiveness of US strikes in disrupting, degrading, and dispersing AQAP violence.

The thesis proceeds as follows. The next section provides a brief overview of AQAP militancy in Yemen and the American response. Afterwards, I introduce the different hypotheses available within academic literature regarding the impact of targeted killings on terrorist and insurgent activities. Next, I develop my empirical model based on these hypotheses—which derives primarily from the Johnston and Sarbahi study—and test the hypotheses using regression analysis and GIS mapping. However, since empirical models may tell only half the story, I also identify qualitative evidence that challenges White House rhetoric regarding the effectiveness of drone strikes in Yemen. Finally, I conclude by offering recommendations for future empirical research on the topic, as well as insight into the deficiencies of the current US counterterrorism policy in Yemen.
2 AQAP Militancy in Yemen and the American Response

2.1 The Formation of AQAP

It is common for radical jihadist groups to seek legitimacy under the Al Qaeda brand, despite the fact that most of these groups hold limited ties to Al Qaeda Central.\textsuperscript{10} However, AQAP is not similar to these other off-shoot organization.\textsuperscript{11} Although AQAP presents itself to be a spontaneous political movement, in reality, it is a carefully managed organization with roots to Al Qaeda-Central that pre-date the September 11 attacks by over a decade. Furthermore, although AQAP is often viewed as a purely terrorist organization, in reality, AQAP also acts an insurgency that uses militant violence as a vehicle to delegitimize and fragment the Yemeni state.\textsuperscript{12}

The AQAP branch of al Qaeda has a history that can be traced back to the 1980s, when Bin Laden came to Yemen from the Afghan Mujahedeen looking for a new jihad to unite the Arab world. In Afghanistan, Bin Laden had commanded a group of volunteer foreign fighters called the “Afghan Arabs” that sought to oust the Soviet invaders and build a Sharia Afghanistan.\textsuperscript{13} However, after the Soviet retreat, Afghanistan fell into civil war between various mujahedeen commanders, forcing Bin Laden to find new ground to develop a Pan-Arab jihad. He was drawn to southern Yemen, the birthplace of his father, where a radical Marxist faction had disbanded the tribal sultanates to create the People’s Democratic Republic of Yemen.\textsuperscript{14}

\textsuperscript{10} Byman 2012. 5
\textsuperscript{11} Ibid, 6.
\textsuperscript{12} Simcox 2012.
\textsuperscript{13} Johnsen 2013. 21
\textsuperscript{14} Ibid 17.
Bin Laden’s obsession of recreating the Afghan Mujahedeen in Yemen sowed the seeds for the al Qaeda organization.\textsuperscript{15} Yemeni tribes had supplied many fighters to the mujahedeen, who returned home from battle only to find their country riddled with corruption and poverty.\textsuperscript{16} Wandering without much purpose yet still filled with the adrenaline of war, these men were attracted to Bin Laden’s cause: a borderless coalition built to protect \textit{all} Muslims from the influence of the West.\textsuperscript{17}

Bin Laden used his Yemeni connections to coordinate the USS Cole bombing in 2000 that took the lives of 17 sailors and left 39 injured. Faced with increasing international scrutiny regarding the events surrounding the bombing, the Yemeni government began to arrest anyone suspected of harboring sympathies for Al Qaeda.\textsuperscript{18} Men who had spent time in Afghanistan, particularly those that returned to Yemen in the weeks surrounding the attacks, were obvious targets; but, the list quickly expanded to include all young men deemed to be security threats in governorates across the country.\textsuperscript{19} Within months Yemen’s jails were filled with suspects, many of whom the government denied fair trials. Some of the suspects were experienced militants, who worked fiercely to radicalize their younger more impressionable fellow inmates.\textsuperscript{20} Predictably, young men left Yemen’s security prisons more radical than when they were initially incarcerated.\textsuperscript{21} Their arbitrary persecution provoked them to harbor serious grievances

\begin{footnotesize}
\begin{itemize}
    \item \textsuperscript{15} Ibid, 20
    \item \textsuperscript{16} A False Foundation, 26
    \item \textsuperscript{17} Johnsen 2013. 20
    \item \textsuperscript{18} Ibid.
    \item \textsuperscript{19} Johnsen 2014.
    \item \textsuperscript{20} Ibid.
    \item \textsuperscript{21} Ibid.
\end{itemize}
\end{footnotesize}
against the Yemeni government, which only further ripened them for AQAP recruitment.\textsuperscript{22}

In 2006, 23 men escaped from a prison in Sana’a and created al Qaeda in the Land of Yemen (AQLY), with nearly all of the escapees forming the core leadership of the group.\textsuperscript{23} On September 17, 2008, AQLY attacked the US Embassy in Sana’a using synchronized suicide bombings, leaving 18 dead.\textsuperscript{24} This attack brought the group domestic and international attention, which coincided with the AQLY’s decision to publish statements online and via its Arabic-language magazine, \textit{Sada al-Malahim}, after its successful plot.\textsuperscript{25} This “attack-and-response” mechanism became signature of the group, as it continued to innovatively use multimedia platforms to communicate with the Arabic and Western world.

The internet especially played an important role for AQLY in 2009, when the group announced its merged with Saudi jihadists through a video, promising that this new organization called “al Qaeda in the Arab Peninsula” will topple "apostate" governments and drive Western influence out of the region.\textsuperscript{26} The video hailed praised fighters who had been killed over the past few years by the Yemeni, Saudi and American governments, declaring “we will tread their path until we establish the Islamic state... until we establish the laws of Allah, or until our blood mixes with theirs.”\textsuperscript{27}

The AQAP merger facilitated the group’s broader \textit{global} aims now that Saudi and Yemeni jihadists could find sanctuary in a united, umbrella organization. Nevertheless,

\begin{itemize}
  \item[\textsuperscript{22}] Ibid.
  \item[\textsuperscript{23}] Zimmerman 2015.
  \item[\textsuperscript{24}] Bauer 2008.
  \item[\textsuperscript{25}] Byman 2014. 49.
  \item[\textsuperscript{26}] A False Foundation, 31
  \item[\textsuperscript{27}] "Profile: Al-Qaeda in the Arabian Peninsula." \textit{Al Jazeera}, May 9, 2012.
\end{itemize}
AQAP’s historic roots to Yemen and the Afghan Mujahedeen continued to play an important role in the group’s local ambitions. Furthermore, since the 2009 merger, AQAP has aggressively coopted mechanisms from its Yemeni predecessors, such as: using Western media platforms, relying on non-hierarchical command structures, building borderless transnational coalitions, and seeking local political objectives while promoting an international jihad.

2.2 US Counterterrorism in Yemen

The US conducted its first drone strike in Yemen in 2002 to target Qaed Sinan Harithi, an al Qaeda operative suspected to have been one of the masterminds behind the USS Cole bombing.28 The attack took the lives of six people—one of them a US citizen—which provoked domestic and international outrage over the legality of this extrajudicial killing.29 Furthermore, news sources also discovered the Yemeni government’s collusion with the US in coordinating and covering up the drone attack, which elicited serious domestic backlash.30 The then president of Yemen, Ali Abdullah Saleh, “furious at being made to look like a liar and a puppet of the Americans” decided to end the US drone campaign in Yemen that same year.31 As Figure 1 shows, Yemen did not see another U.S. strike for nearly 7 years since the 2002 debacle.

Nevertheless, the 2002 attack set precedent for US involvement in Pakistan and Afghanistan, where the Bush administration significantly ramped up drone surveillance and drone strikes to target the Al Qaeda Central organization and the Taliban. In 2010,

29 Ibid.
30 Berger, 2013. 12
31 Ibid.
the Obama Administration restarted the drone campaign in Yemen after AQAP claimed responsibility for several terrorist plots against the US. This included the attempted Christmas Day bombing of 2009, where AQAP operative Umar Farouk Abdulmutallab tried to set off a bomb sewn into his underwear on a Northwest Airlines flight traveling to Detroit.\textsuperscript{32} If the bomb had actually exploded—instead of just setting Abdulmutallab pants on fire—it could have been the most devastating terrorist attack against the US since 9/11.

As AQAP’s strength grew in Yemen—and as its foreign terrorist plots became more formidable threats—the Obama Administration significantly increased US drone and air strikes in Yemen from 2010 onwards. Figure 1 shows that the US conducted over 50 strikes in Yemen in 2012; however, from 2013 onwards, we see a comparable decline in the number of strikes. The Bureau of Investigation attributes this decline to the general presence of civil unrest within Yemen, which made intelligence collection and the execution of US operations particularly difficult.\textsuperscript{33} It is also possible that international backlash played a role dissuading the US from engaging in a more extensive drone campaign in Yemen.\textsuperscript{34} Nevertheless, the Obama administration continues to assert that Yemen serves as a “model” for US counterterrorism strategy. In order to analyze the verity of this assertion, the following chapter will explore several hypotheses available in academia that could provide a foundation in evaluating the success of the American drone and air campaign against AQAP in Yemen.

\textsuperscript{32} Ibid.
\textsuperscript{33} Serle, 2015
\textsuperscript{34} UN News Center 2013.
3 Hypotheses

AQAP uses a variety of tactics to achieve its insurgent goals. However, since it has tenuous political reach and little territorial control, it is motivated to rely on selective violence against both the state and civilians in order to advance its cause. This behavior derives from Kalyvas’ “logic of violence”, which asserts that weak insurgents are incentivized to use selective violence—targeting specific people and institutions based on their loyalties and affiliations—to deter civilian defectors, damage the state, and consolidate political control in contested areas. As AQAP is a weak insurgent—it does not control significant land and it operates in many factions across Yemen—measuring its violence can reasonably act as a proxy for measuring its organizational strength and capability. With violence as the key variable in mind, this chapter will discuss the different hypotheses available in academic literature regarding the relationship between targeted killings and militant violence.

3.1. Do US strikes increase AQAP violence in Yemen?

By the “logic of violence,” since the presence of US strikes threatens AQAP’s sanctuaries in Yemen, thus AQAP responds to this threat by attacking potential information channels and by protecting itself from. The military and the CIA collect intelligence for drone strikes in Yemen using both reconnaissance and surveillance from the air, and on-the-ground human intelligence (HUMINT) networks built by civilian spies. While AQAP has little influence in diverting drone surveillance and

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35 Kalyvas 2006.
36 Ibid.
37 Ibid.
reconnaissance, it does have the ability to dismantle HUMINT by selectively targeting and punishing perceived spies and defectors for past and future U.S. strikes. Thus, we would expect that drone strikes would increase militant violence against civilians deemed disloyal or dangerous to the AQAP cause.

Along the same line, AQAP also seeks to punish the Yemeni government its role in facilitating the US drone program. After 9/11, the former Yemeni president, Ali Abdullah Saleh, signed an agreement with the United States to “generally permit “drone and air strikes in Yemen.”38 His successor, Abdu Rabu Mansour Hadi, continued to abide by this agreement and even publicly acknowledged his coordination with the US in approving each strike.39 As AQAP already seeks to delegitimize and fragment the state, the Yemeni government’s endorsement of the US drone program adds another grievance for the group to fight for.

Furthermore, AQAP holds territorial goals in certain governorates, where it has built relationships with tribal leaders and local population through public service, inter-marriage, and coercion.40 However, several of the AQAP strongholds still remain contested spaces by the Yemeni state and other rebel groups. Now, as drone strikes further jeopardize AQAP strongholds, it is expected that the group would seek more violent means to reestablish its legitimacy within these contested places.

Thus, by the “logic of violence”, the presence of drone strikes in Yemen prompt insurgents to attack civilians, damage the state, and defend its right to rule in contested

39 Ibid.
40 Johnsen 2014.
space. Therefore, I put forward the following that drone strikes increase terrorist violence:

\[ H_1 = \text{drone strikes increase terrorist violence} \]

3.2 Do drone strikes disrupt AQAP violence in Yemen?

One of the main arguments against drone warfare is that civilian casualties could inspire anti-American sentiments and unintentionally produces more recruits for the militant movement. President Obama addressed the issue of civilian casualties in a May 2013 speech, claiming that the US follows a set of guidelines before deciding to pursue a drone strike. One of the guidelines required “near certainty that no civilians will be killed or injured—the highest standard we can set.”

Nevertheless, the administration has faced mounting criticism about the civilian “collateral damage” resulting from air and drone strikes. In December 2013, four U.S. hellfire missiles hit a gathering outside the city of Rad’aa in the Al Bayda governorate and killed twelve people. A Human Rights Watch report on the attack asserted that drone had mistakenly attacked a wedding convoy and killed multiple civilians. On the other hand, the Obama Administration claimed that all the casualties were high-level “militants” and that no civilians had been harmed. These diverging accounts reflect the ongoing debate about how the U.S. defines “civilian” and “militant”, which becomes

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41 Obama, 2013
42 Draper, 2014
43 “The Wedding That Became a Funeral,” 6
44 Ibid.
central to the question of whether the drone program utilizes discriminate violence or indiscriminate violence.

3.21 Disruption in Discriminate Violence

While discriminate violence targets specific individuals within an insurgency, indiscriminate violence targets all people, including civilians, assumed to be part of the insurgency, whether by their geography, religion, ethnicity, or by distinguishing physical factors.45 According to U.S. Army’s Counterinsurgency Manual FM 3-24, a successful counterinsurgency (COIN) strategy should use force discriminately in order to avoid civilian backlash.46 A COIN operation that involves excessive force and ignores “population-centric” strategies could inadvertently drive civilians to the insurgent cause.47

Similarly, scholars also find that when a state uses discriminate violence against insurgents, a civilian population faces a private risk and a costly sanction—including physical injury or death—in joining an insurgent cause.48 Therefore, civilians are more motivated to act as “free-riders” rather than active participants of the insurgency. Thus, when an organization cannot access a large civilian base of support due to this collective action problem, it is forced to rely on a small number of militants to match the output of its larger counterparts.49 This could prove to be an unsustainable strategy, especially as it exposes a small insurgent base to the high organizational costs of coordinating attacks, and the high risk of death and injury from carrying out these attacks.50 Thus, when a state

45 Lyall 2009, 332.
46 FM 3-24 2006, 1-57
50 Lyall 2009, 337.
wields discriminate violence, civilians are less likely to join the insurgent cause, which diminishes and disrupts the insurgent’s capabilities.

In the case of the U.S. involvement in Yemen, drone and air strikes can be viewed as measures of discriminate violence, where the U.S. only targets a select number of AQAP leaders and operatives in order to disrupt its network. In a 2012 speech to the Wilson Center, John Brennan—the current CIA Director and former Homeland Security Advisor to President Obama—outlined the selective nature of targeted strikes:

Targeted strikes conform to the principle of necessity, the requirement that the target have definite military value. In this armed conflict, individuals who are part of al Qaeda or its associated forces are legitimate military targets... With the unprecedented ability of remotely piloted aircraft to precisely target a military objective while minimizing collateral damage, one could argue that never before has there been a weapon that allows to distinguish more effectively between an Al Qaeda terrorist and innocent civilians....Targeted strikes conform to the principle of proportionality, the notion that the anticipated collateral damage of an action cannot be excessive in relation to the anticipated military advantage. By targeting an individual terrorist or small numbers of terrorist with ordinance that can be adapted to harming others in the immediate vicinity, it is hard to imagine a tool that can better minimize the risk to civilians than remotely piloted aircraft.51

Empirical research also seems to indicate that drone strikes produce considerably lower civilian casualties in comparison to on-the-ground combat missions. A University of Massachusetts study found civilian deaths from drone attacks ranged between 4-20 percent of all deaths, while for most military conflicts in the past two decades, civilian deaths ranged from 33-80 percent of all deaths.52 If the prerogative of U.S. involvement

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51 Brennan 2012.
52 Plaw 2012.
in Yemen is to maximize military advantage and minimize civilian casualties, then drone and air strikes in this region can be viewed as forms of discriminate violence. As much of academic literature argues the effectiveness of discriminate violence in disrupting the insurgent group, I can reasonably hypothesize that the use of air and drone strikes also disrupt AQAP’s activities.

\textit{H2= U.S. Strikes disrupt AQAP}

\subsection*{3.22 Disruption and Indiscriminate Violence}

On the other hand, The UN and several human rights organizations argue that U.S. use of extrajudicial air and drone strikes could be classified as indiscriminate violence. A recent report co-sponsored by Stanford and NYU argues that the US government fails to acknowledge a significant number of non-combatant casualties from drone strikes in an attempt to “shield the drone program from democratic accountability.”\textsuperscript{53} The study also asserts the Pakistani civilians remain unaware of why they are subject to drone strikes; thus, when they witness the unwarranted death of friends or family members, it “breed[s] resentment and discontent towards the US,” which inadvertently aid “‘militant’ recruitment and motivate[e] terrorist activity.”\textsuperscript{54} Under this narrative—where innocent civilians fear death by the state, despite their allegiance to the state—could be seen as a form of indiscriminate violence.

Scholars largely agree that in the presence of indiscriminate violence, the civilian population faces a higher cost for not joining an insurgency, either because they (1) begin

\textsuperscript{53} NYU/Stanford 2012, iv.
\textsuperscript{54} Ibid.
to hold new grievances against the state and seek revenge (2) they already fear death at the hands of the state; thus, they are motivated to join the insurgency if it could offer them some measure of protection against the state.\textsuperscript{55} Thus, if more civilians abandon the state in favor of the insurgent, it is reasonable to assume that the insurgency—armed with greater membership—could increase its capabilities and gain more momentum.

David Kilcullen, former advisor to General David Patraeus, stated, “every one of these dead noncombatants represents an alienated family, a new desire for revenge, and more recruits for a militant movement that has grown exponentially even as drone strikes have increased.”\textsuperscript{56} If the Yemeni civilian population view US strikes in their homeland as a form of indiscriminate violence, then I could hypothesize that these civilians would be motivated to support the AQAP insurgency, which in turn increases AQAP capabilities. Thus, I proffer:

**H3: US Strikes do not disrupt AQAP activities.**

### 3.3. Degradation of AQAP

Another hypothesis put forth in both foreign policy and academic settings involve estimating the relationship between leadership decapitation—where top leaders within the organization’s hierarchy are targeted—and the sustainability of an organization. From analyzing 298 incidents of leadership targeting from 1954-2004, Jordan finds that leadership decapitation does not increase the likelihood of collapse in large organizations

\textsuperscript{55} Kalyvas 2006.

\textsuperscript{56} Kilcullen 2009.
or groups motivated by religious grievances.\textsuperscript{57} Furthermore, AQAP—which is motivated by religious grievances—also carefully, organizes itself in networks rather than in hierarchies, so that the several fragmented cells operate under the AQAP umbrella. \textsuperscript{58} Studies how that leadership decapitation does not undermine such decentralized organizations because the lack of hierarchy allows them to become adaptable—when one leader is killed, another one emerges.\textsuperscript{59}

In the case of Yemen, many assumed that the death of AQAP’s principal strategist and top foreign recruiter, Anwar Awalki, would lead to the downfall of AQAP as an organization. During his reign, Awlaki authored, designed, and published al Qaeda’s first English language magazine, “Inspire”, and maintained a heavy online presence through Facebook, Twitter, and Youtube.\textsuperscript{60} However, despite his death, as of 2013, the U.S State Department estimates the organization has "close to a thousand members”, representing dramatic growth from some two-to-three-hundred members in 2009--many of them from foreign countries.\textsuperscript{61} On September 27, 2014, AQAP conducted a rocket attack on the US embassy, and publically stated, "the attack came as a response of an American drone’s targeting of Muslim children in a bombardment that occurred on Friday evening in al Jawf that resulted in their being wounded severely."\textsuperscript{62}

Thus, it seems that despite targeted killings against high-valued individuals, AQAP continues to function and pose a threat against both local and foreign interests. Therefore, I put forth the following hypothesis:

\begin{footnotesize}
\begin{itemize}
  \item 57 Jordan 2009.
  \item 58 Sageman, 2008
  \item 59 Byman 2014.
  \item 60 Mazetti 2013.
  \item 61 “Chapter 6. Foreign Terrorist Organizations” 2013.
  \item 62 Adaki 2014.
\end{itemize}
\end{footnotesize}
**H4: US strikes do not degrade AQAP capabilities**

On the other hand, a diverging line of academic literature argues that leadership decapitation can have crippling effects on an organization. Johnston found that leadership decapitation does not lead to an increase in militant violence, and that it is associated with lower frequency and lethality of insurgent attacks.\textsuperscript{63} Along the same line, another study finds that leadership decapitation can especially undermine terrorist groups due to their reliance on violence, their lack of public support, and their focus on ideology.\textsuperscript{64} Thus, if leadership decapitation makes an organization susceptible to degradation and destabilization, it follows:

**H5: US strikes degrade AQAP capabilities**

### 3.4 Duration of AQAP violence

How does the impact of drone strikes vary over time? Jaeger and Siddique use lagged dependent variables to address this question; however, they failed to find a consistent temporal relationship between drone strikes and terrorist violence in Afghanistan.\textsuperscript{65} On the other hand, Johnston and Sarbahi find that drone strikes in Pakistan have both short and long-term violence reducing effect in Pakistan.\textsuperscript{66} However, can this

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\textsuperscript{63} Johnston 2012.  
\textsuperscript{64} Price 2012.  
\textsuperscript{65} Jaeger and Siddique 2011.  
\textsuperscript{66} Johnston and Sarbahi 2015.
scenario apply to Yemen? Thus, the following hypotheses address the temporal impacts of US strikes

H6: US Strikes reduce AQAP violence in the long-term
H7: US Strikes increase AQAP violence in the long-term

3.5 Dispersion of AQAP Violence:

Johnston and Sarbahi in their study question whether the presence of drone strikes in Pakistan divert Taliban violence to neighboring areas. They argue that militants, in their desperation to seek safety from drones, move their operations to ungoverned space—particularly where mountainous geography can provide camouflage from drone—or to urban jungles, where they are able to blend in with civilians in order to avoid detection. This theory could also hold true in Yemen, where AQAP operatives might seek safe havens in more urban or more rural areas when their initial base of operations come under fire. If US Strikes prompt AQAP to physically shift bases, I would expect a geographic shift in AQAP violence.

H8: Drone strikes displace violence
4 Empirical Strategy and Results

In this chapter, I describe the methodology to estimate the effect of drones on a number of variables. The analysis will look at data from 2010-2013, and attempt to understand how drone and air strikes in Yemen affect AQAP capabilities in a given governorate and unit of time.

4.1 Identifying Assumptions

The study uses panel-data with the unit of analysis “governorate-month”, where each variable is observed at several points in time. Panel data is useful in alleviating suspicions regarding the outcome variables dependency on unobserved explanatory variables that correlate with observed explanatory variables.\(^{67}\) For example, the presence of inter-governorate variation from unobservable variables (like terrain, climate, tribal demographics, proximity to trading hubs) could affect the number of AQAP attacks in a given governorate.

Thus, by controlling for governorates, I am able to control for time-invariant factors that could lead to omitted variable bias. Similarly, by controlling for “month”, I can control for temporal variation (like secular time trends in violence) that could bias the timing of terrorist attacks. As Figure 2 shows, the monthly trends in AQAP violence differ year by year, indicating that the “month-year” fixed-effects should be used in order to account for the variation of months between years. For example, parliamentary elections in Yemen took place in the April of 2012, but did not take place April of 2011.

\(^{67}\) Wooldridge 2002
Assuming that election months could impact the levels of AQAP violence, I am unable to treat April of 2011 and 2012 the same in my model. Introducing a month-year fixed effects could partially alleviate this problem of heteroskedasticity, allowing for my coefficients to retain more internal validity.

Thus, using this two-level fixed effects model (2LFE) with a “governorate-month-year” unit of analysis will allow me to control for variation for a number of immeasurable temporal and time-invariant variables, providing me with a more honest estimate of the causal relationship between U.S. strikes and terrorist violence.

However, estimating this causal relationship could be problematic if the outcome variable and the predictor variable are endogenous. Do drone strikes affect terrorist incidents or do terrorist incidents affect drone strikes? The latter hypothesis could be valid if drone strikes are not conducted at random, but are premeditated, direct, time-sensitive responses to terrorist incidents. However, Johnston and Sarbahi argue that the decision to strike depend on several exogenous variables unrelated to terrorist incident outcome variable.\(^{68}\) While Johnston and Sarbahi concede that drone strikes are not conducted at random, they argue that “weather, bureaucratic, and technological factors” make drone strikes at least “quasi-random” when treated under a small temporal unit of analysis, such as week-to-week, or in my case, month-to-month.\(^{69}\) Thus, the presence of the exogenous factors make month-to-month incidences of AQAP attacks only weakly related to the decision to strike a target.

First, several lengthy legal and bureaucratic procedures—which could extend beyond the month–by-month window for my analysis—affect the timing of a strike. The

\(^{68}\) Johnston and Sarbahi 2015.

\(^{69}\) Ibid, 18.
U.S. does not conduct “personality strikes”—targeted strikes against senior and mid-level AQAP militants—at random but through a set of defined bureaucratic processes. It should be noted that “personality strikes” are different from “signature strikes,” which target “groups of men who bear certain signatures, or defining characteristics associated with terrorist activity, but whose identities are not known.”

The Obama Administration approved signature strikes in Yemen in 2012, but U.S. officials insist that this tactic was not been employed in 2012 or 2013. For this reason, I will make the assumption that all strikes carried out in Yemen from 2010-2013 were personality strikes.

In order for a personality strike to take place, the target must be part of a “kill-list matrix” that includes the “names of terrorism suspects arrayed against an accounting of the resources being marshaled to track them down, including sealed indictments and clandestine operations.” Gregory McNeal, a professor of law at Pepperdine University, published a study in the Georgetown Law Review outlining the procedures involved with nominating a target to the “kill list matrix.”

First, military and intelligence officials from various agencies compile data and make recommendations based on internal vetting and validation standards. Second, those recommendations go through the NCTC, which further vets and validates rosters of names and other variables that are further tailored to meet White House standards for lethal targeting. Third, the President’s designee (currently the counterterrorism adviser) convenes an NSC deputies meeting to get input from senior officials, including top lawyers from the appropriate agencies and departments, such as the CIA, FBI, DOD, State Department, and NCTC…Finally, if the NSC gives approval, the President’s counterterrorism advisor shapes the product of the NSC’s deliberations and seeks final approval from the President. At this stage, targets are evaluated again to ensure that target information is complete.

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70 Klaidman, 41
71 Greenfield 2013.
72 Miller 2012.
and accurate, targets relate to objectives, the selection rationale is clear and detailed, and collateral damage concerns are highlighted.\textsuperscript{73}

Thus, JSOC and the CIA both must follow all the aforementioned procedures before striking a target. While no information has been provided as to average amount of time it takes for a target to become part of the kill-list matrix, it is known that the NCTC reviews its recommendations every three months with intelligence analysts and military officials.\textsuperscript{74} Ultimately, several bureaucratic factors exogenous to the incidents of terror in a month-to-month window could affect the timing of a strike, adding to the “quasi-randomness” of the independent variable.

Weather and terrain play an important role in the ability of a pilot or UAV to strike a target. Cloudy weather patterns and mountainous terrain could affect the UAV’s visibility and situational awareness, impeding the pilot’s capacity to locate a target and deliver missiles to that target in the most precise manner—which adds another randomness factor to the timing of drone strikes.

Militants are also aware of when they are most susceptible to drone strikes, as evidenced by Osama Bin Laden’s memos where he urged his operatives to “move only when clouds are heavy” and live in locations with “rougher terrain…many mountains, rivers, and trees… [which] will defend the brothers from the aircraft.”\textsuperscript{75} In another memo, a Yemeni AQAP operative advised militants to “deceive the drone by entering places of multiple entrances or exits;” “[jam] and [confuse] electronic communication” of

\textsuperscript{73} McNeal 2014.
\textsuperscript{74} Miller 2012.
\textsuperscript{75} “Bin Laden Documents: Fear of Drones.”
the drone; “[use] underground shelters;” “[use] smoke as cover by burning tires.” Such tactics of diversion delay the drone operators’ ability to properly identify targets, which in turn, detracts from the window of opportunity for a strike. Furthermore, if a target believes he is under surveillance by a non-weaponized ISR drone—which is distinguishable by its low altitude—then he would be motivated to employ these diversion techniques and “lose the tail” before a weaponized drone could be summoned for a strike.

The FM 3-60 states that it is the prerogative drone operator to avoid incidental harm to nearby civilians, civilian property, “structures on the immediate area, targets that are on the no-strike and/or restricted target list, livestock, the civil air, and anything that could have a negative effect on military operations.” Therefore, drone operators survey targets for an extended amount of time, which—along with the bureaucratic processes, weather patterns, terrain, militant diversion tactics, and logistical limitations of ISR drones—amplify the randomness involved in the decision to strike in a given month. Thus, a strike in the treatment month could plausibly occur in the preceding or following governorate-month, making monthly comparisons of differences in militant violence across governorates and month using panel-data econometric estimation a credible means of causal identification.

4.2 Data and Variables

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76 “The Al-Qaida Papers - Drones.”
77 Johnston and Sarbahi 2015, 19
78 FM 3-60 2010.
In order to develop the key independent variable, the count of drone and air strikes in Yemen, I gathered data using the New America Foundation’s (NAF) International Security database. Each NAF data point supplies information about the date of the strike, the type of strike, the location (including city, and governorate), and estimates of civilians and militants killed. 79

The NAF provides a reliable measure for U.S. strikes as it uses an “aggregation of credible news reports” from major international wire services such as Associated Press and Reuters; South Asian and Middle Eastern TV networks such as GeoTV and Al Jazeera; Western media outlets such as the BBC and The New York Times, and leading regional newspapers and networks within Yemen. 80

A data point must pass several thresholds before being included into the NAF database. The NAF only includes a strike if there are at least “two credible media sources verifying a strike”, and “four credible media sources per strike”. 81 If there are multiple drone strikes that occur within two hours in the same location, the NAF counts it as one strike. If there are multiple strikes that occur in different locations, then they are counted as separate strikes.

However, I noticed that the NAF website was sometimes inactive and slow to update its data. Therefore I decided to cross-reference the NAF database with the Bureau of Investigative Journalism’s (BIJ) database in order to create the variable, STRIKE, which counts all confirmed U.S. air and drone strikes. The BIJ holds similar standards as the NAF in its reporting of U.S. strikes in Yemen. However, the BIJ also maintains an

79 See: http://securitydata.newamerica.net/drones/yemen/analysis.html.
80 Ibid.
81 Ibid “Methodology.”
active database as “both the timelines and casualty counts change” as “new information on a particular strike or action can emerge months or years after an event.”

In order to develop the dependent variable “INCIDENT”, I assembled the counts of AQAP terrorist attacks against military and civilian targets using University of Maryland’s Global Terrorism Database (GTD). GTD is an open-source database that includes systematic data on domestic as well as transnational and international terrorist incidents from 1970 to 2003. Each GTD incident marked under “AQAP” includes information on the date and location of the incident, the weapons used, the nature of the target, and the number of casualties.

Using both civilian and military targets allows me to better assess AQAP’s overall capabilities as both an insurgency and a terrorist cell. Military targets reflect AQAP’s insurgent interest in delegitimizing, paralyzing, and fragmenting the state. On the other hand, civilian targets represent AQAP’s use of selective violence, which Kalyvas regards as aggression towards individuals perceived as spies or informants within the insurgent’s zone of control. Civilian attacks include attacks against tourists from other countries.

Along the same lines, examining the lethality of AQAP attacks could provide another proxy for understanding AQAP capabilities. Thus, I created the variable “LETHALITY” that incorporates GTD data on total casualties from each incident. Higher number of casualties from an incident could indicate higher level of planning, greater financing, and use of more sophisticated weapons such as Improvised Explosive

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83 “About GTD” 2015.
84 Ibid.
85 Kilcullen 2006.
86 Kalyvas 2006.
Devices (IEDs) or Vehicle-Borne Improvised Explosive Devices (VBIED). Thus, “LETHALITY” could allow me to explore death toll trends of incidents, which could serve as an indicator for measuring AQAP’s organizational strength over time.

Table 1 summarizes the statistics of all the variables I have gathered data for. I focus on three independent variables, (1) number of air and drone strikes (2) resulting casualties and (3) senior al Qaeda members killed, along with two independent variables that measure terrorist activity: (1) number of AQAP incidents and (2) lethality of attacks.

- **STRIKE**: number of drone strikes given a governorate and month
- **HVI**: number of senior leaders killed by a strike in a given governorate and month (source: New America Foundation)
- **INCIDENT**: total number of AQAP attacks in a given governorate and month
- **LETHALITY**: total number of people killed or injured by AQAP attacks in a given governorate and month

4.3 Descriptive Statistics and Graphs:

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87 It is given that lethality does not perfectly correlate with capability. Assassinations of government and military officials have minimal death tolls, but they still reflect AQAP organizational sophistication. Nevertheless, “LETHALITY” offers information about the overall year.

88 In order to test the hypothesis whether leadership decapitation leads to degradation of an organization, I created the dummy variable “HVI” (for High-Valued Individual) that counts casualties of senior AQAP leaders from a strike. If a drone or air strike killed an Senior AQAP leader, then HVI will noted as “1”; if not, then HVI will be noted as “0”. The NAF maintain an updated list of the AQAP hierarchy that also includes leaders that have been killed by strikes.
I constructed a governorate-month dataset spanning from January 2010 to December 2013. The summary statistics for the variables discussed in the previous section are presented in Table 1.

Figure 3, 4, 5, 6 and 7 depict the yearly trends in US strikes and AQAP attacks for Yemen. Given the high degree of positive correlation illustrated in some of the years (as seen in Figure 3 and 4), it is difficult to say with any certainty that the empirical model is not endogenous. However, since Figures 3 and 5 do not show a high degree of correlation, I will assume, for the purpose of this paper, that drone strikes are exogenous. If they are endogenous, the empirical model in this paper would need to be revised.

4.4 Estimation and Results

For the following analysis, I estimate a two-level fixed effects at the governorate and month levels in order to test the causal relationship between incident (and incident related variables) and strike (and strike related variables). In order to estimate spillover effects—particularly the displacement of violence after drone strikes—I also conduct spatial analysis using GIS mapping. Spatial analysis could reveal trends as to whether presence of strikes in a given governorate prompts terrorists to shift their base of operation to another governorate. This shift could be estimated by mapping terror incidents and U.S. strikes and finding geographic patterns between the two variables.

This study does not rely on an OLS linear regression because the outcome variable INCIDENT violates certain OLS assumptions. Each INCIDENT data point represents the number of incidents that happened in a given governorate and during a given month. Given the infrequent occurrence of terrorist attacks in certain months and/or
governorates, and the impossibility of having negative terrorist attacks, the INCIDENT variable is censored at “0” as shown in Figures 7 and 8. Since OLS assumes that the dependent variable is a continuous value and normally distributed, a regular linear regression will not produce the best linear unbiased estimator (BLUE).

On the other hand, the Poisson and Negative Binomial models are designed to analyze count data, particularly when the data is intrinsically heteroskedastic, with the variance increasing near the mean. While the Poisson model assumes that the conditional variance of the dependent variable is equal to the conditional variance of the mean, the Negative Binomial Regression model accounts for the overdispersion of the data. In this case, I use both Poisson and Negative Binomial Regression models depending on whether a model passes the Pearson Goodness of Fit test. If after a running a Poisson regression I find that the model does not fit the Pearson test (particularly if the p<.05) then, I use the Negative Binomial Regression Model.

4.31 Results:

**Disruption:**

In order to test hypotheses 1, 2, and 3, I used INCIDENT and LETHALITY as measures of AQAP violence, and modeled how US strikes impact these measures. Violence provides a reasonable proxy for AQAP capabilities—expectedly, the stronger the organization, the more attacks it is able to carry out. Thus, the following regressions will attempt to analyze whether US strikes disrupt AQAP violence, which in turn could

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89 Cameron and Trivedi 2001.
90 Ibid.
tell a bigger story about the impact of strikes on the capacity and capabilities of the AQAP organization.

\[
\text{log Incident}_i = \beta_0 + \beta_1\text{Strike} + \beta_2\text{Governorate} + e_i
\]

\[
\text{log Incident}_i = \beta_0 + \beta_1\text{Strike} + \beta_2\text{Governorate} + \beta_3\text{Month} + e_i
\]

\[
\text{log Incident}_i = \beta_0 + \beta_1\text{Strike} + \beta_2\text{Governorate} + \beta_3\text{Month}\times\text{Year} + e_i
\]

Since all the coefficients from this regression will be reflected in logs, I will transform the coefficients to Incidence Rate Ratios (IRR), where one minus the coefficient equals the percentage change in the dependent variable when there is a one-unit increase in the independent variable.

The constant \(\beta_0\) reflects the percentage change in incident in given governorate and month when there are no strikes. The coefficient \(\beta_1\) examines the percentage change in incident when there is a one-unit change in US strikes. The coefficient \(\beta_2\) shows the differential percentage change in incident within each governorate; \(\beta_3\) shows the differential percentage change between each month; \(\beta_4\) shows the differential percentage change between each month-year.

Does the use of air and drone strikes in Yemen disrupt AQAP violence? Table 2 presents coefficients of the variable STRIKE on the outcome variable INCIDENT modeled under three different regressions. The first regression includes only governorate fixed effects; the second includes governorate and month fixed effects; the third one includes governorate and month-year fixed effects.
While the above regressions models are able to control for a number of unobservable factors through time and cross-sectional fixed effects, they do not account for variables that trend differentially by governorate and month-year. This includes certain economic and political variables—such as unemployment, GDP, youth population, tribal affiliations, elections, and presence of other insurgent groups—whose exclusion could possibly bias the coefficient on STRIKE. For example, in the observed years of 2010-2013, the monthly unemployment rate of one governorate could have grown at a different rate than the monthly unemployment rate of another governorate. However, I am unable to explore governorate-level trends in monthly unemployment, as the Yemen government does not publish these statistics. Therefore, my model operates under the assumption that the trends in monthly unemployment rate, along with the aforementioned variables, do not vary at the governorate-level. Thus, the results of the following regressions must be interpreted with caution due to possible threats to validity from the heteroskedasticity of unobserved variables at the cross-sectional level.

The first regression shows, with statistical significance, that a one unit increase in STRIKE results in a 38.2% likelihood of a terrorist incident in a given governorate and month. However, since this regression does not account for secular time trends and variation between the different months and years, the coefficient is subject to omitted variable bias; thus, it might not capture the true causal relationship between the US strikes and AQAP attacks. The second regression—which controls for month trends—also yields a statistically significant coefficient: a 34.06% likelihood of a terrorist incident when there is a one unit increase in “strike.” While this coefficient accounts for monthly trends--like fighting seasons and changes in climate--it fails to account for variation of
months between years. The third regression addresses the problem of inter-month-year variation, and yields an estimate--at the 10 percent significance level--of a 17.02% likelihood of a terrorist attack when there is a one unit increase in “strike.”

In order to compare which model fits the data best, I use the Akaike Information Criteria, where $AIC = -2\log(L) + 2p$, where $p$ is the number of parameters of the model.\(^9\) The smaller the AIC of a model, the better the fit. The conventional wisdom for AIC comparisons indicates that two models should only be significantly different if the difference between the AICs exceeds by 10.\(^9\) In this case, the difference between the third regression and second regression exceeds by over 100, indicating that the third regression yields the best fitting model.

Thus, the third regression offers the best estimate of the causal relationship between AQAP attacks and drone strikes. However, since the $\beta_1$ coefficient from this regression is significant only at the 10 percent-level, I am not confidently able to reject the null hypothesis that US strikes reduce AQAP attacks.

In the second regression, the outcome variable $\log Lethality$ will act as proxy for terrorist capabilities, where the casualties of a terrorist attack represents the sophistication of the methods used by the terrorist group. The regression will attempt to show how drone strikes impact terrorist capabilities, where coefficient $\beta_1$ will examine the percentage change in lethality when there is a one unit change in STRIKE, with $\beta_2$ and $\beta_3$ retaining the same function as the first set of regressions but in relation to $log lethality$ outcome variable.

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\(^9\) Dekwarde, Denuit, and Partat C 2007

\(^9\) Burnham and Anderson 2002.
It is also important to note that while the variable LETHALITY might provide a likelihood estimator, it does not perfectly represent the impact of AQAP attacks on the Yemeni state. For example, the assassination of an important government official could be more destructive to the state than the casualties of several civilians. However, the model does not account for the political importance of the individuals assassinated—it only looks at casualty levels to estimate the likelihood of a lethality, given a US strike. Thus, the true “disruption” of US strikes on AQAP’s strategic gains cannot be discerned from this model. Nevertheless, measuring casualty levels provides a reasonable proxy for testing the hypothesis of AQAP capabilities—generally, the greater the likelihood of a lethality, the more successful the group is in organizing and carrying out its attacks.

\[
\log \text{lethality}_i = \beta_0 + \beta_1 \text{Strike} + \beta_2 \text{Governorate} + \epsilon_i
\]

\[
\log \text{lethality}_i = \beta_0 + \beta_1 \text{Strike} + \beta_2 \text{Governorate} + \beta_3 \text{Month} + \epsilon_i
\]

\[
\log \text{lethality}_i = \beta_0 + \beta_1 \text{Strike} + \beta_2 \text{Governorate} + \beta_4 \text{Month} \times \text{Year} + \epsilon_i
\]

Table 3 shows the results for the preceding regressions. Similar to the modeling choice scenario for the outcome variable INCIDENT the third regression best fits the model with the lowest AIC statistic. The \(\beta_1\) coefficient on this model suggests that a one unit increase in US strike leads to a .7 percent likelihood of a lethality from an AQAP attack. However, this coefficient is not statistically significant; thus I am unable to reject the null hypothesis that US strikes do not increase the likelihood of lethalities from AQAP attacks.
Degradation:

In order to test hypotheses 4 and 5, I will attempt to model the impact of leadership decapitation on AQAP capabilities.

\[
\text{log Incident}_i = \beta_0 + \beta_1 \text{HVI} + \beta_2 \text{Month*Year} + \beta_3 \text{Governorate} + e_i
\]

\[
\text{log Lethality}_i = \beta_0 + \beta_1 \text{HVI} + \beta_2 \text{Month*Year} + \beta_3 \text{Governorate} + e_i
\]

where the constant \( \beta_0 \) will reflect the rate of incidents in a given governorate and month when there are no deaths of HVI. The coefficient \( \beta_1 \) will examine the percentage change in lethality when there is a one-unit change in the casualty of a HVI. The coefficient \( \beta_2 \) shows the differential percentage change between each month*year. Thus, the addition of \( \beta_1 \) and \( \beta_2 \) reflects the percentage change in lethality in a particular month and year when there is a one unit change in HVI. Similarly, the coefficient \( \beta_3 \) shows the differential percentage change between each governorate.

The second regression will attempt to show how the deaths of senior AQAP leaders impact the organization’s capabilities, where coefficient \( \beta_1 \) will examine the percentage change in lethality when there is a one-unit change in HVI. \( \beta_2 \) and \( \beta_3 \), retaining the same function as the first regression but in relation to the outcome variable \( \text{log lethality} \).

While Johnston and Sarbahi interacted the variable “strike” with “HVI” to determine how--when controlling for drone strikes--the death high valued individuals impact terrorist incidents and attack lethalitys. I decided not to use this approach because because I believe it poses some collinearity problems. A HVI casualty is a direct result of
a US strike, thus “HVI” correlates with the variable “strike.” If I including “strike” and “HVI” as explanatory variables in my model, the presence of collinearity could lower the predictive power of either variable.

Tables 4 and 5 show the results from the preceding regressions. For both outcome variables “Incident” and “Lethality”, coefficients are significant under governorate and month fixed effects, but insignificant under month-year fixed effects. As mentioned before, interpreting the month-only fixed effects could pose a threat to internal validity due to the inter-year variation between months that could arise from unobserved variables. Thus, I am unable to confidently support the results from a month-only fixed effects model.

**Duration**

In order to test whether the impact of US strikes differ depending on the duration of the attacks, I used the following regressions using time lags for the variable “strike”:

$$
\log \text{ Incident}_i = \beta_0 + \beta_1 \text{Strike}_{t-1} + \beta_2 \text{Strike}_{t-2} + \beta_3 \text{Strike}_{t-3} + \beta_4 \text{Strike}_{t-4} + \beta_5 \text{Strike}_{t-5} + \beta_6 \text{Strike}_{t-6} + \beta_7 \text{Month} \times \text{Year} + \beta_8 \text{Governorate} + \epsilon_i
$$

and

$$
\log \text{ Lethality}_i = \beta_0 + \beta_1 \text{Strike}_{t-1} + \beta_2 \text{Strike}_{t-2} + \beta_3 \text{Strike}_{t-3} + \beta_4 \text{Strike}_{t-4} + \beta_5 \text{Strike}_{t-5} + \beta_6 \text{Strike}_{t-6} + \beta_7 \text{Month} \times \text{Year} + \beta_8 \text{Governorate} + \epsilon_i
$$

The duration regressions include time lags for six months, with $\beta_2$ representing the coefficient on a one month lag ($\text{Strike}_{t-1}$), $\beta_3$ representing the coefficient on a two month
lag \((\text{Strike}_{t-2})\); \(\beta_4\) representing the coefficient on a three month lag \((\text{Strike}_{t-3})\), etc. The coefficients show the significance of the relationship between strikes that occurred 1-6 months prior, and the outcome variables “incident” and “lethality.” A six-month lag provides a lengthy window for me to assess whether the impact of US strikes on AQAP violence emerges with time. Furthermore, using lagged variables could allow me to confront some of the endogeneity problems that I previously discussed. If a strike happened within the window of 6 months, does it increase or decrease the violence in a given month and governorate?

Table 6 describes the results, with both outcome variables INCIDENT and LETHALITY treated with month fixed effects (the first two columns) and month-year fixed effects (the last two columns). The results show a statistically significant coefficient for the 3-month lagged strike variable “Strike\(_{t-3}\)” at the 5 percent level. It indicates that a one unit increase in US Strike leads to a .14 percent decrease in the likelihood of an AQAP attack. However, all other lagged coefficients remain statistically insignificant. Thus, I am unable to confidently support either Hypothesis 6 that US Strikes have a sustained violence reducing impact in Yemen.

**Dispersion:**

Do US Strikes disperse the violence in Yemen? In order to explore this hypothesis, I first tried to replicate the econometric spatial-lag approach that Johnston and Sarbahi used in their paper. Spatial lags work best when there is cause to believe that the panel data suffers from cross-sectional dependence. In the context of my analysis, cross-sectional dependence would mean that a US Strike in one governorate affects
AQAP violence in a nearby governorate. In order to rectify possible biases that could result from this type of cross-sectional dependence, economists and political scientists often use spatial lags—where the dependent variable is lagged by geographic space, with the radius from the observed location increasing with each additional lag.

However, before using spatial-lags, it is customary to test whether the panel data suffers from cross-sectional dependence in the first place. When I conducted the Pesaran CD test on my regressions—the conventional test used to check if unobserved variables might be correlated with observed variables across cross-sections.93 I was able to reject the null that my errors suffered from cross-sectional dependence--meaning I could support the hypothesis that a US strike in one governorate does not impact AQAP violence in another governorate. Thus, I decided not to rely on the spatial lag model in my study.

However, in order to test whether AQAP violence shifts over time, I used arcGIS to map AQAP incidents and US Strikes from 2010 to 2013. Figure 8 shows the geographic dispersion of AQAP violence--depicted by the color gradient that ranges from white to deep red to indicate the levels of violence in a given governorate--and the geographic dispersion of US Strikes--depicted by the grey circles, whose size reflects the number of strikes in a given governorate. Figures 9,10,11 and 12 are magnified representations of 2010, 2011, 2012, and 2013 respectively.

Note that in Figure 8, there are very few drone strikes, which correlates with the low intensity of AQAP attacks. In addition, the incidents seem to be located in a select few governorates, particularly in Abyan and Sanaa. However, after a year, Figure 9

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suggests that while attacks continue to remain concentrated in the aforementioned governorates, they also seem to have spread to a growing number of other areas. This trend only intensifies as we look at Figures 10 and 11, which represent 2012 and 2013.

Furthermore, it seems that the areas with the most number of incidents also have the most number of drone strikes. Thus, we could expect that the high number of drone strikes in a particular area would dissuade the militants from continuing to operate in that area. The visual trends seems to demonstrate the hypothesis—the greater the drone strikes in a given year, the more the spread of AQAP violence.

While I am unable to prove a causal relationship between US strikes and the dispersion of AQAP activities, I am able to use these visual trends to assert that some correlation seems to exist between the two variables. These visual trends seem to suggest that drone strikes in a given governorate do not contain violence within that governorate; but provoke AQAP to shift its operations its violence to other governorates. If a causal relationship can be derived from this trend, it would suggest that the US is simply playing whack-a-mole with AQAP—a strike in one governorate might just yield an incident in another governorate.

### 5 Anecdotal Evidence

Although the econometric study fails to find empirical evidence that US Strikes disrupt, degrade, and disperse AQAP violence, a diverging body of anecdotal evidence does indicate that AQAP remains a viable domestic and international security threat, despite the American drone campaign. According to a hearing in the Subcommittee for Homeland Security, in the last few years, “while core al-Qaeda declined in Pakistan,
AQAP strengthened in Yemen…with a core membership [that] grew from approximately 300 members in 2009 to around 1,000 in 2012…”94 The increase in recruitment coincides with AQAP’s most recent plots against Western targets--like the 2013 threat against the US Embassy that forced a shutdown on all Western embassies down for 22 days, or the recent January 2015 attack in Paris against the French satirical newspaper “Charlie Hebdo.” It seems that despite its loss of most of its command structure due to drone strikes, AQAP uses a variety of different mechanisms to remain a resilient organization. These mechanisms include (1) engaging local tribes through governance, (2) crafting a strong domestic and foreign propaganda machine that dissipates a single narrative that allows for AQAP to co opt rational local objectives with a global agenda; and finally (3) legitimizing a political movement through territorial gain. The following section will supply more in-depth observations about these mechanisms, providing explanations for how AQAP functions both as local insurgency and global terrorist network; and shedding light upon deficiencies of the current US counterterrorism policy in Yemen.

5.1 Tribal Engagement

The late AQAO cleric Anwar Awalki once said “the cradle for Jihad today are the tribes.”95 While the Yemeni government was set up as a parliamentary democracy, Yemeni tribes possess serious social and political capital, “often act[ing] as a state in their own right, controlling territory and imposing their own laws in the country’s rugged mountains.”96 AQAP, knowing that tribal affiliation will provide them much needed

94 Subcommittee Hearing, 8
95 A False Foundation, 49
96 Johnsen 2013, 7
security and sanctuary, employed a series of strategies to engage various tribal groups in both North and South Yemen. These strategies primarily included governance through public service, intermarriage, and media communications.

In order to initially win tribal support, AQAP promised many tribes in the Marib and al-Jawf its support in intertribal conflicts. However, AQAP was particularly able to catapult its cause after the Saleh government ran a series of raids on several tribal regions, which sometimes left many civilians dead. As tribal groups became increasingly agitated with Sana’a, AQAP was able to exploit this grievance by promising vengeance against the Saleh regime and allegiance to the tribal sheikhs. Their allegiance came in the form of public service, such as offering to build schools, or through intermarriage, where high-level operatives married into different tribal groups.

Along the same line, AQAP also uses media communications as part of its tribal outreach effort, where each level of virtual engagement involves “a series of discourse before confronting tribesmen with recommendations for action.” The prominence of videos and written statements directed towards tribal groups—along with the aforementioned efforts towards providing governance—indicate AQAP’s long-term investment in the tribal landscape. The current U.S. counterterrorism strategy does not take into account how tribes could provide a ready-made pool of recruits for AQAP. According to a former deputy chief of mission to Yemen, "Drone strikes take out a few bad guys to be sure, but they also kill a large number of innocent civilians. Given Yemen’s tribal structure, the U.S. generates roughly forty to sixty new enemies for every

97 A False Foundation, 100.
98 Johnsen 2010
99 Johnsen 2013, 40
AQAP [al Qaeda in the Arabian Peninsula] operative killed by drones."\(^{100}\) And as civilian death tolls from drone strikes increase in Yemen, AQAP continues to legitimize its governance by leveraging the anger of tribal factions and propagating their grievances against US and the Yemeni state.\(^ {101}\) As Yemeni tribes possess great political and social capital in Yemen, a US counterterrorism policy that marginalizes the tribal population could inadvertently produce more recruits for AQAP. This suggests that tribal engagement should play an important role in American involvement in Yemen—where a campaign to win the “hearts and minds” of tribal factions—should be considered over the current counterterrorism campaign that relies predominantly on targeted killings.

5.2 The AQAP Propaganda Machine

Multiple insurgencies and political parties battle for power in Yemen, each fighting for their own set of grievances and competing political ideologies. In order to set itself apart from these different groups, AQAP attempts to project a message that is unifying and inclusive to all Yemeni people—a narrative that transcends class, tribe and regional identity. One of the main marketing strategies that AQAP uses in the local level is to project itself as a paternalistic protector of Muslims around the world. This “Muslim Protector” narrative is not foreign to the Yemeni people. During the Afghan Mujahedeen, the Yemeni government and tribal leaders had pledged thousands of young men to fight the “holy war” against the Soviet Union. This jihad was viewed as a rite of passage for

\(^{100}\) Sledge 2013.

\(^{101}\) Mothana 2012.
many, where protecting the Muslim brothers and sisters of a foreign land embodied the Prophet’s battle against the unbelievers and infidels.\textsuperscript{102}

AQAP constantly draws upon Yemen’s involvement in the Afghanistan, particularly by portraying the mission of AQAP as a continuation of the mujahedeen, where the Yemenis will once again be “pursuers of righteousness…” [and] “target criminals from America, Crusaders, and henchmen from security forces and intelligence officials responsible for shedding blood of women and children in Aden, Mu`ajalla [Abyan], al-Dal’a, Lahj, Lawdar, Marib, Ta`izz, and Shabwah.”\textsuperscript{103}

Even this particular statement, which was from a video release in February 2011 in a series called Masar ‘al-Khuna (“Fighter of Traitors”), is testament to how AQAP promotes the narrative that jihad the only solution to all the popular grievances of the Yemeni people.\textsuperscript{104} Furthermore, since Yemen had played an instrumental role in providing foreign fighters for the Afghan Mujahedeen, the idea of fighting for a similar domestic cause could be presented in the familiar “Mujahedeen” platform. Similarly, by claiming reference to the Mujahedeen, AQAP presents itself as a reflection of local population and the global community of subjugated Muslims. By declaring jihad to be the only solution to all the popular grievances of the Muslim people, AQAP is able to merge its local and global ambitions in a narrative that could be palatable to both Yemenis and foreigners alike. However, having a unified narrative is useless without having the proper mechanisms to voice the message. Using a variety of mediums and technologies, AQAP has been able to establish a strong publicity arm that serves to create

\textsuperscript{102} Johnsen 2013, 7
\textsuperscript{103} False Foundation, 44
\textsuperscript{104} Ibid.
a local and foreign support base and provides a major tool for recruitment of operatives. The complex propaganda machine of AQAP primarily seeks to (1) delegitimize the Yemeni government, (2) exploit popular grievances Yemeni of the people, (3) and provide theological arguments (especially using Sharia law) to recruit, develop support, and justify its attacks.

5.21 *Sada al-Malahim*

In seeking a Yemen permissive for terrorism, AQAP has worked to position itself as the foremost legitimate means for expressing discontent with the political status quo. One of the main ways that AQAP delegitimizes Sana’a is by characterizing the government as un-Islamic, claiming that it neither represents the interests of the people nor the principles of Islam. In 2008, the group began publishing a magazine, *Sada al-Malahim* (*"The Echo of Battle"*), which helped to spread its ideological message in Yemen and around the region. Many of its issues focus on the corruption in Sana’a, the lack of public service, Saleh’s ties to the United States, and the movement towards secularization.\(^{105}\)

Apart from spelling out the grievances the group holds against the Yemeni government, the magazine also speaks out strongly against West and why the Yemeni people must withdraw their allegiance from the “apostate” government in Sana’a and transfer their loyalty to more legitimate leaders, who will expel all non-Muslim interests from the Arabian Peninsula and establish the application of Islamic law."\(^{106}\) In one of the issues, the Mohammed al-Qahtani, the former Guantanamo Bay Detainee who was

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\(^{105}\) Al Jazeera 2014

\(^{106}\) A False Foundation, 40
allegedly involved in the September 11 attacks, issued a statement in *Sada* about why the Yemeni Mujahedeen will be emblematic of the fall of the West:

My choice was based on two reasons, the first and most important is a religious reason, as the Almighty said “Fight the unbelievers who are near to you, and let them find harshness in you,” and to execute the commandment of the messenger of God, who said “expel the polytheists from the Arabian Peninsula” and to liberate al-Qibla of Muslims and the mosque of Mustafa and to cleanse the land of the peninsula . . . from the filth of the polytheists and apostates… If the interests of the enemy in the Arabian Peninsula were hit and the funding from oil was stopped and the oil refineries were destroyed, the enemy would collapse, and it would not only withdraw from Iraq and Afghanistan, but it would completely collapse. If it were to be hit from various locations, it would withdraw humiliated from the land of Mohammed…

The presence of such propaganda allows AQAP to evoke the religious significance of fighting the jihad in Yemen, which can serve a recruitment tool for local fighters while elevating the significance of Yemen’s place in the global jihad. Current counterterrorism efforts in Yemen should consider the importance of local propaganda output: if drone strikes are unable to stop the publishing of local arabic language magazines such as *Sada al-Malahim* --which also holds an online presence--then AQAP can still remain successful in attracting and possibly mobilizing new members.

### 5.22 INSPiRE Magazine

AQAP’s Western strategy advances a second aim distinct from the group’s objectives in Yemen. While *Sada al-Malahim* calls for Yemenis to join the fight against

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the West through the AQAP front, *Inspire*, AQAP’s English-language magazine, does not seek to recruit foreign fighters for the Yemeni movement. Instead, it provokes its readers to become lone-wolf jihadis, prompting them to take on their own jihad within their own communities, without seeking guidance or military training abroad. For example, the magazine lays out how very few tools are necessary to carry out an attack:

Two Nokia mobiles, $150 each, two HP printers, $300 each, plus shipping, transportation and other miscellaneous expenses add up to a total bill of $4,200. That is all what [sic] Operation Hemorrhage cost us. In terms of time it took us three months to plan and execute the operation from beginning to end. On the other hand this supposedly “foiled plot”, as some of our enemies would like to call [it], will without a doubt cost America and other Western countries billions of dollars in new security measures. That is what we call leverage.\(^{108}\)

Although Awlaki was killed by a drone strike in 2011, *Inspire* continues to publish issues online. The magazine is well crafted, complete with color schemes and layouts using InDesign software. This best exemplifies how the threat of AQAP does not necessarily rest upon its physical capability of attacking the Western homeland; rather, the AQAP threat depends upon its ability to spread radical ideology to a foreign audience through innovative, accessible platforms. In May 2013, two Chechen brothers bombed the Boston Marathon, killing a few and injuring hundreds more. The Tsarnaev brothers allegedly acted alone as lone wolves, waging their own personal jihad against the United States. However, they began their journey to radicalization after watching sermons of Anwar Awlaki on Youtube and then reading *Inspire* magazine, which provided detailed instructions on how to construct an undetectable homemade bomb. In this case, AQAP

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\(^{108}\) *Inspire*, Al-Qa’ida in the Arabian Peninsula, volume 3 (2 November 2010), 3, 7, 15; *Inspire* (volume 1),
somehow inadvertently played an important role in enabling the actions of terrorists, who were able to carry out AQAP’s jihad without ever having stepped into the mountainous sanctuary tucked in the hinterlands of Yemen. The fact that AQAP can export its violence to Western countries without using operatives suggests another deficiency in the American counterterrorism policy.

5.3 Territorial Gain:

Bin Laden once pointed out in late 1996 that in Yemen, “the topography is mountainous, [the] people are tribal, armed, and allow one to breathe clear air unblemished with humiliation.” Alliances with tribes of mountainous would provide AQAP with the most important form of security: freedom from law enforcement. By establishing base in ungoverned space, AQAP could operate free from the threat of law enforcement while still enjoying the benefits of a viable recruitment base.

Many sources indicate that AQAP has developed strongholds in the governorates of Ma’rib, Shabwah, and al Jawf through its relationships with tribal sheiks. In Southern Yemen, an AQAP insurgent group called “Ansar al Sharia” began to take hold in the Abyan governorate. By securing control of these different governorates in the North and South, AQAP could take control of historic trafficking routes that pass through parts of Marib, al-Jawf and Abyan, which would further assist the group in securing funding from supporters in Saudi Arabia. Ansar al Sharia best exemplifies AQAP’s attempt at crafting an insurgency.. In distinguishing itself from the al Qaeda terrorist affiliate, AAS presents itself as legitimate,

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109 False Foundations, 19
110 “Al-Qaeda 3.0: Exploiting Unrest from Syria to Sahel” 2013.
political entity, with propaganda videos showing “AAS connecting electricity lines in Ja’ar suburbs and images of electric lights and fans operating correctly.” By providing a form of governance to the locals, AAS also integrates itself with both the urban and tribal framework of Abyan.

Senior AQAP cleric Abu Zubayr Adel al-Abab, has said “the name Ansar al-Shari’a is what we use to introduce ourselves in areas where we work, to tell people about our work and goals.” Mohammed al-Bashar, the Yemeni Embassy’s official spokesman in Washington, D.C., described AAS as “AQAP’s attempt to empower local jihadi-linked actors with ties to AQAP, and rebrand the movement under a global positive banner... After all, who would dare say no to Islamic law?” Moreover, AAS and AQAP have a symbiotic relationship. The two groups “feed on each other. They support each other. They certainly are related, but they’re not identical.”

While AAS has lost some territory after the Yemeni government led a series of counter terrorism raids in 2012, the group continues to operate in the region and still poses a threat to the Yemeni security. Furthermore, considering the recent coup d’état, the Yemeni government no longer posses the military or law enforcement forces to quell an AAS rebellion if it were to happen. As current US counterterrorism or counterinsurgency efforts do not seem to have sufficiently thwarted AAS expansion, additional measures must be considered. If AAS gains the capabilities to stage a coup

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111 Simcox 2014.
113 Mohammed al-Bashar, Yemen Embassy Spokesman, Interview by Robin Simcox, Washington, D.C., 3 July 2012
114 Ibid.
against the sitting Shiite government, then essentially, AQAP will have successfully taken control over the Yemeni state

6 Implications and Conclusions

Through this thesis, I set out to investigate whether the current US counterterrorism policy in Yemen sufficiently addresses the domestic and international threat posed by Al Qaeda in the Arab Peninsula. Using violence as a proxy for AQAP’s capabilities, I first relied on regression analysis in order to estimate the relationship between US Strikes and AQAP militancy. The empirical strategy utilized count regression models—particularly the Poisson and the Negative Binomial models—and incorporated governorate and month-year fixed effects to account for time-invariant factors and temporal variation. With these models, I tested several hypotheses on two different outcome variables—(1) number of terrorist incidents and (2) number of people killed from terrorist incidents—in order to determine whether a causal relationship existed between US Strikes and AQAP violence.

The results from my experiment indicate that no consistent, causal relationship exists between the two aforementioned variables, contradicting the findings of Johnston and Sarbahi (2015) that claim that drone strikes have a violence reducing impact on militant groups. On the other hand, my thesis is also unable to confidently assert that US strikes have a violence increasing effect, as none of my coefficients from my econometric model pass the statistical significance threshold.

Nevertheless, trends within the data indicate that AQAP violence and US strikes are highly correlated, suggesting that the current counterterrorism policy has done little to
curb the violence. It seems to follow that when drone strikes increases, AQAP violence simultaneously increases, and vice versa. Similarly, mapping data also reveals that the dispersion of AQAP violence is associated with an increase in US strikes. Through the maps, we can see visual trends of AQAP violence geographically moving away from drone strikes and increasing in other parts of the country. This indicates that the US counterterrorism policy does not sufficiently contain the violence geographically—it just displaces it somewhere else.

However, these trends must be observed with caution. The age-old “correlation is not causation” argument especially applies here due to possible endogeniety problems between the outcome variable and the independent variable. Thus, additional empirical research is needed on the topic to understand how causality fits into the framework. Perhaps a more robust model could use random effects instead of fixed effects—having more observable explanatory variables in the dataset could allow for more sophisticated econometric analysis and could alleviate measurement errors from omitted variable bias. Unfortunately, due to my limited access to data, I could only rely on a fixed effects model in order to test my hypotheses. However, I believe that with access to other governorate-level data on variables such as GDP, unemployment, youth population, access to internet, etc. could allow for the numbers to tell a much more interesting story. Thus, I believe the US should consider investing more resources into empirically evaluating the impact of its counterterrorism policy in Yemen and/or in other countries where drone warfare is becoming popularized. Then, rather than simply relying on political rhetoric in the decision to enter wars, the public and policymakers alike can have access to empirical hindsight regarding the effectiveness of this hallmark US counterterrorism policy.
However, until then, plenty of anecdotal evidence indicates that air and drone strikes are doing little to thwart the AQAP threat in Yemen. AQAP is an intelligent organization. Using a variety of different mechanisms, it has been able to manage a local insurgency while sponsoring a global terrorist network. Through tribal engagement, AQAP was able to spark an insurgent arm in southern Yemen. Through a single, unifying narrative that calls for a Yemeni mujahedeen—one to protect _all_ subjugated Muslims—AQAP has been able to exploit the grievances of the Yemeni people, prompting a call for arms against the Yemeni government and Western influence in the Arabian Peninsula. Through its variety of media platforms, AQAP has been able to project its radical ideology to an international audience.

By coopting a local agenda within the larger, global jihad framework, AQAP has been able to build a strong Yemeni base while still spreading its influence abroad. When thinking about counterterrorism policies against Yemen, this local/global dynamic must become part of the discussion. A persistent air campaign may disrupt the AQAP, but it does little to dismantle the deep historic roots of mujahedeen and jihadism in Southern Yemen, or curb the bellowing voice of Anwar Awlaki’s ghost readily available on Youtube or _Inspire_. It is important to acknowledge that AQAP pursues a variety of strategies to achieve its goals: it can simultaneously display the organizational characteristics of a terrorist group, the tactics of a guerilla movement, and a rhetoric of a political party. By understanding the multi-dimensional way that AQAP operates, U.S. counterterrorism efforts should consider counterinsurgency efforts—where the civilian population becomes the focus rather than the terrorist network—and find a multifaceted way to address the many elements that continue to keep AQAP strong. By doing so, the
United States can allow for the Yemeni government to regain some of its legitimacy amongst its people, while insuring the demise of AQAP’s popularity within the Arabian Peninsula.

References:


Al-Qaeda 3.0: Exploiting Unrest from Syria to Sahel: Expert,” Agence France-Presse, January 26, 2013;


Mohammed al-Bashar, Yemen Embassy Spokesman, Interview by Robin Simcox, Washington, D.C., 3 July 2012


"Subcommittee Hearing: Understanding the Threat to the Homeland from AQAP."


Appendix One

Table 1: Summary Statistics

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Number of Observations 1008

Impact of US Strikes on AQAP incidents

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*P<.10, **P<.05, ***P<.01

Note 1: All results are reported as incidence rate ratios (IRR) The IRR represents the change in the dependent variable in terms of a percentage increase or decrease, with the precise percentage determined by the amount the IRR is either above or below 1. For example, the coefficient on strike from the third regression could be interpreted as a 17.02 percent likelihood of an AQAP attack when there is a one unit increase in strike.
### Impact of US Strikes on incident lethality

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*P<.10, **P<.05, ***P<.01

### Table 4: Impact of HVI casualties on AQAP Attacks

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Table 5: Impact of HVI casualties on incident lethalitys

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Table 6: Impact of US Strikes on Incident and Lethality with lags

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Appendix Two:

**Figure 1:** US Strikes in Yemen from 2002 to 2014

**Figure 2:** Monthly Time Trends in Terrorist Attacks
Figure 3: US Strikes and AQAP attacks in 2010

Figure 4: US Strikes and AQAP Attacks 2011
**Figure 5:** US Strikes and AQAP Attacks 2012

**Figure 6:** US Strikes and AQAP Attacks 2013
Figure 7: Time Trends in Terrorist Attacks and U.S. Strikes
Figure 7 and 8: The Non-Normal Distribution of the Dependent Variable and its Errors
Figure 8: AQAP violence and US Strikes from 2010 to 2011
Figure 9: AQAP violence and US Strikes in 2010
Figure 10: AQAP violence and US Strikes in 2011
Figure 11: AQAP violence and US Strikes in 2012
Figure 12: AQAP violence and US Strikes in 2013