THE IMPACT OF DRONE ATTACKS ON TERRORISM: THE CASE OF PAKISTAN

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REMOTE CONTROL

Examining changes in military engagement

The Remote Control project is a project of the **Network for Social Change** hosted by **Oxford Research Group**. The project examines changes in military engagement, in particular the use of drones, special forces, private military companies and cyber warfare.

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Cover image: The ruins of a building in Karachi after a bomb exploded outside a Shiite mosque in Abbas Town. Creative Commons, Flickr / Nadir Burney

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Executive Summary

This report examines the issue of terrorist backlash after drone attacks. The question of whether counterterrorism strategies that employ targeted killings downgrade or foster future terrorist attacks is analysed by using Pakistan (from 2004-2013) as a case study. The report finds that the traditional argument of deterrence, and the argument of subsequent terrorist backlash, are both present in the case study, but their prevalence is dependent upon where the measure of effectiveness occurs.

Academic literature suggests a number of explanations for why terrorist attacks should lesson in the wake of targeted killings:

- Targeted killings may dis-incentivize terrorist organisations and cause a deterrent effect
- Target killings deprives terrorist organisations of valued recruits and increases co-ordination costs.
- Target killings forces members of the terrorist group to concentrate upon personal security rather than attack planning.
- By discriminately targeting terrorist group members – it decreases the possibility of level one and two supporters becoming mobilized and active recruits.

The case studies in the academic literature shows that the target of the attack matters when we attempt to account for the level of subsequent terrorist activity, and further suggests reasons of why targeted killings through drone strikes might create substantial terrorist backlash and cause an increase in terrorist activity.

This report looks at the impact of drone strikes in Pakistan from 2004-2013 on subsequent terrorist activity there to try and ascertain whether drone strike attacks result in an increase (e.g. backlash) or a decrease (e.g. capacity downgrading) in subsequent terrorist attacks. It also looks at whether what happened in each drone and terrorist attack (i.e. how discriminate they were) had an impact.

In Pakistan from 2004-2013 there were 374 drone strikes that killed 2,296 people and there were 7,361 terrorist attacks that killed 13,829 people. While terrorist attacks are responsible for 85% of the deaths within this conflict, the average drone strike kills over 6 individuals while the average terrorist attack killed just under 2.

The effect of drone strikes on subsequent terrorist activities in Pakistan, as analysed in this report, are as follows:

Monthly Level: There is a relationship between the proliferation of drone attacks and terrorist attacks within a given month. Further, the number of victims or the status of those killed in the drone attack does not appear to change the frequency of subsequent terrorist attacks

Lagged Effects at Monthly Level: Takes into account the sequencing of attacks by looking at the correlation between drone related behaviour in one month and terrorist related behaviour the following month. Same findings as monthly level - terrorist attacks and fatalities increase in the aftermath of a targeted drone strike.

Weekly Effect: There are no shifts in behaviour the week immediately after a drone strike in either direction, consequently the spike in terrorist attacks is not immediate but appears gradually over weeks 2-4.

Disaggregating Drone Impacts and Weekly behaviour: The report finds that particularly deadly drone attacks ease the number of subsequent attacks across all categories of targets. However, this has no impact upon numbers killed by terrorist groups. While their capacity to operate lessons, they are just as lethal when they choose to act.

Daily Analysis: The report finds that 80% of drone strikes in Pakistan were followed by a terrorist attack within a day. However, this rate is consistent with normal day-to-day affairs where no drone strike is present. The chances of a terrorist attack on any given day is 83%, not much higher than when a drones strike takes place.

This report finds that there is no definitive conclusion to the traditional deterrence vs. backlash argument. These analyses collectively show the complex relationship between targeted killings by drones and terrorist attacks in Pakistan. The answer is not as easy as the traditional deterrence vs backlash argument as both are apparent here.

Introduction

Countering terrorism with punitive enforcement measures like targeted assassinations has a long history. In the aftermath of 9/11, the merits 'war' approaches to countering terrorist groups became highly salient within public discourse. Proponents claimed that such measures promise to reduce subsequent terrorism by degrading terrorist group capacity in a number of ways. First, it reduces the pool of cadres and recruits. Second, by imposes costs on those who provide financial and other forms of support for terrorists. Third, it has the potential to remove terrorist group leaders and other skilled members. Fourth, it serves as a deterrent for would-be terrorists and supporters. Fifth, it imposes costs on terrorist group members who have to spend more time and finances in changing locations and avoiding detection. This lessens their ability to commit terrorist attacks. Sixth, it reduces the flow of internal communications within the terrorist groups. Seventh, these policies are often popularly within a country's domestic constituency. Finally, compared to other forms of counter-terrorism (like full scale insurgencies), single strikes are far more proportional (Lotrionte 2003; Luft 2003; Yoo 2006; Wilner 2010).

Critics suggested otherwise and made a number of compelling arguments. First, it violates basic democratic and human rights. Second, other initiatives such as arresting terrorists may prove more effective. Third, it may in fact prompt a backlash from the terrorist group. Fourth, it may erode public support for state counterterrorism officials. Fifth, it may kill non-combatants. Sixth, it may enhance sympathy for terrorists. Finally, it provides the targeted terrorist movement with propaganda fodder (see Byman 2006; Jordan, 2009; Hafez 2006; Walsh and Piazza 2010).

While these theoretical debates grew in number, there was a striking lack of empirical approaches that actually tested these assumptions. In 2006, Lum et al analysed the effectiveness of counter-terrorism strategies from the available social science research literature. Their main finding was that "there is almost a complete absence of high quality scientific evaluation evidence on counter-terrorism strategies" (2006:1). Amongst the handful of studies they could find, there was a suggestion that "retaliatory attacks (for example, the U.S. attack on Libya in 1986 or attacks by Israel on the PLO) have significantly increased the number of terrorist attacks in the short run" (2006:1). In the eight years that have passed since, empirical approaches to understanding this question have flourished. In particular, these studies have tested whether punitive counter-terrorism measures downgrade or foster future terrorist attacks. Parallel major data collection efforts have allowed analyses to be carried out on conflicts such as Northern Ireland, Palestine, Chechnya, Afghanistan, Iraq, Spain and Pakistan. In a relatively short period of time, we have gone from very few analyses to many analyses, of which there have been very quick improvements in terms of the methodological rigour and theoretical nuance. The next section outlines these key studies.

Prior research

Are counterterrorism strategies that employ targeted killings effective in reducing the scale or impact of subsequent terrorist attacks? This is a salient question given the use of such strategies in high profile counterterrorism campaigns. Diverse conflict zones such as Palestine, Northern Ireland, Sri Lanka and the Basque region have all witnessed this form of counter terrorism. More recently, the United States' use of targeted assassinations on suspected terrorist locations in Pakistan, Afghanistan, Yemen, Jordan and, increasingly, East Africa regularly makes the headlines. Before empirically examining the impact of U.S. drone strikes in Pakistan, lets take a moment to analyse the theory behind the utility (or lack) of drone strikes. Only by understanding the intended consequences of any prevention policy, can we understand the levels of effectiveness it achieves.

Supporters cite three key arguments. First, these measures lesson the numbers of terrorists and possible recruits and therefore degrade a terrorist group's capacity for action. Second, these attacks demonstrate the state's potency and determination in the face of terrorist threats. In other words, they are politically useful. Third, they serve as a deterrent for would-be terrorists and supporters (Lotrionte 2003; Luft 2003; Yoo 2006; Wilner 2010).

Critics also cite three key arguments. First, such strikes violate basic human rights. Second, they may cause a backlash of more terrorist activity. Third, and on a related note, these attacks may enhance sympathy for the terrorists by providing them with propaganda fodder.

This particular study is interested in measuring whether drone strike attacks in Pakistan result in an increase (e.g. backlash) or a decrease (e.g. capacity downgrading) in subsequent terrorist attacks. Rather than treating all terrorist attacks and drone attacks as equal, the aim is to disaggregate what actually happened in each attack in terms of how (in) discriminate they were. Not every drone strike will have the same radicalizing effect and this is largely due to the amount of damage caused by these policies (Bueno de Mesquita, 2005). The focus of this study however lies with violent counterterrorism operations and their effectiveness in desisting future terrorist attacks.

The effectiveness of targeted killings can be measured in many different ways (Carvin, 2012). While the targeted killing of terrorists is rarely effective in completely halting a campaign of violence (Cronin, 2011; Jordan, 2009), the results are somewhat mixed when we analyse the number of subsequent terrorist attacks by a terrorist organization. For example, Hafez and Hatfield (2006) illustrate that targeted assassinations had no significant impact on the level of Palestinian violence. Mannes' (2008) comparative study

of leadership decapitation in 81 terrorist organizations showed that this policy rarely leads to a decrease in subsequent attacks in the following five year period. Mannes (2008) however also shows that in the case of religious terrorist organizations, attacks are likely to significantly increase following the targeted killing of its leader. LaFree et al (2009) found that of the six high-profile British counterterrorist operations employed by the British government against PIRA analysed, three resulted in a significant increase in subsequent terrorist attacks. Dugan and Chenoweth's (2012) study shows that repressive actions by the Israeli state sometimes led to increases in Palestinian terrorism. Fielding and Shortland (2010) came to a similar conclusion in their analysis of insurgency in Egypt. Johnston (2012), however, illustrates that leadership decapitation not only increases the prospects of the war ending but also reduces the intensity and scale of insurgent attacks. Maoz's (2007) findings indicate the temporal nature of terrorist group retaliation. Maoz illustrates that while violent actions by Israel often lead to a short-term decrease in Palestinian terrorist activity, there is a corresponding long-term increase in terrorism.

A growing number of studies recognize the need to disaggregate the target of counterterrorism measures. These studies typically show that the propensity for a terrorist organization to increase or decrease their attacks in the wake of counterterrorist operations depends upon whether these government operations were indiscriminate against the community at large or discriminate against the terrorist organization itself. For example, Benmelech, Berrebi and Klor (2010) examined the effectiveness of house demolitions on attempts to reduce Palestinian suicide terrorism. House demolitions targeting the dwellings of Palestinian terrorists were deemed to cause "an immediate, significant decrease in the number of suicide attacks" (2010:2). On the other hand, house demolitions that were indiscriminately targeted against the Palestinian community at large caused a significant increase in subsequent suicide attacks. While Dugan and Chenoweth (2012) found some support for the backlash effect of repression on terrorism, the results were stronger when this repression was directed indiscriminately toward Palestinian civilians.

Finally, Condra and Shapiro (2012) found that Iraqi insurgent attacks significantly increased following civilian deaths attributed to coalition forces. Attacks significantly decrease following coalition force activities that kill insurgents. On the other hand, Kaplan et al (2005) illustrates that Israeli targeted killings of terrorists led to a subsequent increase in suicide bombings. The same pattern was not apparent for attacks on Palestinian civilians. Lyall's (2009) study of Chechen attacks showed that indiscriminate artillery fire by Russian forces reduced the subsequent number of insurgent attacks by close to a quarter.

Turning toward discriminate targeting of terrorist operatives, the literature suggests a number of explanations that account for why terrorist attacks should lesson in the wake of repressive counterterror actions. First, targeted killing may dis-incentivize terrorist organizations and cause a deterrent effect. This is a long-standing argument from the study of social movements (Obserschall, 1973). Second, targeted killing deprives terrorist organizations of valued recruits and increases co-ordination costs. Third, targeted killing forces members to concentrate upon personal security rather than attack planning (Hafez and Hatfield, 2006). Finally, by discriminately targeting terrorist group members, it decreases the possibility of level one and two supporters becoming mobilized and active recruits.

In sum, these studies support the assertion that the target of state repression matters when we attempt to account for the level of subsequent terrorist activity. Citing Mason and Krane (1989), Hafez and Hatfield (2006) outline this logic very neatly:

> States that selectively target known militants for suppression and avoid indiscriminate application of repression are likely to reduce the likelihood of mobilization because ordinary people are not drawn into the conflict unwillingly…Selective repression against core militants signals to potential recruits that only 'troublemakers' will be punished and, therefore, those who keep their distance will not become victims of repression. Indiscriminate repression…intensifies anger among the public and does not provide guarantees that non-violent activism will not be repressed. Under these circumstances, supporters and sympathizers may be inclined toward greater risk to mitigate their losses, seek security in militant groups, or inflict revenge.

Finally, two recent studies have examined the geo-spatial interaction of terrorist events and counterterrorism activities. Braithwaite and Johnson (2012) analysed the sequential relationship between Iraqi insurgent attacks and Coalition counterinsurgency (COIN) operations. Whilst indiscriminate COIN operations in a particular geographic area elevated the likelihood of subsequent insurgent attacks in the same area in the medium- to long-term, the opposite was true for discriminatory and capacity-reducing COIN operations. Focusing on the same case, Linke et al (2012) also found a reciprocal relationship between these two actors' activities at the local level (although the levels of reciprocity differed dependent upon the socio-economic and ethnic make-up of the region). While the 'tit-for-tat' nature of conflicts has long been hypothesized, these recent studies have illustrated that these dynamics are largely played out at the local level.

The American political scientist Joseph K. Young succinctly expresses the aggregate impression that one generates from this wealth of studies:

> In social science, there aren't really laws like gravity. There are always exceptions. Most theories are probabilistic. We expect some thing on average to go up whenever another thing goes down (or up). We look at trends and note the exceptions and hope to get it

> right more than we get it wrong. One process, from my observation, seems nearly law-like. Violence begets violence…Sometimes violence is necessary, sometimes it is unavoidable, sometimes it may be the moral decision, but I think whatever the justification for its use, it will (almost) always generate more of itself.

In a relatively small number of years, we have gone from very few studies on counterterrorism effectiveness to many that specifically focus on targeted assassinations. While the early studies looked at the relationship between the number of counter-terrorism activities in a given year with the number of terrorist attacks in a given year, the later studies are far more fine-grained. Typically, the look at the impact on a weekly, monthly and yearly level. They categorize counter-terrorism killings into discriminate and indiscriminate attacks. They disaggregate terrorist attacks in a similar fashion. Finally, they disaggregate the country of analysis into smaller geographical regions to get a sense of what the backlash is apparent at a local level or state-wide. Table 1 provides an overview these analyses. As you will see, how 'effectiveness' is measured differs widely.

Table 1: An overview of empirical analyses of 'deterrence' vs. 'backlash'

Authors	Case Study	Tested	Finding
Kaplan et al (2005)	Israel/Palestine	Do targeted assassinations reduce level of violence?	1. Israeli targeted killings of terrorists led to a subsequent increase in suicide bombings 2. Preventive arrests rather than targeted killings led to a decrease in attacks over time
Hafez & Hatfield (2006)	Israel/Palestine	Do targeted assassinations reduce level of violence and success rate of operations?	No Impact
Cronin (2011)	Various qualitative cases	Does killing a group's leader lead to the death of the group?	"Cases where a group has halted a campaign following the killing of the leader are difficult to find, and those examined here do not support the conclusion that assassination ends terrorism"
Jordan (2009)	298 incidents of terrorist leaders being killed from 1945-2004	Does killing a group's leader (a) lead to a group becoming inactive (b) decrease its frequency of attacks (c) decrease the number of people the group kills?	"Decapitation is actually counterproductive, particularly for larger, older, religious, or separatist organizations"
Mannes (2008)	81 Examples of Terrorist Groups Losing their Top Leadership from 1970+	Does killing a group's leader (a) decrease its frequency of attacks (b) decrease the number of people the group kills?	1. General decline in no. of incidents but not on fatal attacks 2. "decapitation strikes…cause religious organizations to become substantially more deadly"
LaFree et al (2009)	Northern Ireland	How did 6 high-profile British CT operations impact subsequent PIRA terrorism?	"Strong support" for the backlash argument

Dugan & Chenoweth (2012)	Israel/Palestine	Test effects of repressive (or punishing) and conciliatory (or rewarding) actions on terrorist behaviour	1. Repressive actions by the Israeli state sometimes led to increases in Palestinian terrorism 2. Conciliatory actions are generally related to decreases in terrorist attacks
Fielding & Shortland (2010)	Egypt	Impact of repressive actions on subsequent terrorism	Repressive actions by Egypt sometimes led to increases in Egyptian terrorism
Moaz (2007)	Israel/Palestine	Tests the temporal effects of when reprisal attacks occur after a targeted assassination	While violent actions by Israel often lead to a short-term decrease in Palestinian terrorist activity, there is a corresponding long-term increase in terrorism.
Phillips (2013)	Mexico (organised crime groups)	Impact of killing or arresting leaders of Mexican drug cartels	1. Killing leaders -> No significant impact on violence in short-term, increase in long-term 2. Arresting leaders -> Significant decrease in short-term, increase in long-term
Benmelech, Berrebi & Klor (2010)	Israel/Palestine	Examines whether house demolitions are an effective counterterrorism tactic against suicide terrorism.	1. House demolitions targeting the dwellings of Palestinian terrorists were deemed to cause “an immediate, significant decrease in the number of suicide attacks” 2. House demolitions that were indiscriminately targeted against the Palestinian community at large caused a significant increase in subsequent suicide attacks
Condra & Shapiro (2012)	Iraq	Impact of ‘collateral damage’ on subsequent insurgent violence	1. Iraqi insurgent attacks significantly increased following civilian deaths attributed to coalition forces 2. Attacks significantly decrease following coalition force activities that kill insurgents

Braithwaite & Johnson (2012)	Iraq	Analysed the sequential relationship between Iraqi insurgent attacks and Coalition counterinsurgency (COIN) operations.	1. Indiscriminate COIN operations in a particular geographic area elevated the likelihood of subsequent insurgent attacks in the same area in the medium- to long-term, 2. The opposite was true for discriminatory and capacity-reducing COIN operations.
Gill, Horgan & Piazza (In Press)	Northern Ireland	Did the occurrence of killing PIRA members or members of the Catholic community impact PIRA bombing activities (a) in general and (b) against particular targets.	Both indiscriminate and discriminate CT killings caused a significant increase in PIRA bombing activities (Particularly bombings that targeted civilians).
Asal, Gill, Rethemeyer & Horgan (2014)	Northern Ireland	Did the occurrence of killing PIRA members or members of the Catholic community impact PIRA's ability to kill?	1. Killing PIRA members significantly decreases IED fatalities 2. Killing innocent Catholics in a Brigade's county significantly increases total and civilian IED fatalities & shooting fatalities

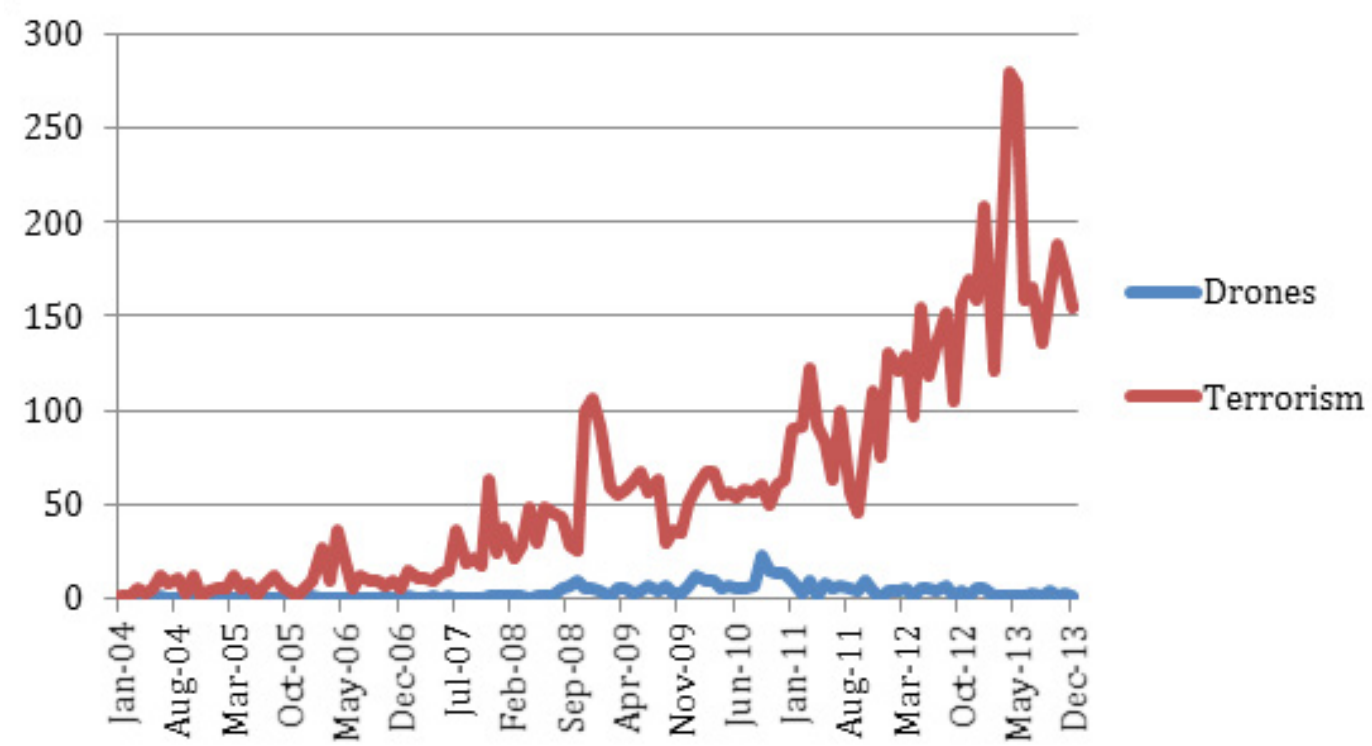
Drone strikes in Pakistan

This particular study is interested in the impact of drone strikes in Pakistan on subsequent terrorist activity there. The analyses depicted below are based on data from two sources. Data related to drones was kindly supplied by the Bureau of Investigative Journalism. This data provides accurate data on drone attacks within Pakistan's borders between 2004 and 2013. The variables include locational and temporal details and fatality metrics disaggregated across civilian and children lines. The terrorism event data comes from the Global Terrorism Database, a free resource provided by the START center at University of Maryland. This data also encompasses locational and temporal details and fatality metrics as well as details regarding target type. Before turning to the main analyses, lets first take stock of the scale of drone and terrorist attacks in Pakistan during this period.

Over this ten-year period, 374 drone strikes killed 2296 people while 7361 terrorist attacks killed 13829. While terrorist attacks are responsible for 85% of the deaths within this conflict, the average drone strike kills over 6 individuals while the average terrorist attacks kills just under 2.

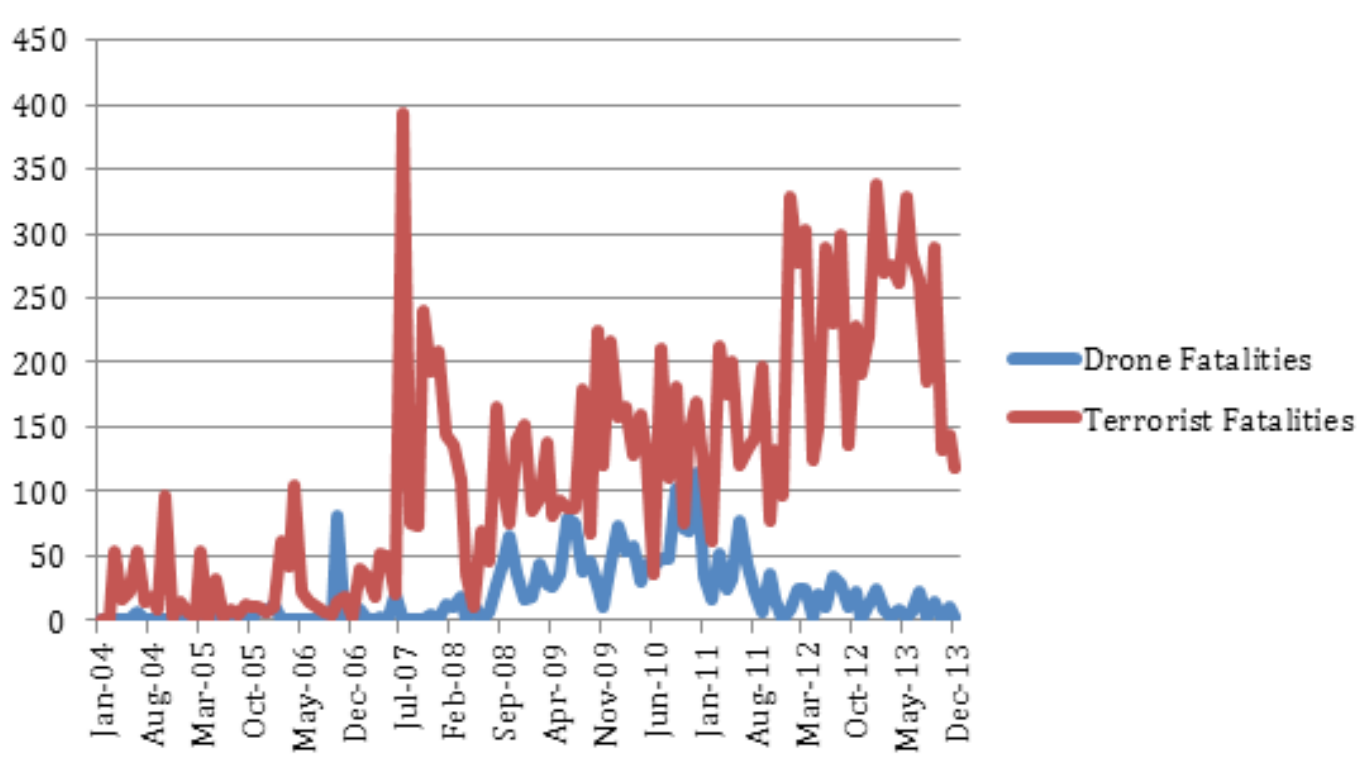
Figure 1 outlines the number of drone and terrorist strikes per month within Pakistan. The results highlights the fact that terrorism was a problem in Pakistan years before the onset of regular drone strikes and increased a great deal in the years that followed the peak drone strike era.

Figure 1: Number of drone strikes and terrorist attacks per month



Of course not all drone strikes should be treated equally. Given the arguments of the proponents and the critics of this policy (outlined above), it is key to look at how (in) discriminate they typically tended to be. Figure 2 therefore outlines the number of fatalities caused by both drone and terrorist strikes per month respectively.

Figure 2: Number of fatalities caused by drone strikes and terrorist attacks per month



Of course these are just descriptive outputs, to dig a little deeper, we turn our attention to a series of statistical approaches. The first analyses the statistical correlation between drones and terrorist attacks at the monthly level.

Analysis 1: Impact at the monthly level

The first analysis aggregated the drone and terrorism data into monthly amounts. For example, March 2008 witnessed 1 drone attack, 18 deaths by drones (at least 4 of which are civilian and at least 1 of which was a child). It also witnessed 28 terrorist attacks (of which 14 targeted the military, religious figures or government – in other words 'High Value Targets') and a total of 109 were killed. For this analysis, the sums for 120 months were calculated. A correlational matrix was run and the results are displayed in Table 3 in the Appendix. Significant associations are shaded.

The results indicate that:

1. The more drone attacks in a given month, the higher the number of terrorist attacks and fatalities attributed to terrorist attacks. It also appears that this spike in terrorist activity is disproportionately aimed against civilians and not high-value targets.
2. The more people killed in drone attacks, doesn't have any significant impact on terrorist attacks in a given month. However, there does appear to be some tit-for-tat aspects. The more people killed in drone attacks in a given month is significantly associated with more people being killed by terrorist attacks and this could be a function of more terrorist attacks targeting civilians.
3. Who is killed in drone attacks doesn't appear to have any correlation with terrorist behaviour.

In sum, there appears to be a relationship between the proliferation of drone attacks and terrorist attacks within a given month. The content of the drone attack (in terms of how many are killed or who is killed) doesn't appear to change the frequency of terrorist attacks that much. What matters is that drone strikes occur and not necessarily what they do. We then conducted a simple linear regression with number of drone attacks, number of civilian deaths caused by drones, number of child deaths caused by drones and total fatalities caused by drones. Total terrorist attacks acted as the dependent variable. The model was significant and accounts for just over 10% of the variance in terrorist attacks in a given month. The same process was undertaken with total fatalities caused by terrorism as the dependent variable. Again, the model was significant and accounts for just over 15% of the variance in fatalities caused by terrorist attacks in a given month.

Analysis 2: Lagged effects at the monthly level

A major problem with the above analysis is that it does not take the sequencing of attacks into account. By aggregating the counts it doesn't take account of when the drones and terrorist attacks happened within that month. The above findings are related to correlations, not causation. The March 2008 example shows 1 drone attack and 28 terrorist attacks. Our understanding of the relationship between the two factors would be very different if the 28 attacks preceded, not proceeded, the 1 drone attack. In that case, the correlation appears to be a result of drone strikes responding to a spike in terrorist attacks. If the drone strike preceded, not proceeded, the 28 terrorist attacks, our reading of the situation would be different. To overcome this problem, analysis 2 lags the terrorist attack counts by one month. In other words, we are now looking at the correlation, for example, between drone related behaviours in month 1 and terrorist related behaviours in month 2. Analysis 1 on the other hand, looks at the correlation of both within the same month. Table 4 in the Appendix outlines these results.

The same significant findings as analysis 1 are found. We can now say with a little more confidence that terrorist attacks (particularly ones targeting civilians) and fatalities increase in the aftermath of a drone strike.

Analysis 3: Weekly analysis

Analyses 1 and 2 find a relationship at the monthly level. Next, we drill down on our unit of analysis to the weekly level in a couple of ways. A series of independent t-tests were conducted that compared (a) the number of terrorist attacks in total (b) the number of terrorist attacks on civilians (c) the number of terrorist attacks on high value targets and (d) the number of fatalities in the 7 days prior and after every drone strike. Table 2 outlines the results. It indicates that there is no discernable shift in behaviours in the week immediately after a drone strike in either direction. It is actually strikingly similar. While analyses 1 and 2 notes spike in terrorism at the monthly level, it certainly appears that this spike is not immediate but rather appears gradually over weeks 2-4 for example.

Table 2: Before and after a drone strike comparisons

Variable	Week before or after drone strike	N	Mean	Std. deviation	Std. error mean
No. of terrorist attacks	Before	383	21.15	13.51	.69
	After	383	21.01	12.51	.63
Attacks on civilians	Before	383	14.25	8.02	.41
	After	383	14.04	7.42	.37
Attacks on HVT's	Before	383	6.89	7.01	.35
	After	383	6.97	6.70	.34
Terrorist fatalities	Before	383	40.32	34.53	1.76
	After	383	40.53	39.68	2.02

A potential problem with the above analysis is the level of overlap between the drone attacks which were themselves clustered in space and time. Perhaps this clustering effect has caused some double counting and has thrown off the findings somewhat. The same test was therefore run that only included drone strikes that appeared in isolation within a given week. This narrowed down the sample substantially (by 70%). The results however stayed the same although there does appear to be a (non-significant) widening of the number of fatalities caused in the aftermath of an isolated drone attack.

Table 3: Before and after a drone strike comparisons II

Variable	Week before or after drone strike	N	Mean	Std. deviation	Std. error mean
No. of Terrorist Attacks	Before	109	22.87	16.37	1.56
	After	109	22.57	14.71	1.40
Attacks on Civilians	Before	109	14.31	9.52	.91
	After	109	14.38	8.63	.82
Attacks on HVT's	Before	109	8.55	8.51	.81
	After	109	8.19	7.89	.75
Terrorist Fatalities	Before	109	37.94	31.76	3.04
	After	109	42.90	37.79	3.62

Next, we broke this analysis down by region and found that this fatality divergence is largely attributable to drone attacks that occur in Bajaur, Kurram and South Waziristan.

Analysis 4: Disaggregating drone impacts & weekly behaviour

Analysis 3 simply tested the impact of drones on terrorist behaviour at a weekly level and found no significant impact. Next we tested whether what occurred in the drone attack matters (Remember, this was not the case at the monthly level). The results suggest that yes it does impact behaviour but possibly not in the direction we expect. Particularly deadly drone attacks ease the number of subsequent attacks across all categories of targets. However, this downgrading in activity has no significant impact upon the numbers killed by terrorist groups. So while their capacity to operate lessons, they are just as lethal when they choose to do so. We also tested whether these effects are made stronger by the presence of multiple drone attacks and it appears that the results stay consistent.

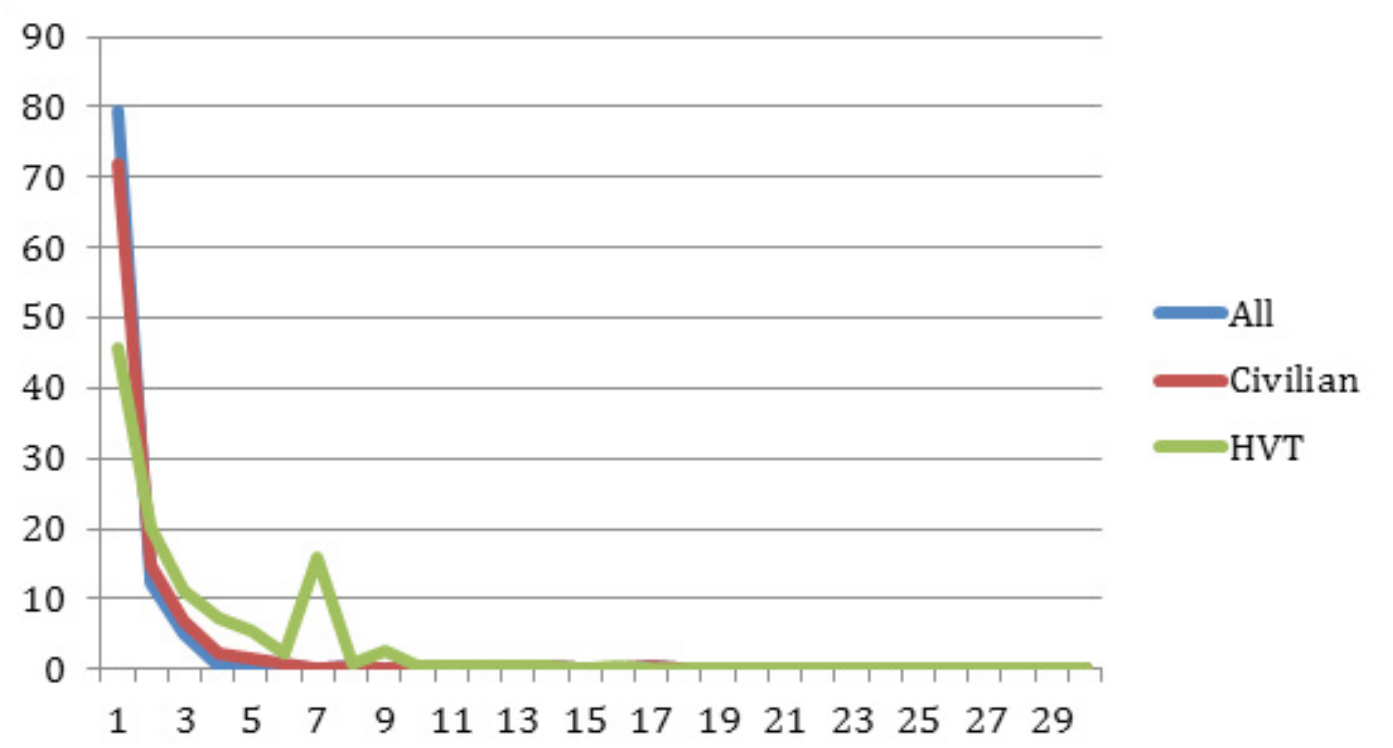
Analysis 5: Daily analysis

In relation to each drone incident i, the time elapsed until the subsequent incident i+1 was calculated.[1] The data was then aggregated to indicate in how many instances the subsequent incident i+1 occurred on the same day, in how many instances it occurred one day later, two days later and so forth. These frequencies were subsequently used to estimate the hazard rate at each time interval with the denominator defined by how many incidents in the sample had not yet experienced i+1, effectively, in how many instances districts remained at risk after their initial incident.

The analysis indicated that in approximately 80% of drone attacks, a terrorist attack is likely to follow within a day. The hazard rate then begins to decline dramatically, but remains at a relatively elevated level until day three before decaying. This figure appears remarkably high but when compared against the base rate, it actually remains quite consistent with normal day-to-day affairs where no drone attack is present. When we disaggregate across who is targeted by these terrorist attacks, a slightly different pattern emerges. Just over 40% of drone strikes are followed the next day by an attack against high value targets. This elevated level of risk lasts longer than those targeting civilians and spikes again around days 7 and 8. This second spike may account for some of the disparities found between the monthly and weekly levels of analysis. The findings are also indicative of the ease with which civilians can be targeted in the direct aftermath of a drone strike, compared to high-value targets (75% vs. 43%).

At first glance, this 80% figure looks indicative of a major backlash effect. However, the base rate (e.g. the chances of an attack on any given day) is 83%.

Figure 3: Hazard rate of terrorist attacks following a drone strike



1 The smallest unit of time available was the date on which the incident occurred, therefore excluding the possibility of determining the order of multiple incidents taking place on the same day. However, in relation to the present analysis it was necessary only to measure the frequency of time delays between incidents so this was not problematic. For example, were four incidents to occur on the same date, three of these would be considered to be followed by a further incident on the same day with i+1 in relation to the final incident occurring on the nth day; it is not necessary to determine the order of these incidents.

Conclusion

In a relatively short period of time, the study of the interaction between state targeted killings and non-state violence has gone through a series of generational improvements. From simple aggregated yearly counts, to studies that can disaggregate according to victim type, target type and to smaller temporal periods of time like the effect at the day, week and month level.

The analyses in this report collectively show the complex relationship between targeted killings by drones and terrorist attacks. The answer is not as easy as the traditional deterrence vs. backlash argument. Both are apparent in these analyses but their prevalence changes dependent upon where the measure of 'effectiveness' occurs. The rate of attacks remain consistent for the first day compared to the base rate but this then ebbs away significantly in the week that follows before returning stronger again over the course of the subsequent 3 weeks. This is particularly the case in relation to the terrorist group targeting civilians.

What is clear however, is that there is a positive linear relationship between drones and terrorism attacks at the monthly level. The nature of the drone strike does not appear to matter (in terms of the numbers killed or who was killed), just the fact that they occurred. The violent response by terrorist groups is disproportionately more likely to target civilians (and hence also increase the fatality rate as they are softer targets). This finding regarding civilians taking the likely brunt of the upswing in terrorism attacks has been found in studies of the Northern Ireland conflict also. The response also does not occur within a day or even a week, but has a longer term implication as the terrorist group likely slows down its activities in the immediate aftermath of a drone strike for basic security reasons. When they do re-emerge they target softer targets that do not necessitate the lengthy planning that a high-value target may warrant. The cumulative effect of these drone strikes on civilian casualties has therefore been far greater in terms of their indirect victims (e.g. those who died in the terrorist reprisals) than the victims directly killed in the drone strikes themselves.

The results displayed in this research report are of course purely correlational. Future research may also disaggregate Pakistan into smaller geographical units and incorporate more variables for a full regression to be carried out. These variables could control for aspects like the location of the drone strike, population density, and socio-economic indicators. The work of The Bureau of Investigative Journalism in collecting data on drone attacks is excellent but gaps in data still abound in terms of who the casualties are in drone strikes (e.g. confirmed militants vs. ordinary citizens) and this may have implications for the results. Future research may also account for the type of terrorist attack that occurs in response to drone attacks. Other studies might expect easily planned attacks (such as shootings) to be more likely than those attacks requiring a great deal of coordination and planning (such as bombings).

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Appendix

Table 4: Correlation between drone and terrorist behaviour in the same month

		Drones	Drone fatalities	Civilian drone fatalities	Children drone fatalities	No. of terrorist attacks	Terrorist attacks on HVT	Terrorist attacks on civilian	Fatalities from terrorism
No. of drones	Pearson Correlation	1	.846**	.260**	.053	.265**	.131	.349**	.350**
	Sig. (2-tailed)		.000	.004	.562	.003	.153	.000	.000
Drone fatalities	Pearson Correlation		1	.545**	.355**	.125	-.020	.229*	.211*
	Sig. (2-tailed)			.000	.000	.172	.825	.012	.021
Civilian drone fatalities	Pearson Correlation			1	.902**	-.074	-.120	-.034	-.045
	Sig. (2-tailed)				.000	.420	.193	.712	.628
Children drone fatalities	Pearson Correlation				1	-.107	-.118	-.091	-.105
	Sig. (2-tailed)					.244	.201	.321	.252
No. of terrorist attacks	Pearson Correlation					1	.947**	.969**	.750**
	Sig. (2-tailed)						.000	.000	.000
Terrorist attacks on HVT	Pearson Correlation						1	.839**	.769**
	Sig. (2-tailed)							.000	.000
Terrorist attacks on civilian	Pearson Correlation							1	.682**
	Sig. (2-tailed)								.000

Table 5: Correlation between drone and terrorist behaviour lagged effects

		Drones	Drone fatalities	Civilian drone fatalities	Children drone fatalities	No. of terrorist attacks	Terrorist attacks on HVT	Terrorist attacks on civilian	Fatalities from terrorism
No. of drones	Pearson Correlation	1	.846**	.260**	.053	.207*	.075	.294**	.285**
	Sig. (2-tailed)		.000	.004	.562	.024	.419	.001	.002
Drone fatalities	Pearson Correlation		1	.545**	.355**	.099	-.043	.201*	.185*
	Sig. (2-tailed)			.000	.000	.285	.646	.028	.044
Civilian drone fatalities	Pearson Correlation			1	.902**	-.091	-.149	-.039	-.052
	Sig. (2-tailed)				.000	.326	.105	.674	.576
Children drone fatalities	Pearson Correlation				1	-.096	-.123	-.068	-.094
	Sig. (2-tailed)					.297	.181	.459	.311
No. of terrorist attacks	Pearson Correlation					1	.947**	.968**	.758**
	Sig. (2-tailed)						.000	.000	.000
Terrorist attacks on HVT	Pearson Correlation						1	.836**	.774**
	Sig. (2-tailed)							.000	.000
Terrorist attacks on civilian	Pearson Correlation							1	.689**
	Sig. (2-tailed)								.000

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