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To cite this article: Daren Fisher & Laura Dugan (2019): The Importance of Governments' Response to Natural Disasters to Reduce Terrorist Risk, Justice Quarterly, DOI: [10.1080/07418825.2019.1685120](https://doi.org/10.1080/07418825.2019.1685120)

To link to this article: <https://doi.org/10.1080/07418825.2019.1685120>



Published online: 15 Nov 2019.



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The Importance of Governments' Response to Natural Disasters to Reduce Terrorist Risk

Daren Fisher^a  and Laura Dugan^b 

^aDepartment of Criminal Justice, The Citadel, Charleston, SC, USA; ^bDepartment of Criminology and Criminal Justice, University of Maryland, College Park, MD, USA

ABSTRACT

The increased incidence of natural disasters may be among the major forces driving crime over the coming century. Indeed, previous research suggests that natural disasters provide the catalyst for acts of terrorism. However, because governments can choose how they respond to natural disasters, they might be able to select actions that would mitigate hostile reactions. In this article, we argue that government responses' natural disasters could alter the rational motivations for terrorism. If true, then by responding adequately to a disaster, a government can also reduce both political violence risks and public health harms. This study argues that it is the portrayal of government responses to a natural disaster that impacts subsequent terrorism rather than the natural disaster itself. Using data from the Philippines, Turkey, and the United Kingdom between 1987 and 2013, findings suggest that when disasters occur, governments have a unique opportunity to diminish the incentives for terrorism.

ARTICLE HISTORY

Received 1 March 2019
Accepted 17 October 2019

KEYWORDS

Natural disasters; terrorism; disaster response policy; government actions; rational choice

Introduction

Changes in global climate increase the risk for conflict (Hsiang, Burke, & Miguel, 2013), and natural disasters are predicted to have a major impact on crime and violence over the coming century (Agnew, 2012, 2017). Acute environmental changes can create opportunities for criminal acts by those seeking to maintain their privileged position, and rebellion by the marginalized populations who may "seek revenge against those seen as the source of their problems" (Agnew, 2012, p. 35). This dynamic is exacerbated as rapid global urbanization has concentrated vulnerable populations in ways that could be detrimental in the wake of natural disasters (Kennedy, 2002; Slettebak, 2012). Governments' responses to such disasters matter, as the populous looks to them for reprieve. Governments, indeed, are charged with preparing for, responding to, and recovering from natural disasters (Green, 2005; Green & Ward, 2004; National Academy of Sciences, 2002; Nel & Righarts, 2008; Waugh, 2006).

Natural disasters can leave enduring influences upon even the most productive and well-established societies (Hewitt, 1983). These large-scale events capture the attention of entire nations and can exacerbate existing tensions between a state and its populace. Natural disasters focus public attention on whether or not a state is prepared to deal with crises and support its people (Berrebi & Ostwald, 2011; Waugh, 2006). How well the government fares in this assessment, in turn, can influence rates of crime and violence. In countries that fall under the scrutiny of a terrorist threat, increased civilian grievances resulting from inadequate government responses to disaster could incentivize existing terrorist organizations to act on behalf of the aggrieved. A growing body of literature estimates the criminological consequences to disasters showing how they relate to desistance from crime and recidivism (Kirk, 2009, 2012, 2015); variation in strain, social control, and opportunities for crime (Agnew, 2012); terrorism (Berrebi & Ostwald, 2011; Paul & Bagchi, 2018); civil war (Brancati, 2007); wars in general (Wallace-Wells, 2019); and other forms of violent conflict (Bergholt & Lujala, 2012; Nel & Righarts, 2008; Slettebak, 2012). Although there is a relatively recent theoretical and empirical development, this growing body of research suggests that climate change and the increased frequency of natural disasters may be among the “major forces driving crime” (Agnew, 2012, p. 21; Hsiang et al., 2013; Wallace-Wells, 2019).

Thus, the effects of all catastrophes require prompt action to effectively mitigate a broad array of deleterious outcomes (Galea, Nandi, & Vlahov, 2005; Green & Ward, 2004). Further, a government also needs to evaluate its response to assure improvement in its emergency management system before the next major event (Waugh, 2006, p. 11). Concordantly, how well a government responds to a disaster – whether it is an actual or portrayed response – can magnify its economic, political, and social costs, triggering long-term negative consequences including violence (Brancati, 2007; Perry & Lindell, 2003; Sönmez, Apostolopoulos, & Tarlow, 1999; Waugh, 2006). Indeed, previous research argues that how the government responds to natural disasters determines its terrorism risk. It claims that by redirecting security resources toward disaster relief, potential targets for terrorism are softened and more easily exploited (Berrebi & Ostwald, 2011; Zhuang & Bier, 2007). Yet this research only broadly examines the effects of natural disasters on terrorism, ignoring how governments responded, potentially obscuring key policy lessons for minimizing risk. Government responses to natural disasters vary widely (Neumayer, Plümper, & Barthel, 2014), and Kelman and Koukis (2000) argue that well-orchestrated responses to disasters can foster cooperation and trust, lowering the impetus for violence. Concordantly, efforts to improve emergency management could undermine rational justifications for existing terrorist organizations to violently target the government. Indeed, the concern about violent backlash has motivated international aid in the aftermath of major natural disasters. Jones (2012) reports that when the largest earthquake in Chilean history struck in 1960, killing more than 1,600 people, US President Eisenhower requested that the American Red Cross coordinate an even greater relief effort and ordered the US Air Force to deliver 900 tons of food. These efforts were lauded by politicians as effectively weakening the ability of the Chilean Communist Party to take power during a time of great vulnerability. If a link does exist between government responses and subsequent violence, net of shifts in opportunity created by the disaster itself, then

additional effort by the government could mitigate harm during and after a natural disaster, reducing the risk of crime, terrorism, insurgency, and other forms of conflict (Rummel, 1991; Shomer, Davis, & Kelley, 1966). This creates more policy options to reduce violence beyond the standard practices of deterrence and target hardening.

If government responses can mitigate violence, then poor emergency management could also fuel it by exacerbating existing grievances (Mandel, 2002). Areas already prone to conflict might be especially vulnerable, as Cohen and Werker (2008) observe that many governments underinvest in areas perceived as hostile, leaving them unprepared for and depleted in the wake of disaster. As such, inadequate responses to disasters in marginalized geographic areas can be interpreted as hostile, incentivizing subsequent terrorist attacks by the organizations who claim to represent the people living in these areas. In light of these observations, we argue in this research that natural disasters may either increase or decrease terrorism, depending on how adequately the government response is perceived, as implied by its portrayal in the media.

Following this reasoning, we expect that natural disasters would only incite terrorist attacks when they affect aggrieved groups of people with ties to existing terrorist organizations. If true, then the relationship between natural disasters and terrorism would depend upon whether the natural disaster occurred in a geographically marginalized and hostile area. This would make inadequate analyses that aggregate to the nation level, as the true effects would be masked by erasing important policy-relevant variation. In an attempt to better understand how government responses to natural disasters influence distinct types of terrorist threats, we posit that terrorist organizations that support a geographically isolated constituency are more reactive to the government's response to natural disasters. We test for this relationship by using autoregressive Poisson regression models on natural disaster, media reports, and terrorism data from the Philippines, Turkey, and the United Kingdom between 1987 and 2013. Findings show that when disasters occur, the perceived adequacy of the governments' responses to natural disasters is negatively related to terrorist attacks, supporting our ideas. These findings persist despite null findings for the direct relationship between natural disasters and terrorism in Turkey and the Philippines.

Terrorism and natural disasters

Rational choice and terrorism

Terrorism can be argued to be a result of rational decision-making as expressed in rational choice-derived theories of crime (Carson, 2014; Fisher & Dugan, 2019; Freilich, Chermak, & Hsu, 2018; LaFree, Dugan, & Korte, 2009). Assuming that humans are self-interested, have free will, and seek to maximize pleasure and minimize pain (see Beccaria, 1764; Bentham, 1781), they will engage in crime or other socially deviant behaviors when the expected benefits exceed any perceived risks (Becker, 1968). Previous research has also demonstrated that the nature and outcomes of these decisions vary across offenses (Clarke & Cornish, 1985) and in the presence of visceral stressors (Loewenstein, 1996). Further, perceptions of risks and rewards are more important to decision-making than objective probabilities of punishment (Nagin, 1998, 2013). This last finding is especially relevant to the current research, as discerning the

importance of perceptual data compared to objective values is important for understanding how disaster relief might influence the decisions of terrorists to attack. According to the seminal work of the Nobel Laureate Herbert Simon (1982), rationality in the aftermath of a natural disaster should be considered “bounded,” as information flow is obscured by its mayhem. Thus, instead of assuming pure rationality, this article reasserts that especially in dire situations, such as the aftermath of a natural disaster, individuals settle for solutions that appear “good enough” or morally warranted, instead of actually maximizing their personal utility. Given that natural disasters leave softer targets (Berrebi & Ostwald, 2011; Zhuang & Bier, 2007), when a government is seen to have failed in its disaster relief response, exacerbating the damage, the “good enough” or morally warranted response would be for a terrorist organization to attack (Kubicek, 2002). Attacking under these conditions increases the likelihood of success, while gaining political favor from its constituency (see Berrebi & Ostwald, 2011). Concordantly, terrorist organizations may engage in acts of terrorism when the government’s response is portrayed as inadequate, even when their constituency is threatened by the more immediate and pressing peril following a natural disaster.

Following the lead of previous scholars who claim that terrorists are rational actors (Crenshaw, 1981; LaFree & Ackerman, 2009), we argue that perpetrating a terrorist attack is one of the plethora of rational options available to individuals who are unable to derive adequate utility from a nation or government. Research by Dugan and Chenoweth (2012) suggests that between 1987 and 2004 Palestinians responded with increased terrorism when the Israeli government acted repressively toward Palestinian terrorists or civilians. Further, they found that terrorism was, on average, less frequent after the Israeli government behaved more conciliatory toward Palestinian civilians, suggesting that governments can influence terrorist decision-making through more than just the presence or absence of punishment. Indeed, studies that have evaluated the deterrent effects of government responses to terrorism have typically found them ineffectual, and some cases found them to be associated with subsequent increases in terrorism, likely through backlash (Carson, 2014; LaFree et al., 2009). Although deterrence theories have been criticized for their inability to anticipate the different utility structures and reactions of terrorists (Victoroff, 2005),¹ the presence of observable trends within the above studies provides strong evidence for a rational component to terrorist decision-making that is not necessarily consistent with the predictions of deterrence.

Expanding upon this body of research, we argue that policies that systematically exclude people from the benefits of citizenship, such as inadequate support in the wake of a natural disaster (Waugh, 2006), could motivate terrorism. Conversely, we also suggest that sufficient, and even effective responses to natural disasters by governments, may prevent terrorism by reducing the rational incentives for retaliation. In other words, the perceived adequacy of a government’s response to a natural disaster

¹It should also be noted that terrorist organizations have their own distinct goals that can diverge markedly from simply preserving the well-being of their constituency. For example, despite being called the Kurdistan Workers’ Party (PKK), which implies that its central mission is to support the Kurdish Separatist movement in Turkey (Rodoplu, Arnold, & Ersoy, 2003; Çandar, 2012), the PKK was founded as a Marxist-Leninist group and it also promotes a leftist agenda (Criss, 1995). Indeed, its motivations have been described as being more in line with its founder, Öcalan, than a direct expression of the Kurdish population in Turkey (Özcan, 2006).

can either motivate or mitigate violence. As such, this study aims to test whether terrorism may be influenced by the sentiment portrayed by the media of government responses after a disaster.

Natural disasters, government responses, and terrorism

This earthquake is a declaration of bankruptcy for the Turkish political administrative structure. The Turkish political and administrative systems must be investigated from the ground up (Erkan Mumcu, Turkish Tourism Minister, 1999 in Green & Ward, 2004).

Natural disasters are exogenous shocks that cause physical insecurity for a population (Flynn, 2008). Unrelated to the political and social landscape, natural disasters can rupture the fabric of even the most productive and orderly human environment (Hewitt, 1983). Drawing on a sample of 167 countries between 1970 and 2007 Berrebi and Ostwald (2011) demonstrate that natural disasters can exacerbate existing tensions between a state and its populace, and reveal just how unprepared a state is to deal with crises (Waugh, 2006). Conversely, if responded to adequately, a properly coordinated disaster management and relief effort can improve social outcomes, demonstrated through altruistic actions by members of the impacted community and the state (Perry & Lindell, 2003). Kaniasty and Norris (2004, p. 202) have dubbed this process “the heroic stage.” Connected to the idea that the cause of the disorder is immediately identifiable and unattributable to human action, the need for an immediate response to this external stressor mobilizes those impacted, creating a post-disaster utopia (Hall & Landreth; Kaniasty & Norris, 2004). This altruistic social reaction is often short lived however, especially in cases with ineffective state support.

Typically, victimized communities soon discover that the need for assistance far exceeds the availability of resources. The initial generosity and togetherness are slowly overtaken by a gradual disillusionment and the harsh reality of grief, loss, and destruction (Kaniasty & Norris, 2004, p.201).

How communities experience disasters during the initial response, recovery, and reconstruction stages differs dramatically depending upon who resides in them (Fothergill, Maestas, & Darlington, 1999). Even when large-scale natural disasters impact large geographic areas, neighborhoods that had been neglected through economic and social marginalization typically face more devastation, making them less resilient to disaster (Flint & Luloff, 2005; Masozera, Bailey, & Kerchner, 2007). These same neighborhoods can be further disadvantaged when the government diverts response resources to more politically palatable communities. Kinzer (1999) noted that due to ongoing fighting between Kurdish rebels and Turkish troops that the Southeastern region of Turkey has had to wait for disaster assistance until this conflict lessened. In light of these differential responses, the Turkish state was not only a softer target (Berrebi & Ostwald, 2011), but also a morally justifiable target for retribution via legitimate and illegitimate means (Green & Ward, 2004).

Given that a government’s response to a natural disaster can make it either the hero or the villain to those impacted, and that this status can vary from one disaster to another, it does not necessarily follow that the vulnerabilities resulting from a natural disaster provide ideal terrorist targets. As the state’s response to a natural disaster

is unlikely to be consistently effective across disasters, not all disasters should incite a terrorist response. Indeed, this study argues that when disaster management and relief efforts are perceived as being properly coordinated, the result will be prosocial and possibly altruistic (Perry & Lindell, 2003), ultimately decreasing terrorism risk. Social support mobilized through this process for example often occurs in spite of “previous community conflicts and race, ethnic, and social class barriers” and may engender subsequent altruistic actions within the impacted area (Kaniasty & Norris, 2004, p. 202). Rather than leading to target softening alone (Berrebi & Ostwald, 2011), the response to a natural disaster could also improve the relationship between a state and its populace. Consequently, the rational incentives for a group to engage in a subsequent terrorist action may diminish as the people hold the government in higher regard. Indeed, Berrebi and Ostwald (2011) in their discussion note that an immediate terrorist attack following a natural disaster may instill resentment among those who have previously been part of the terrorist group’s constituency. While this was unaccounted for in their empirical model, this assertion is consistent with the rational choice framework described above. Further, if the state’s response is instead deemed to be inadequate, and as the full impact of the destruction is realized, existing tensions between a state and its populace will be exacerbated increasing the incentives of perpetrating an attack.

Yet, even if a government responded perfectly to a natural disaster, the incentives for terrorism could still persist, as terrorist goals are often broader than simply advocating for the well-being of their constituency (Boylan, 2015). Thus, the impact of natural disasters on terrorism is likely to be heterogeneous, not absolute, and contingent on how a government is perceived to respond.

Capturing important variation

While a natural disaster can impact an entire nation, the quality of responsiveness across affected areas can vary markedly (Galea et al., 2005). If, indeed, rational choice drives the disaster–terrorism relationship, then the strength of the relationships will vary within a country depending on the quality of emergency management. While Berrebi and Ostwald (2011) found an empirical link between natural disasters and terrorist attacks using annual country-level measures, their level of aggregation makes it difficult to discern what mechanism(s) may be driving the relationship, and how long after a disaster we should expect a terrorist attack. The reaction to a disaster will likely vary across contexts and circumstances. Some disasters cause more damage than others, as large-scale natural disasters such as the typhoons, tsunamis, and volcanic eruptions in the Philippines differ by at least an order of magnitude from floods, landslides, and storms that occur in the United Kingdom (Guha-Sapir, Below, & Hoyois, 2016). Large-scale natural disasters may undermine the tactical capacity of governments and terrorist groups alike, delaying the ability for both to respond. Consequently, despite the will to attack, it may take longer in the aftermath of more extreme disaster events for terrorist groups to take action (Kaniasty & Norris, 2004). As the temporal lag between a disaster and an attack is currently unknown, relying upon yearly level data to test this relationship will likely obscure most meaningful variation,

concealing key trends. As a 1-year lag model can treat events occurring one month apart (December in year t and January in year $t + 1$) the same as events occurring 23 months apart (January in year t and December in year $t + 1$), more granular temporal analyses are required to better understand the link between natural disasters and terrorism.

Addressing this issue and following the lead of other terrorism scholars (see Benmelech, Berrebi, & Klor, 2010, 2015; Dugan & Chenoweth, 2012; Fisher & Meitus, 2017), the following analysis relies on the month as its unit in order to capture the temporal lag between disaster response and terrorist attacks. It takes time to plan, organize, and perpetrate terrorist attacks, often requiring the acquisition of technical and financial resources to execute (Hoffman, 2008; Nesser, 2008). As such, there is a temporal lag between any stimulus that alters terrorist decision-making and the terrorist event itself. Given the covert nature of terrorist planning and preparation, it is difficult to estimate how long this lag may actually be and to what extent it varies across attacks. Santifort, Sandler, and Brandt (2013) suggest that hostage-taking and similar forms of terrorism may take months to plan; however, other more routine forms of terrorism are much faster to plan and implement. Systematically collected data produced by Smith et al. (2016) further suggest that around half of all terrorist preparatory actions occur within one month of the attack, with 75% of environmentalist preparatory actions happening less than 30 before an attack.

Finally, not all terrorists will be motivated to attack after a poorly administered disaster relief effort, as political goals differ (Hoffman, 2006) and not all terrorist groups advocate for an identifiable constituency. However, despite the immense variation across organizations' ideology, goals, methods, and capabilities, particularly in Turkey (see Anaz, Aslan, & Özkan, 2016; Fisher & Lee, 2019; Sayari, 2010), and the Philippines (see Quilala, 2018), we expect that the driving force in the variation in responses to natural disasters will be more strongly related to where and how the terrorist organizations' constituencies live, not their ideology. Organizations whose constituencies live in geographically isolated and economically depressed areas will be more sensitive to how well the government responds to their needs after a disaster. In fact, it is unlikely that disasters that strike in areas without a marginalized group with connections to terrorism will affect the risk of terrorism (e.g., Puerto Rico following Hurricane Maria in 2017). Despite evidence of an aggregate impact of disasters on terrorism (Berrebi & Ostwald, 2011), we argue that more can be learned by assessing within nation variability measured by shorter spans of time. In this article, we use monthly data to assess the relationships between natural disasters, government responses, and terrorism for three nations that are vulnerable to natural disasters and have existing geo-politically based terrorism – the Philippines, Turkey, and the United Kingdom.

Hypotheses

This study examines the relationship between natural disasters, the portrayed adequacy of state responses, and subsequent terrorism from 1987 through 2013 in the Philippines, Turkey, and the UK. In addition to having experienced numerous natural disasters and terrorist attacks, the Philippines and Turkey were selected because of their ongoing conflicts with terrorist organizations that fight for people who live in



Figure 1. Map of the Philippines.

geographic isolation: the Islamic people in the Mindanao cluster of Islands in the Philippines and the Kurdish people in the southeast of Turkey (see [Figure 1](#) and [2](#)).² These contexts are ideal to evaluate whether the relationship between natural disasters and subsequent terrorism is consistent across terrorism types and geographic locations within a nation. We include the UK in this analysis as an “off diagonal” nation in order to better assess the generalizability of our argument. While the UK also has a geographically marginalized terrorist constituency in Northern Ireland ([Figure 3](#)), its experience with natural disasters is minor compared to that of the Philippines and Turkey during these years. In fact, if we were to rely only upon the International

²Other candidates for this study include Nigeria, India, and the Democratic Republic of Congo, as they all experienced geographically diverse terrorism and natural disasters during the period examined. For the purposes of this study, however, Turkey, the Philippines and the UK were selected due to their clear geographic delineation with regard to terrorism. The other nations, however, are ideal contexts to further assess the generalizability of the findings generated by this study.



Figure 2. Map of Turkey.

Disaster Database (Guha-Sapir et al., 2016) definition of a natural disaster,³ Northern Ireland would be recorded as being unaffected by a single natural disaster during this period. The natural disasters that hit this region fall below the EM-DAT threshold and include localized flooding and landslides – all of which seem inconsequential when compared to the typhoons, volcanic eruptions, and 7.6 magnitude earthquakes of the Philippines and Turkey. Consequently, we strategically include the UK in this study to assess whether the hypothesized relationships hold in a setting with a geographically marginalized terrorist group that experiences relatively low impact natural disasters.

We begin this analysis by first testing the broad hypothesis offered by Berrebi and Ostwald (2011) that natural disasters are associated with increases in terrorism. While their analysis tests this relationship using 167 countries over 38 years, we assess whether it holds using three single nations and a more refined temporal unit.

H1: Natural disasters are positively associated with the number of terrorist attacks in subsequent months.

We anticipate that any observed associations found when testing hypothesis 1 are unlikely due exclusively to the presence or absence of natural disasters. Instead, we elaborate by expanding upon the ideas of Waugh (2006) and the predictions of rational choice by anticipating that how adequate a government is perceived to respond to a natural disaster will either reinforce or diminish the rational justification to subsequently perpetrate terrorism. If a populace perceives that the government is unable to adequately support them in a time of crisis, terrorism may be used to express this grievance. As such, through mitigating the harmful consequences from a natural disaster, the rational incentive to attack would be undermined.

H2: The portrayed adequacy of a government's response to natural disasters is negatively associated with the number of terrorist attacks in subsequent months.

Finally, because some terrorist conflict is directed toward improving the well-being of persons living in geographically isolated areas, we expect the relationship predicted

³The EM-DAT definition of a natural disaster requires that for an event results in the death of 10 or more people killed, 100 or more people are affected, there is a declaration of a state of emergency, or there is a call for international assistance (CREG, 2010).



Figure 3. Map of the United Kingdom.

in hypothesis 2 to depend entirely upon whether the disaster affects these constituencies, leaving the relationship between disasters and terrorism in other regions null.

H3: The portrayed adequacy of a government's response to natural disasters *that affect geographically marginalized constituencies* is only negatively associated with the number of terrorist attacks perpetrated by groups supporting the constituency in subsequent months.

As implied by hypothesis 3, we should expect no association between the adequacy of the governments' responses to a natural disaster and subsequent terrorism in areas of the country outside of region occupied by the terrorists' constituency.

H3a: The portrayed adequacy of a government's response to natural disasters that affect areas other than that for the geographically marginalized constituencies will have no effect on terrorist attacks by groups other than those that support the constituency in subsequent months.

Data sources

Terrorist attacks

We measure the number of terrorist attacks for each month using data from the Global Terrorism Database (GTD). The GTD is an event-based database that contains

information on all terrorist events across the globe between 1970 and 2014 (LaFree, Dugan, & Miller, 2014). The events in the GTD have been chronicled from open sources, such as wire services like LexisNexis, Reuters and the Foreign Broadcast Information Service (FBIS, now Opensource.gov), US State Department reports, other US and foreign government reports, and US and foreign newspapers (including the *New York Times*, the *British Financial Times*, the *Christian Science Monitor*, the *Washington Post*, the *Washington Times*, and the *Wall Street Journal*). The teams of GTD collectors over the years relied upon coders who spoke up to 15 different languages. More recently, news articles are translated using Google in order to be better detected. However, the inconsistency over the years leads us to expect that the number of terrorist attacks is better measured in the UK, an English-speaking country, than in the Philippines and Turkey (Dugan & Distler, 2016).

The GTD defines terrorism as, “the threatened or actual use of illegal force and violence to attain political, economic, religious, or social goals through fear, coercion, or intimidation” (LaFree & Dugan, 2007, p. 184). Functionally, for an incident to have been included in the dataset, it must contain the following three elements:

- I. The incident was intentional (the result of a conscious calculation on the part of the perpetrator);
- II. The incident included some observable level of violence or the threat of violence;
- III. The perpetrator of the incident was a subnational actor.

Further, two of the following three conditions must also be met in order for an event to be included in the GTD:

- I. The violent act was aimed at attaining a political, economic, religious, or social goal;
- II. The violent act included evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) other than the immediate victims;
- III. The violent act was outside the precepts of International Humanitarian Law (START, 2009).

In the current analysis, we only include terrorist attacks that were perpetrated between June 1987 and December 2013 because June 1987 is the first month for which we can measure a key independent variable described later, and at the time of this analysis, GTD data were only available through 2013. Further, data from 1993 are missing in the GTD because the original collectors lost those cases during an office move. Finally, the GTD team relied on different data collection methods over time that included both prospective and retrospective collections, making it important that those periods are used as control variables in the models (Dugan & Distler, 2016).

The final data are compiled from 3,686 attacks in the Philippines, with 825 that were attributed to Islamic groups; 2,418 in Turkey with 1,239 attributed to Kurdish groups; and 2,217 in the United Kingdom, with 1,172 attributed to republican groups. The perpetrators in the attacks recorded by the GTD are often not attributed to any

specific group or person (37.3%, 32.1%, and 25.3% in the Philippines, Turkey, and UK, respectively) making it plausible that individuals associated with the relevant terrorist movements were responsible for a subset of the unattributed attacks. We treat unattributed attacks as if they were not part of the specific movements, resulting in the known measurement error. However, this type of measurement error leads to inefficient estimates and biases them toward zero, as some Islamists, Kurds, and republicans are treated as outsiders reducing the differences between attacks by these groups and others.

The total number of attacks is tallied for each month in each country to test hypotheses 1 and 2. The total number of attacks perpetrated by Islamists (and non-Islamists), Kurds (and non-Kurds), and republicans (and non-republicans) are tallied for each month and country to test hypotheses 3 and 3a.⁴

Natural disasters

Data on natural disasters come from the Emergency Events Database (Guha-Sapir et al., 2016) produced by the Centre for Research on the Epidemiology of Disasters (CRED). The CRED data were compiled from numerous United Nations agencies, non-governmental organizations, insurance companies, research institutes, and press agencies (Guha-Sapir et al., 2016). In cases where the details of a given disaster differ across sources, the data collected from UN agencies, governments, and the International Federation of Red Cross and Red Crescent Societies were prioritized (Guha-Sapir et al., 2016). For an event to be classified as a natural disaster in CRED, it must meet at least one of the following operational criteria: 10 or more people were killed, 100 or more people were affected, a state of emergency was declared, or there was a call for international assistance (Guha-Sapir et al., 2016).

All natural disasters recorded in CRED for the three countries between June 1987 and December 2013 were used, yielding 373 natural disasters in the Philippines, 91 in Turkey, and 72 in the UK. The data include information on the type of disaster, its start and end date, its location, and the number of deaths attributed to it. While the present analysis is concerned only with the timing and location of natural disasters within these nations, other factors are used to assess whether any observed relationship is conditioned by the magnitude (the number of deaths) of a given natural disaster. As it was noted above, no natural disasters meeting the above definition were observed to occur in Northern Ireland during this period. In the other two countries, disasters occurred both inside and outside of the region where the terrorists' constituencies

⁴Groups that were coded as being Islamist in the Philippines include the following: Bangsamoro Islamic Freedom Movement (BIFM), Abu Sayyaf Group (ASG), Moro Islamic Liberation Front (MILF), Moro Ghuraba, Moro National Liberation Front (MNLF), Jemaah Islamiya (JI), Muslim Fundamentalists, Al-Khobar, Muslim Separatists, Muslim Rebels, Muslims, Muslim Militants, Muslim Guerrillas, Tulawie Clan, Former Muslim Guerrillas, Moro National Liberation Front Splinter Group, Bodyguards of Muslim Warlord Governor Tupay Loong, Bangsamoro National Liberation Army, and Bangsamoro Islamic Freedom Movement (BIFM). Groups that were coded as being Kurdish include the following: the Kurdistan Workers' Party (PKK), Kurdish Militants, Kurdish Separatists, Kurdish Rebels, Kurdish Militants, Kurdish Guerillas, Kurds, Kurdistan Freedom Hawks (TAK), Kurdish Islamic Unity Party, Kaka Tribesmen, and the Hamawand Tribe. Groups that were designated as being Republican include the following: the Irish National Liberation Army (INLA), the Irish Republican Army (IRA), Irish Republican Extremists, the Irish People's Liberation Organization (IPLA), the Continuity Irish Republican Army (CIRA), the Real Irish Republican Army (RIRA), Óglaigh na hÉireann, Dissident Republicans, and the New Irish Republican Army.

live. In order to test hypothesis 1, the number of monthly disasters is tallied for the entire country, making the absence of EM-DAT-defined disasters in Northern Ireland inconsequential here.

Perceptions of government responses to natural disasters

In order to measure whether the governments' responses to specific natural disasters were perceived as adequate, a systematic search for natural disasters in these countries was made using Reuters News in the Factiva database.⁵ This search yielded 10,422 articles for the Philippines, 10,064 for Turkey, and 68,869 for the UK for the period between June 1987 and December 2013. As language referencing natural disasters was often used metaphorically to refer to political and economic events, the lead sentence of each article was first examined for whether it referred to a natural disaster. For those that did, the full article was examined to determine whether it mentioned the government's response to a natural disaster. This process yielded 1,229 articles regarding the Philippine Government's response to natural disasters, 811 regarding the Turkish Government's response, and 246 regarding the UK Government's response. Some of these articles referenced events outside the purview of the EM-DAT database, but were still publicly regarded as natural disasters. Notably, when using this different threshold, natural disasters did occur in Northern Ireland, allowing us to test hypothesis 3 in the UK.

In order to minimize subjectivity and allow replication, this research pioneers a method that measures the perception of a government's response to disasters by extracting the sentiment used to describe that response in news articles. For more than a decade, sentiment analysis software has been developed in order to systematically record and analyze "opinions, sentiments, evaluations, appraisals, attitudes, and emotions towards entities such as products, services, organizations, individuals, issues, events, topics, and their attributes" (Liu, 2012, p. 7). At the time of writing, a number of openly available packages for measuring sentiment on a number of different scales were available, but most automatically coded the language describing a natural disaster as negative, making them inadequate for our purposes. Sentiment Analysis Online (2016) allows users to set a topic as neutral, so that the sentiment calculation would extract deviations in tone beyond the baseline reporting the disaster, thus capturing the nature of the public's perception of the government's response to the disaster.

In order to assure that Sentiment Analysis Online worked as anticipated, we randomly selected a pilot sample of 100 articles and found 98% agreement with the positive/negative tone of these articles. Based on this performance, we used Sentiment Analysis Online to compute the sentiment contained in each story with a continuous

⁵Search Syntax for the Philippines: (philippin* or filippin*) and (disaster or earthquake or flood or temperature or epidemic or landslide or avalanche or volcan* or typhoon or tsunami or mudslide)

Search Syntax for Turkey – "turk*" and "disaster" or "earthquake" or "flood" or "temperature" or "epidemic" or "landslide" or "avalanche"

Search Syntax for UK – ("u k" or "united kingdom" or "northern ireland" or "england" or "scotland" or "britain" or "great britain" or "wales" or "belfast" or "cardiff" or "edinburgh" or "london" or "british" or "brittish" or "welsh" or "briton" or "scottish" or "gb" or "irish" or "ulster" or "cymru" or "glasgow" or "aberdeen" or "scots" or "english" or "isle of man" or "guernsey" or "jersey" not "new jersey") and (disaster or earthquake or flood or temperature or epidemic or landslide or avalanche or volcan* or typhoon or tsunami or mudslide)

score that ranged from -1 if the tone is “very bad,” to 1 if the tone is “very good” (Sentiment Analysis Online, 2016, p. 1). We calculated the monthly average of these scores to measure perceived adequacy of the government’s response to the disaster to test hypothesis 2.⁶ In order to test hypotheses 3 and 3a, we recalculate the monthly averages of those scores separately for natural disasters that occurred in the marginalized region and those that occurred outside of the marginalized region.

We selected control variables that were similar to those used by Berrebi and Ostwald (2011) and captured the social, political, and economic contexts that could jointly influence terrorism activity and responses to disasters (Berrebi & Lackdawalla, 2007). These data were extracted from the World Bank’s World Development Indicators database (2013), which measures yearly variation of many indicators for a large set of countries, including the Philippines, Turkey, and the UK. Our analyses include as controls the percentage of working population unemployed, gross domestic product (GDP) per capita in constant 2000 US Dollars, gross consumption expenditures as a percentage of gross domestic product (GFCE), foreign direct investment as a percentage of GDP, and Development Assistance Committee country inflows as a percentage of GDP (DAC). Both population and urbanization are included as controls because they directly impact the severity of the consequences of a natural disaster (Kennedy, 2002). A high magnitude earthquake in an isolated jungle will have fewer consequences than one that strikes in downtown Manila. Further, GDP per capita is used as a proxy for each country’s ability to mitigate the effects of a disaster (Berrebi & Ostwald, 2011). Government consumption expenditures are used to measure the size of the government and as a proxy for the degree of “government intrusiveness” into societal affairs (Berrebi & Ostwald, 2011; Robison et al. 2006). The level of foreign investment and DAC country inflows are used to control for participation in the global economy and forces of globalization (Fearon & Laitin, 2012).⁷

A final series of control variables accounts for the magnitude of disasters in each month, the data collection series, and the ceasefire agreements between the PIRA and the British government. We include the total number of persons killed each month as a result of a natural disaster to account for the magnitude of grief. Indicator variables are used to distinguish the different collection periods of the GTD, with the first period omitted (i.e. January 1998–March 2008, April 2008–October 2011, and November 2011–December 2013). And finally, for the UK models, we include a dummy variable that captures the period after the first ceasefire agreement by the IRA in August 1994.

Methods

We begin our analysis by describing the data to demonstrate the variation in the number of terrorist attacks and in the sentiment of responses to natural disasters.

⁶Although this strategy may not a perfectly measure public perceptions, it offers a replicable and reliable way to measure perceptions that is consistent across all three nations.

⁷We note here that these control variables only capture yearly variation within each country, as monthly data are unavailable, which will result in downward bias in their standard errors because months in the same year will have the same value. Consequently, significance tests for the control variables may erroneously conclude relevance when there is none. Despite this limitation, we retain these measures for analyses due to their expected relationship to the key independent and dependent variables, which could lead to omitted variable bias if excluded.

Because terrorism is a rare event and the data are time series, autoregressive Poisson (ARP) regression is used to test the above hypotheses. The ARP model corrects for autocorrelation and allows the variance to be over dispersed (Katsouyanni et al., 1996; Schwartz et al., 1996). To test the first hypothesis, ARP regressions are run for each nation using the following model:

$$Terrorism = \alpha_{t-k} \circ y_{t-1} + \varepsilon$$

where

$$\alpha_{t-k} = 1/[1 + \exp(\beta_1 NaturalDisaster + \beta_2 Killed + \beta_3 controls)]. \quad (1)$$

In this equation, the subscripts t and $t-k$ show whether the variables were measured during the current month (t) or k months prior to t ($t-k$). The α_{t-k} refers to the logistic distribution function of the relevant independent variables at time point $t-k$. Note that the controls other than the GTD collection periods are measured during the same month as the disasters. The GTD collection periods and the 1994 Ceasefire in the UK models are measured at t . While lagging the other controls is unnecessary, it makes little difference since all months in the same year have the same value (i.e. see note 5). As terrorism data from 1993 are missing, these months are treated as missing. However, because the independent variables are measured in 1993, we are able to measure those values in 1993 as k increases.

NaturalDisaster is the number of natural disasters that occurred that month (using the EM-DAT criteria). The $\alpha_{t-k} \circ y_{t-1}$ operator represents the binomial thinning of y such that the count of the terrorist attacks (y) at time point $t-1$ either “survives” with equal probability α or “dies” with probability $1-\alpha$ (Brännäs, 1995). The ε is assumed to be independently and identically distributed Poisson with mean $\lambda > 0$ and independent of y_t . Within this model, if hypothesis 1 is supported, the coefficient estimate for $\hat{\alpha}_1$ will be both positive and statistically significant. However, because it can be reasonably argued within rational choice theory that terrorist organizations might be reluctant to attack when its constituency is at its most vulnerable due to the high costs of losing popular support, we use two-tailed tests in this analysis.

To test hypothesis 2, we replace *NaturalDisaster* with *Adequacy*, as shown in [equation 2](#) below.

$$Terrorism = \alpha_{t-k} \circ y_{t-1} + \varepsilon$$

where

$$\alpha_{t-k} = 1/[1 + \exp(\beta_1 Adequacy + \beta_2 Killed + \beta_3 controls)]. \quad (2)$$

If hypothesis 2 holds, then the estimate for $\hat{\beta}_1$ will be negative and statistically significant. We test this hypothesis using a one-tailed test because rational choice theory provides no reasonable argument for an effect in the opposite direction.

In order to test hypotheses 3 and 3a, we partition the data on terrorism and adequacy into two sets for each country. The terrorist attack was either perpetrated by the groups representing the people in the marginalized region (H3) or it was not (H3a), and the adequacy either refers to disasters in the marginalized region (H3) or it does not (H3a). The ARP models are run for each set of data in each country as shown in [Equation 3](#) using each set of data.

$$TerrorismX = \alpha_{t-k} \circ y_{t-1} + \varepsilon$$

where

$$\alpha_{t-k} = 1/[1 + \exp(\beta_1 AdequacyX + \beta_2 Killed + \beta_3 controls)]. \quad (3)$$

To directly test hypothesis 3, *TerrorismX* refers to attacks by the relevant perpetrators Islamists in the Philippines, Kurds in Turkey, and republicans in the UK and *AdequacyX* refers to the perceived adequacy of the response to disasters in the marginalized region in all three countries. If that hypothesis holds, then $\hat{\beta}_1$ will be negative and statistically significant. To test hypothesis 3a, the model uses attacks by other terrorists as *TerrorismX* and the perceived adequacy of the response to disasters in non-marginalized regions as *AdequacyX*. If the hypothesis holds, then β_1 will be null. Both tests are one-tailed for reasons described above.

Accounting for any delayed attack response

As discussed above, we expect that any terrorist attacks that were perpetrated as a reaction to government behavior after a natural disaster would likely take time to implement (Kavanagh, 2011) and that the association between the two could change over time (Perry & Lindell, 2003). As such, each hypothesis is tested sequentially, estimating β_1 using a different lag each time ($k=1$ to 12).⁸ Because the four hypotheses are tested on data from three countries using 12 different lag times, there are 144 set of results ($4 \times 3 \times 12$), making it cumbersome to present the full set of results here. Instead, we graphically present the coefficient estimates $\hat{\beta}_1$ for the key independent variables and report the coefficient estimates for all variables in the models with statistically significant key variables in the Appendix. The complete set of results for all 144 models is available from the authors upon request.

At first glance, it may appear that we are making 144 sets of comparisons to test our hypotheses, which would make our findings especially vulnerable to Type I error due to multiple comparisons. However, each hypothesis relies upon a set of findings from only three countries or regions. Further, we expect concurrent lagged independent variables to be correlated with one another, thus picking up the effect of nearby lags in each model. For this reason, we expect the graphical presentation of the estimates to show a mixture of trends and random fluctuation. Given that we are comparing the effects of 12 lags within countries and 36 lags across countries, we still might be vulnerable to Type I error due to multiple comparisons. For this reason, we highlight those finding that are robust to error rate correction.

Findings

Descriptive statistics

We begin by describing the primary dependent and independent variables that are used to test the hypotheses. Table 1 shows the average number of attacks, the number of natural disasters, and sentiment score for all measured months in each country. It also includes the standard deviations and the proportion of months where the value

⁸We run these models separately to avoid multicollinearity that could mask important findings.

Table 1. Mean, standard deviation, and proportion of zeros for terrorism, natural disasters, and sentiment scores in Philippines, Turkey, and the UK.

	Philippines			Turkey			UK		
	Mean	SD	$p(0)$	Mean	SD	$p(0)$	Mean	SD	$p(0)$
Terrorist attacks	11.944	13.504	0.065	7.873	12.391	0.160	7.209	9.056	0.173
Attacks by marginalized terrorist groups	2.696	4.401	0.297	4.042	7.975	0.395	3.784	7.061	0.405
Attacks by other groups	9.248	11.478	0.140	3.830	6.321	0.275	3.424	3.880	0.242
Natural disasters	1.183	1.270	0.369	0.294	0.554	0.752	0.216	0.524	0.817
Natural disasters in marginalized area	0.392	0.713	0.719	0.121	0.365	0.889	0.000	0.000	1.000
Natural disasters in non-marginalized area	0.791	0.999	0.497	0.173	0.420	0.843	0.216	0.524	0.817
Average sentiment	-0.083	0.135	0.402	-0.067	0.137	0.578	-0.027	0.104	0.732
Average sentiment in marginalized area	-0.023	0.087	0.755	-0.085	0.107	0.821	-0.001	0.007	0.987
Average sentiment in non-marginalized area	-0.061	0.110	0.500	-0.044	0.114	0.663	-0.028	0.104	0.745

is zero. Note that the statistics are calculated from only 306 months because those in 1993 are excluded here. We also excluded the first month for the dependent variables and the last month for the independent variables to account for a one-lag model. We see in this table that the Philippines experienced more terrorism than the other nations and that most of the attacks were perpetrated by non-Islamic groups. In contrast, most attacks in both Turkey and the UK were perpetrated by the groups that fight for the marginalized people represented in these analyses (i.e. Kurdish and republicans, respectively). The Philippines also experiences more natural disasters than the other two countries, averaging more than one per month, compared to one every three to five months in the other countries (1/average). Interestingly, the non-marginalized regions in all three countries experience more disasters than the marginalized regions. However, more is revealed when we examine the sentiment scores by region. Only in Turkey is the sentiment score worse for the marginalized area than the non-marginalized area. In other words, the Turkish government seems to respond more poorly to disasters in the Southeast than it does elsewhere. Both the Philippines and the UK show worse sentiments for disasters in the non-marginalized regions. However, it is worth noting that the average sentiment across all nations is negative, suggesting that none of them are portrayed to respond adequately to disasters on average.

We now examine how the trends on terror attacks and adequacy of responses to natural disasters have varied over time. [Figure 4](#) presents the monthly number of terrorist attacks for all three countries using the same scale for comparison. The highest peak for terrorism across all countries was experienced by the Philippines in May 2013 ($f = 94$), followed by 84 attacks in March 1992 in Turkey. The highest peak for the UK occurred in December 1991, with 52 attacks. With the exception of the Philippines, it was evident that each of these peaks was primarily driven by terrorism committed by groups connected to the marginalized populations identified in this study. Indeed, 67.9% of the Turkish peak of 84 attacks were committed by Kurdish-related terrorist groups ($f = 57$), and 90.3% of the UK peak of 52 attacks being committed by republican terrorist groups ($f = 47$). In contrast, only 9.6% of the peak for Philippine terrorism was committed by Islamic-based groups ($f = 9$), reflecting the heterogeneity in terrorism trends within this nation.

We next show in [Figure 5](#) how the sentiment scores describing the portrayed adequacy of responses to natural disaster have varied over the months in this study. We present the average sentiment scores instead of the frequency of natural disasters

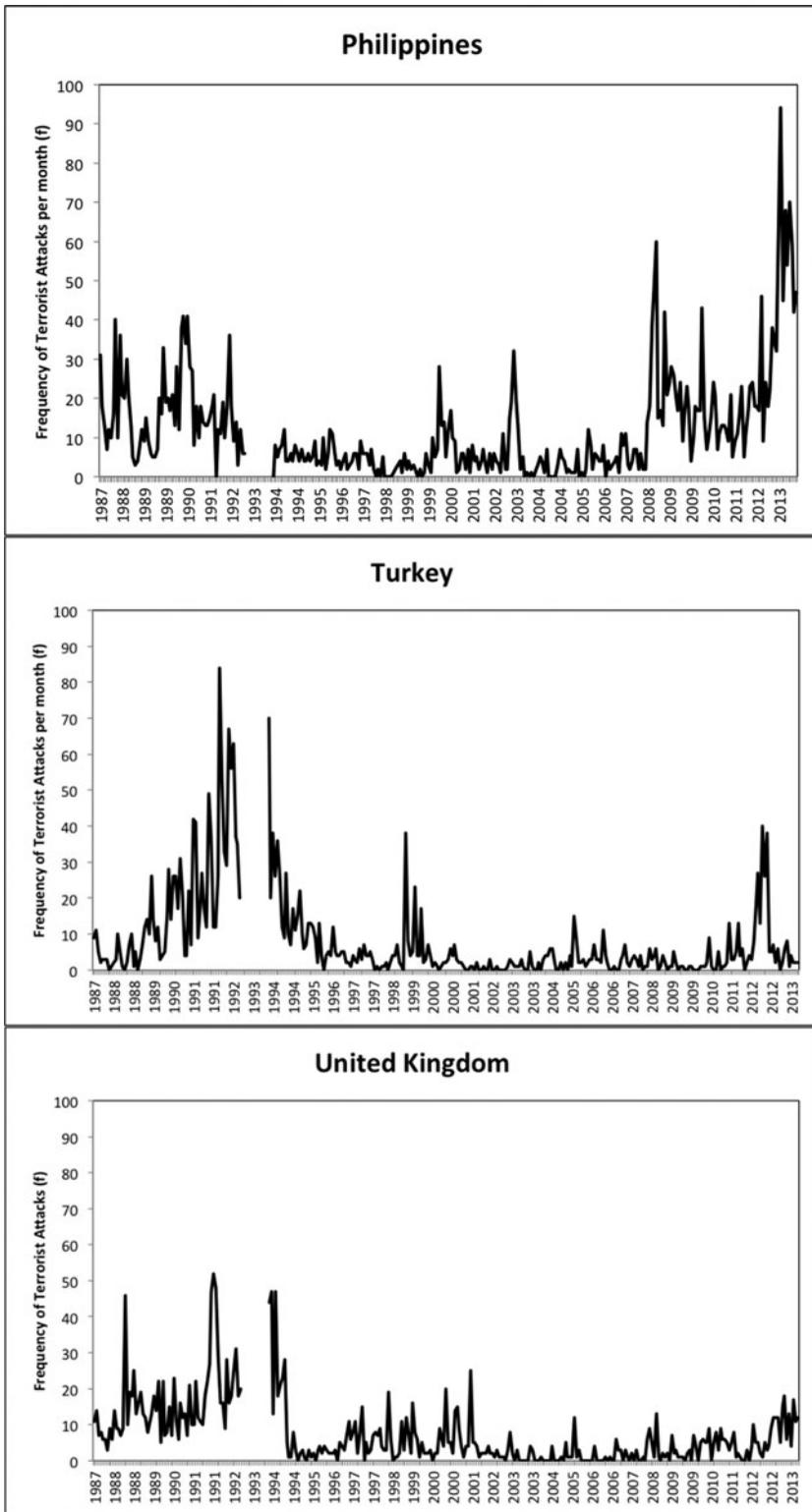


Figure 4. Number of terrorist attacks per month in the Philippines, Turkey, and the UK.

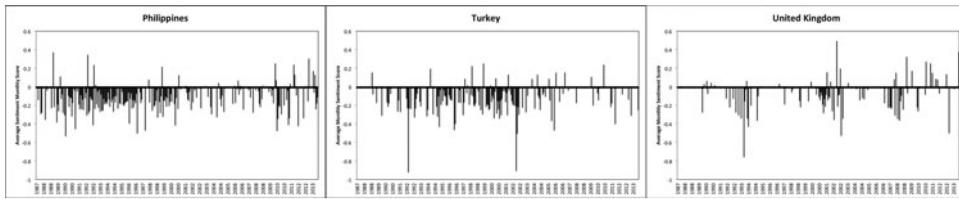


Figure 5. Average monthly sentiment score in the Philippines, Turkey, and the UK.

to save space and because all of the natural disasters found in EM-DAT had at least one Reuters News article that referenced the Government's response.⁹ Figure 5 shows that the average monthly sentiment scores were both positive and negative in all three countries, demonstrating meaningful variation in the portrayed adequacy of the government's response across disasters. From this figure, it is clear that the sentiment falls below zero more often than above in all cases, which is unsurprising given that their averages are all negative in Table 1. The graphs in Figure 5 also demonstrate that the UK had the highest average sentiment score for a given month in June 2002 ($\bar{x} = 0.493$), while Turkey had the two lowest average sentiment scores in April 1992 ($\bar{x} = -0.922$) and June 2002 ($\bar{x} = -0.906$). We see that the Philippines may have had the most months with negative sentiment scores (170 out of 319); however, Turkey had the highest negative to positive month ratio at 7.38:1, followed by the Philippines at 6.54:1, and the UK at 2.75:1.

Tests of hypotheses

Turning to hypothesis 1, which states that natural disasters should be *positively* related to subsequent terrorism, we present line graphs of the coefficient estimates in Figure 6 for each country. The horizontal axis shows the number of months prior to the current month (k in $t-k$) that natural disasters had occurred. In other words, it shows the estimate for the k lagged effect for 1 to 12 lags. The vertical axis shows the magnitude of the estimate. Note that all countries are set to the same scale for comparison. When the estimate is statistically different from zero (two-tailed, $p < 0.05$), then its value is reported in the graph along with the level of significance. Across all 36 estimates (12×3) that were generated for this hypothesis, the only statistically significant positive result was estimated with a lag of 5 months for the Philippines ($\hat{\beta} = 0.059$, $p = 0.049$), suggesting that five months after natural disasters, there are more attacks in that country. However, the results in the Philippines also suggest that eight months after the disasters, there are fewer attacks ($\hat{\beta} = -0.082$, $p = 0.013$). A negative relationship between natural disasters and terrorism was also observed in the UK at a lag of two months ($\hat{\beta} = -0.235$, $p = 0.049$).¹⁰ We present the coefficient estimates

⁹In some cases, it seems that the government did not physically respond to the natural disaster because its verbal response was their only discovered response to these natural disasters (e.g. "Officials said it was difficult to get a clear picture of the situation because of problems in communicating with the remote area. Anatolian quoted deputy Prime Minister Bulent Ecevit as saying a village in Bingol was totally damaged by the quake." "There was no word of loss of life, Ecevit said." Excerpt taken from *Quake hits eastern Turkey, 11 injured*, Iba0000020010925du4d07m93.

¹⁰When robustness checks were conducted using Poisson (in line with Berrebi & Ostwald, 2011), negative binomial, and zero-inflated negative binomial models, the substantive findings held.

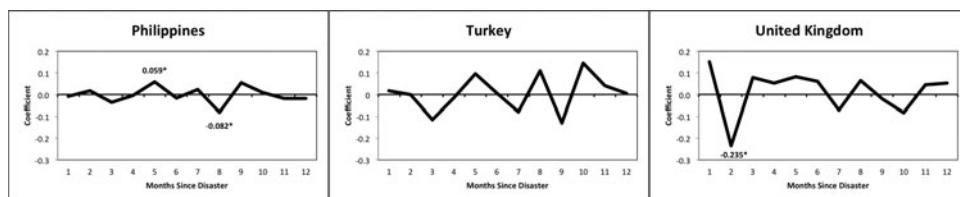


Figure 6. Coefficients for the impact of natural disasters on terrorism across 1–12 lagged months ($*p < 0.05$, $**p < 0.01$, $***p < 0.001$).

for the full model for the Philippines using five and eight lags, and the UK using two lags in Table 2.¹¹ The incident rate ratios (IRR) calculated from these coefficients suggest that a natural disaster is expected to increase the rate of subsequent terrorism in the Philippines after five months by 6.1%, and three months later decrease the rate by 7.9%. For the UK, these coefficients suggest that a natural disaster is expected to decrease the rate of subsequent terrorism in the Philippines after five months by 20.9%. Concordantly, this study finds very limited support for hypothesis 1 that predicted that the natural disasters would be positively related to subsequent terrorism.

Hypothesis 2 states that the portrayed adequacy of the government's response to natural disasters should be negatively related to terrorism in subsequent months. Figure 7 displays the coefficient estimates for all lags in each country.¹² In line with the findings for hypothesis 1, a statistically significant negative relationship was observed between the portrayed adequacy of the Philippine Government's response to a natural disaster and terrorism occurring five months later. Although this finding occurred after the same temporal lag as for natural disasters aforesaid, it suggests that a one unit increase in the average sentiment score was associated with a reduction in the rate of terrorism of 39.7% ($p = 0.028$). Given that the range of the sentiment score is 0.9, which is less than one, a more realistic interpretation is for a one standard deviation increase in the average sentiment score (i.e. 0.135 from Table 1). Thus, as the average sentiment score increases by one standard deviation, the rate of terrorism decreases by 6.6%. Note that the estimated effect after eight months is null, in contrast to the finding in Figure 6.

Both Turkey and the UK also exhibited the hypothesized negative relationship between the portrayed adequacy of the government's response to a natural disaster and subsequent terrorism across a number of temporal periods. Indeed, the analysis from both Turkey and the UK shows that the strongest effect was detected in the month following the disasters, and a one standard deviation increase in the average sentiment score was related to an estimated decrease in the rate of terrorism of 19.9% ($p < 0.001$) and 13.5% ($p = 0.012$), respectively.¹³ Statistically significant relationships

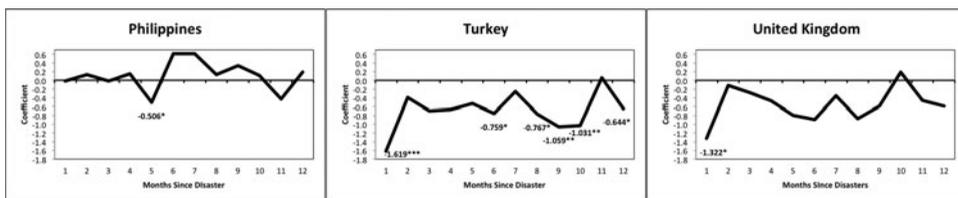
¹¹Subsequent sensitivity analyses were used to examine whether the relationship between natural disasters and terrorism observed in the Philippines may have been contingent on the presence volcanic eruptions, which were absent from the other two nations. The results were nearly identical when volcanic eruptions were removed.

¹²The coefficient estimates for the eight full models with statistically significant estimates for the adequacy of the government's response to natural disasters can be found in Table 3 in the Appendix.

¹³This finding for Turkey was robust to a Bonferroni corrected α of 0.004; however, the finding would not be statistically significant for the UK. However, had this study only used one model to test each hypothesis within each nation and region (a lag of one month) following Smith et al., (2016), this would be considered statistically significant.

Table 2. Coefficients and standard errors for the impact of natural disasters on terrorism for five and eight lags in Philippines ($*p < 0.05$, $**p < 0.01$, $***p < 0.001$).

Variable	Philippines – five lags β (SE)	Philippines – eight lags β (SE)
Disaster	0.073* (0.031)	-0.078* (0.035)
Sum of killed	-0.006 (0.004)	0.001 (0.001)
GDP	0.008*** (0.001)	0.006*** (0.001)
Population (Millions)	-0.095*** (0.01)	-0.097*** (-0.058)
GFCE	-0.029 (0.017)	-0.045* (0.018)
FDI	-0.181** (0.07)	-0.283*** (0.072)
DAC	0.006*** (0.001)	0.001 (0.001)
Unemployment	0.134*** (0.023)	0.525*** (0.055)
General election year	-0.244*** (0.051)	-0.467*** (0.056)
Constant	3.384 (1.866)	6.374 (1.954)
Log-likelihood	-1491.097	-1463.178

**Figure 7.** Coefficients for the impact of the perceived adequacy of the government's response to a natural disaster on terrorism across 1–12 lagged months ($*p < 0.05$, $**p < 0.01$, $***p < 0.001$).

were also observed for lags of six ($\hat{\beta} = -0.759$, $p = 0.048$), eight ($\hat{\beta} = -0.767$, $p = 0.033$), nine ($\hat{\beta} = -1.059$, $p = 0.005$), 10 ($\hat{\beta} = -1.031$, $p = 0.005$), and 12 months ($\hat{\beta} = -0.644$, $p = 0.041$) in Turkey, indicating that any connection between portrayed adequacy and terrorism may not be limited to a single reaction within Turkey.

Hypotheses 3 states that the negative relationship between government's response to natural disasters and terrorism should only hold for disasters that affect the geographically marginalized constituency of terrorist organizations in each country. This implies that the adequacy of responses to disasters in other places will be unrelated to terrorist attacks by others (hypothesis 3a). The findings for both series of models are shown in Figure 8. The solid line depicts the findings for hypothesis 3, which should be *negative*, and the dashed line shows the findings for hypothesis 3a, which should be *null*.¹⁴ When significant, the estimates for the unmarginalized areas are in a box to distinguish them from the estimates for the marginalized areas. Turning the results for the Philippines, we find that, indeed, the only significant result comes from the adequacy of responses to disasters in the Mindanao islands on Islamic terrorist attacks ($\hat{\beta} = -1.972$, $p = 0.016$, lag = 4).¹⁵ Terrorist attacks by non-Muslim groups are unrelated to the adequacy of responses to natural disasters on Islands outside of Mindanao. The perception of the government's response to natural disasters is also

¹⁴The coefficient estimates for the eight full models with statistically significant estimates for the adequacy of the government's response to natural disasters can be found in Table 4 in the Appendix.

¹⁵Had we tested the model with two-tails, the adequacy of responses to disasters elsewhere in the Philippines would be *positively* related to non-Islamic attacks six months later (EQ $\backslash O(\beta, \Lambda) = 3.239$, $p = 0.005$). However, a closer investigation into this finding suggests that it is driven by the spike in terrorism in 2013, because it disappears when the 2013 data are excluded.

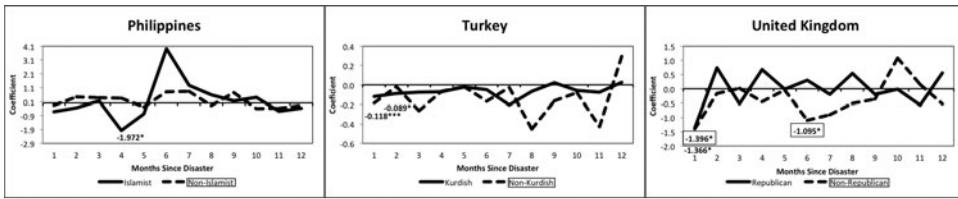


Figure 8. Coefficients for the impact of the perceived adequacy of the government's response to a natural disaster on terrorism by terrorism type across 1–12 lagged months ($*p < 0.05$, $**p < 0.01$, $***p < 0.001$).

related to Kurdish terrorism within Turkey for both one ($\hat{\beta} = -0.118$, $p < 0.001$) and two ($\hat{\beta} = -0.089$, $p = 0.028$) lags, providing additional support for hypothesis 3. In line with the predictions of hypothesis 3a, non-Kurdish terrorism is unrelated to the perception of the Turkish Government's response to natural disasters outside of the southeast. Therefore, hypotheses 3 and 3a are both supported by the findings in the Philippines and Turkey.

The findings for the UK model provide mixed support for the predictions of hypotheses 3 and 3a. Similar to the aggregated findings for the UK, the adequacy of responses to natural disasters is negatively related to republican ($\hat{\beta} = -1.366$, $p = 0.038$) and non-republican terrorism ($\hat{\beta} = -1.396$, $p = 0.017$) after a lag of one month. Further, the adequacy of responses to natural disasters occurring on the mainland of the UK (Great Britain) is negatively related to non-republican terrorism after a lag of six months ($\hat{\beta} = -1.095$, $p = 0.037$). Consequently, hypothesis 3 is only partially supported by the findings in the UK, since hypothesis 3a is unsupported.

Beyond the key findings discussed above, a number of other factors emerged as predictors of terrorism in these models. While unemployment was consistently and positively related to terrorism in all nations regardless of how we lagged the measure of disaster (see Appendix Tables 3 and 4), the directionality of the economic factors including GDP and GFCE varied both between nations and regions. This was also the case for the impact of election years on terrorism, suggesting that their effect on terrorism, net of other influences, may not be consistent across countries or regions within countries. Despite these statistical findings, this study urges caution in when drawing conclusions, as many of these key control variables are only measured in yearly increments, causing their significance to be overstated. This, however, is not an issue for estimate for the effect of the sum of people killed in natural disasters, which is measured for each month. The sum of people killed was only statistically significant in the regionally specific models for Turkey and the Philippines. Note that the directionality of this effect in Kurdish–Turkey depends on which lag the perceived response is measured. While this signals the instability of the estimate, we also recognize that the total number of fatalities is realized over time, strengthening its correlation with the lagged perception of government's response, which could be driving this instability.

Conclusions

In his 2013 American Society of Criminology presidential address, Robert Agnew (2013) stated that “over the next few decades climate change will become one of the

major forces, if not the major force driving crime.” We interpreted this as a charge to examine the effects of natural disasters on crime so that we can find ways to mitigate at least some of their damaging effects. Taking this charge very seriously, we attempt to disentangle the Berrebi and Ostwald’s (2011) finding that natural disasters lead to more terrorism. While cross-national yearly longitudinal analysis is important to identify important associations, their research necessitated further investigation in order to better understand the mechanism that motivates terrorism after a disaster. We began this research by trying to replicate Berrebi and Ostwald’s (2011) finding for three nations over monthly periods and found little support, as there was no relationship in either direction in Turkey, mixed findings in the Philippines, and contrary findings in the UK. We anticipated that if disasters, indeed, cause terrorism, it would be especially evident in Turkey and the Philippines because each nation experiences severe natural disasters and terrorist attacks. Given the findings, we conclude that natural disasters unlikely lead to more terrorism on their own merit.

However, we do expect that how a government responds to a natural disaster could either mitigate or facilitate subsequent terrorist attacks. Disasters require that a government act promptly and effectively to mitigate a broad array of negative consequences both during the event and in its aftermath (Galea et al., 2005; Green & Ward, 2004). Through hypothesis 2, we posited that a government’s real or portrayed failure in this duty to its populace can magnify the disaster’s economic, political, and social costs, and increase the rational justifications to engage in terrorism. When taking each nation at its aggregate, we found much support for this claim, as the adequacy of the response to a natural disaster is negatively related to terrorism within the following year in all three countries. Further, the analysis allowed us to estimate the time it takes for terrorist attacks to be perpetrated after poorly handled natural disasters. We anticipate that these estimates can help governments better allocate resources and to justify continued support to affected areas. Importantly, the estimated temporal lag differs across nations, suggesting important contextual variation. Both Turkey and the UK were observed to have increases in terrorism in the month following the expression of poor disaster management suggesting a swift backlash. While not surprising given that previous research shows that terrorists can respond quickly with backlash (see LaFree et al., 2009), this finding also suggests that terrorist groups are less likely to attack shortly after the government adequately meets the needs of the disaster victims. A negative relationship also appeared after six or more months in Turkey, suggesting further benefits may also be yielded with some persistence throughout the year following a disaster. The findings for the Philippines suggest that a terrorist response will take at least five months after a poorly managed disaster. This longer lag might be due to the severe disasters more typically experienced in the Philippines (Kaniasty & Norris, 2004), which could delay terrorist organizations from taking advantage of stressed government resources and target softening.

Finally, we anticipated that only ethno-nationalist terrorist organizations would react to the adequacy of a government’s response to a natural disaster, as those organizations are particularly attuned to the well-being of their geographically and economically isolated supporters. While we found observable differences in the results for attacks by those groups and others, the overall findings offered conditional

support for our assertion. In fact, this finding was clear in both the Philippines and Turkey, where attacks by Islamic groups followed poor responses to natural disasters in the Mindanao islands and attacks by Kurdish groups increased following natural disasters in the southeast. In the UK, however, all groups were sensitive to government responses in and out of Northern Ireland. Taken together, these findings firstly suggest that for some nations, the relationship between responses to natural disasters and terrorism is particularly apparent for terrorist groups that represent a geographically marginalized constituency. However, for other nations, *any* organization might be reluctant to attack after a government is portrayed to have responded well to a disaster regardless of who is affected (i.e. during the heroic phase), as such attacks could villainize the group among even its most devoted supporters.

Generally, the findings suggest that some terrorist organizations are sensitive to how well a government is perceived to respond to a natural disaster. This can be good news because it suggests that governments can undermine exploitive terrorists in the aftermath of natural disasters. Managing public perception should be a policy priority for nations with ongoing terrorist threats. This policy need is especially heightened in nations that have marginalized populations living in geographically concentrated areas, and in nations with limited journalistic output as this may be the primary public portrayal (see Lowrey et al., 2007). Governments should make ongoing public statements, highlighting their efforts to respond to and repair the damage from natural disasters, in order to counteract messaging by terrorist organizations that might portray the government as the source of social and public problems (Kydd & Walter, 2006). Research by Dugan, Huang, LaFree, and McCauley (2008) suggests that this approach is promising, as they found that public communication by the Turkish Government after a harrowing terrorist attack at the Orly Airport in 1983 led, in part, to the rapid decline of the Armenian terrorist organization ASALA (Dugan et al., 2008). Siddiqi (2014) further describes that following large-scale flooding in Pakistan in 2010–2011, the poor government response was seen to violate the social contract and allowed political space for the growth of the terrorist organization Jamaat-ud-Dawa. In this example, this Islamist terrorist group was able to capitalize on this perceived failure toward already disenfranchised people in order to help legitimize their political messaging. Particularly in contested political spaces, public reminders that governments are actively helping the poorest and most disenfranchised can help reduce the risk of terrorism (Hunter, 2005).

Of course, this study faced several limitations. First, we relied only on Reuters news reports to assess how the public perceived government responses to disasters. An ideal measure would have come from local surveys of persons living in the area who were affected by the disaster. However, given the need for a uniform measure across several nations over time, a sentiment analysis of articles reporting on the disaster likely captured much of the important variation needed for this analysis. A second limitation is based on the constraints of relying upon open sources to measure terrorism in the GTD. It is certainly possible that media might be too preoccupied with recovery reporting to detect smaller terrorist attacks following a disaster. However, following the logic spelled out in this paper, terrorists want their constituencies to know about any attacks perpetrated on their behalf, and are more likely to orchestrate an

event that assures media attention, and subsequent inclusion in the GTD. The likely more pressing consequence for this research is that specific perpetrators are not always attributed by media sources, misclassifying a subset of attacks perpetrated by Muslim, Kurdish, and republican groups as “other” in our within-country analyses. Yet, because this misclassification biases the findings toward zero, our findings are considered more conservative and our conclusions hold despite the limitation of the GTD. Another limitation was our inability to control for monthly variation in the economic and demographic profile of each country. Although yearly variation in these correlates of terrorism was included in all models, we were unable to test for potential interactions between these factors and the perceived adequacy of a government’s response. We anticipate that economic dependency is an important factor and urge subsequent research to estimate how fluctuation in the financial resources available to the government may further inform the relationship observed in this study.

Regardless of the mixed findings, it is clear that future research in this area should continue to assess how the aftermath of a disaster might affect terrorism risk differently within a country. Finer geographic units could account for factors such as terrain and access to resources such as water, hospitals, and education, which might also play a role in how a terrorist group might respond to a disaster. Further, it is possible that governments intentionally provide less disaster aid in areas that are perceived to support terrorism. If so, then the effect of the perceived disaster response (also related to disaster aid) on terrorism might be driven by actual levels of aid. While the descriptive statistics presented here showed that the portrayed response is higher in the regions with known terrorist organization for the UK and the Philippines – assuaging some of this concern, more refined analyses could use sentiment as a dependent variable to better assess whether disasters in those marginalized communities with militant advocates are lower than in other marginalized communities. While it might seem more ideal to collect systematic and accurate data on government aid to specific areas after a disaster, such data are vulnerable to inaccuracies and corruption (Nikolova & Marinov, 2017), and comparisons across different sizes and types of disasters are meaningless. Further, we argue that grievances are drawn more from perceived injustices rather than actual injustices, making the sentiment as reported by the news more directly tied to the motivating theory of this research than actual measures of aid would be.

In general, we need more research in this area before drawing strong conclusions on how natural disasters and government responses influence terrorism. For example, research should test for alternative mechanisms to those discussed above, including the disruption of social networks (see Kiliç et al., 2006) and the influence of changing political regimes or other temporal factors. Further, little is known about how disasters might affect terrorist organization recruitment, or the target or severity of terrorist attacks. Future research should also extend to more nations, as natural disasters, terrorist motivations, and government responses vary across locations. Nigeria, India, and the Democratic Republic of Congo would be ideal countries to include in any replication, as they are all vulnerable to natural disasters and have terrorist constituencies in geographically isolated areas. Replication studies could also draw upon more localized data sources, as the GTD relies heavily on English-speaking news reports (Dugan & Distler, 2016). Local non-English news sources might include lesser known attacks and

more accurately attribute attacks to specific groups. Finally, future research should reconsider how to operationalize natural disasters. According to the EM-DAT definition of a natural disaster, Northern Ireland experienced none; yet, Reuters reported in 2011 “DUBLIN/BELFAST (Reuters) - Two people died and hundreds were stranded in northern and eastern Ireland on Tuesday after torrential rain closed roads and rail lines, left shops and homes under water.”

In sum, the consistent findings that the perceived adequacy of the government’s response to a natural disaster is negatively related to terrorist attacks just months after the disaster suggest that governments’ preparedness for disaster is more important than it is generally believed. If terrorist groups are, indeed, willing to leverage their constituencies’ anger and attack after a poorly managed disaster, then governments should devote resources to publicize their efforts and to take action to mitigate further devastation, which will, in turn, further mitigate public health harms and improve the well-being of all.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Daren Fisher is an Assistant Professor at The Citadel. He is specialized in empirically testing the predictions of criminological theory to better inform government policies that aim to reduce terrorism using econometric methods and qualitative approaches. Dr. Fisher has published articles in the *European Journal of Criminology*, *Studies in Conflict and Terrorism*, *Critical Studies on Terrorism*, *Police Practice and Research*, and *Women & Criminal Justice*. He has also authored book chapters on Sociological and Criminological Explanations of Terrorism (Oxford University Press, eds. Erica Chenoweth, Andreas Gofas, Richard English, and Stathis Kalyvas) and the Emergence of Classical Criminological Theory (Wiley, ed. Ruth A. Triplett).

Laura Dugan is a Professor in the Department of Criminology and Criminal Justice at the University of Maryland. Her research examines the predictors and consequences of terrorist violence and the efficacy of violence prevention/intervention policy and practice. She also designs methodological strategies to overcome data limitations inherent in the social sciences. Dr. Dugan is a founding co-principal investigator for the Global Terrorism Database (GTD) and co-principal investigator of the Government Actions in Terrorist Environments (GATE) dataset. Dugan holds a doctorate in Public Policy and Management and a Masters in Statistics from Carnegie Mellon University. She has coauthored *Putting Terrorism into Context: Lessons Learned from the World’s Most Comprehensive Terrorism Database*, along with more than sixty journal articles and book chapters.

ORCID

Daren Fisher  <http://orcid.org/0000-0002-7901-4856>

Laura Dugan  <http://orcid.org/0000-0001-5930-6950>

References

- Agnew, R. (2012). Dire forecast: A theoretical model of the impact of climate change on crime. *Theoretical Criminology*, 16(1), 21–42. doi:10.1177/1362480611416843

- Agnew, R. (2013). Presidential Address: American Society of Criminology Annual Meeting 2013. Retrieved from http://www.asc41.com/videos/2013/AgnewBob_2013_Presidential.html
- Agnew, R. (2017). Dire forecast: A theoretical model of the impact of climate change on crime. In R. White (Ed.), *Transnational environmental crime* (pp. 97–118). New York, NY: Routledge.
- Anaz, N., Aslan, Ö., & Özkan, M. (2016). Turkish foreign terrorist fighters and the emergence of a new kind of radicalization. *Turkish Studies*, 17(4), 618–642. doi:10.1080/14683849.2016.1243987
- Beccaria, C. (1764). *On crimes and punishments*. Indianapolis: Hackett Publishing Company.
- Becker, G. S. (1968). Crime and punishment: An economic approach. In N. G. Fielding, A. Clarke, & R. Witt (Eds.), *The economic dimensions of crime* (pp. 13–68). London: Palgrave Macmillan.
- Benmelech, E., Berrebi, C., & Klor, E. F. (2010). The economic cost of harboring terrorism. *Journal of Conflict Resolution*, 54(2), 331–353. doi:10.1177/0022002709355922
- Benmelech, E., Berrebi, C., & Klor, E. F. (2015). Counter-suicide-terrorism: Evidence from house demolitions. *The Journal of Politics*, 77(1), 27–43. doi:10.1086/678765
- Bentham, J. (1781). *The principles of morals and legislation*. Oxford: Clarendon Press.
- Bergholt, D., & Lujala, P. (2012). Climate-related natural disasters, economic growth, and armed civil conflict. *Journal of Peace Research*, 49(1), 147–162. doi:10.1177/0022343311426167
- Berrebi, C., & Lakdawalla, D. (2007). How does terrorism risk vary across space and time? An analysis based on the Israeli experience. *Defence and Peace Economics*, 18(2), 113–131.
- Berrebi, C., & Lakdawalla, D. (2007). How does terrorism risk vary across space and time? An analysis based on the Israeli experience. *Defence and Peace Economics*, 18(2), 113–131.
- Berrebi, C., & Ostwald, J. (2011). Earthquakes, hurricanes, and terrorism: Do natural disasters incite terror? *Public Choice*, 149(3–4), 383. doi:10.1007/s11127-011-9868-x
- Boylan, B. M. (2015). Sponsoring violence: a typology of constituent support for terrorist organizations. *Studies in Conflict & Terrorism*, 38(8), 652–670. doi:10.1080/1057610X.2015.1030190
- Brancati, D. (2007). Political aftershocks: The impact of earthquakes on intrastate conflict. *Journal of Conflict Resolution*, 51(5), 715–743. doi:10.1177/0022002707305234
- Brännäs, K. (1995). Explanatory Variables in the AR(1) Poisson Model. *Umeå Economic Studies*, No. 381.
- Çandar, C. (2012). *'Leaving the Mountain': How may the PKK lay down arms? Freeing the Kurdish question from violence*. Istanbul: TESEV Publications.
- Carson, J. V. (2014). Counterterrorism and radical eco-groups: A context for exploring the series hazard model. *Journal of Quantitative Criminology*, 30(3), 485–504.
- Clarke, R. V., & Cornish, D. B. (1985). Modeling offenders' decisions: A framework for research and policy. *Crime and Justice*, 6, 147–185. doi:10.1086/449106
- Cohen, C., & Werker, E. D. (2008). The political economy of "natural" disasters. *Journal of Conflict Resolution*, 52(6), 795–819. doi:10.1177/0022002708322157
- Centre for Research on the Epidemiology of Disasters (CRED). (2010). Emergency Events Database (EM-DAT). Accessed at: <https://www.emdat.be> Accessed on 5/7/2019.
- Crenshaw, M. (1981). The causes of terrorism. *Comparative Politics*, 13(4), 379–399. doi:10.2307/421717
- Criss, N. B. (1995). The nature of PKK terrorism in Turkey. *Studies in Conflict & Terrorism*, 18(1), 17–37. doi:10.1080/10576109508435965
- Dugan, L., & Chenoweth, E. (2012). Moving beyond deterrence: The effectiveness of raising the expected utility of abstaining from terrorism in Israel. *American Sociological Review*, 77(4), 597–624. doi:10.1177/0003122412450573
- Dugan, L., & Distler, M. (2016). *Measuring terrorism*. In G. LaFree & J. Freilich (Eds.), *Handbook of the criminology of terrorism*. pp. 189–205. New York: Wiley.
- Dugan, L., Huang, J. Y., LaFree, G., & McCauley, C. (2008). Sudden desistance from terrorism: The Armenian secret army for the liberation of Armenia and the Justice Commandos of the Armenian Genocide. *Dynamics of Asymmetric Conflict*, 1(3), 231–249. doi:10.1080/17467580902838227
- Fearon, J. D. & Laitin, D. D. (2012). How persistent is armed conflict? (No. 311). Economic Research Southern Africa.

- Fisher, D., & Dugan, L. (2019). *Sociological and criminological explanations of terrorism*. In E. Chenoweth, A. Gofas, R. English, & S. Kalyvas (Eds.), *The Oxford handbook on terrorism*. Oxford: Oxford University Press.
- Fisher, D., & Lee, J. G. (2019). Testing the universality of the gender equality–peace thesis: The influence of increased gender equality on terrorism in Turkey. *Women & Criminal Justice*, 29(4–5), 242–265. doi:10.1080/08974454.2019.1582124
- Fisher, D. G., & Meitus, A. A. (2017). Uprooting or sowing violence?: Coca eradication and guerrilla violence in Colombia. *Studies in Conflict & Terrorism*, 40(9), 790–807. doi:10.1080/1057610X.2016.1239430
- Flint, C. G., & Luloff, A. E. (2005). Natural resource-based communities, risk, and disaster: An intersection of theories. *Society & Natural Resources*, 18(5), 399–412. doi:10.1080/08941920590924747
- Flynn, S. E. (2008). America the resilient-defying terrorism and mitigating natural disasters. *Foreign Affairs*, 87, 2. Retrieved from <https://heinonline.org/HOL/LandingPage?handle=hein.journals/fora87&div=21&id=&page=>
- Fothergill, A., Maestas, E. G., & Darlington, J. D. (1999). Race, ethnicity and disasters in the United States: A review of the literature. *Disasters*, 23(2), 156–173.
- Freilich, J. D., Chermak, S. M., & Hsu, H. Y. (2018). Deterring and preventing terrorism. In A. Silke (Ed.), *Routledge handbook of terrorism and counterterrorism* (pp. 460–469). Abingdon: Routledge.
- Galea, S., Nandi, A., & Vlahov, D. (2005). The epidemiology of post-traumatic stress disorder after disasters. *Epidemiologic Reviews*, 27(1), 78–91. doi:10.1093/epirev/mxi003
- Green, P. (2005). Disaster by design: Corruption, construction and catastrophe. *The British Journal of Criminology*, 45(4), 528–546. doi:10.1093/bjc/azi036
- Green, P., & Ward, T. (2004). *State crime: Governments, violence and corruption*. London: Pluto Press.
- Guha-Sapir, D., Below, R., & Hoyois, P. (2016). *EM-DAT: International disaster database*. Brussels: Université Catholique de Louvain. Retrieved from www.emdat.be on 5/7/2018.
- Hewitt, K. (1983). *Interpretations of calamity from the viewpoint of human ecology*. London: Allen and Unwin.
- Hoffman, B. (2008). *Inside terrorism*. New York, NY: Columbia University Press.
- Hsiang, S. M., Burke, M., & Miguel, E. (2013). Quantifying the influence of climate on human conflict. *Science (New York, N.Y.)*, 341(6151), 1235367. doi:10.1126/science.1235367
- Hunter, L. M. (2005). Migration and environmental hazards. *Population and Environment*, 26(4), 273–302. doi:10.1007/s11111-005-3343-x
- Jones, M. M. (2012). *The American Red Cross from Clara Barton to the New Deal*. Baltimore, MD: Johns Hopkins University Press.
- Kaniasty, K., & Norris, F. H. (2004). Social support in the aftermath of disasters, catastrophes, and acts of terrorism: Altruistic, overwhelmed, uncertain, antagonistic, and patriotic communities. *Bioterrorism: Psychological and public health interventions*, 3, 200–229.
- Katsouyanni, K., Schwartz, J., Spix, C., Touloumi, G., Zmirou, D., Zanobetti, A., ... & Medina, S. (1996). Short term effects of air pollution on health: a European approach using epidemiologic time series data: the APHEA protocol. *Journal of Epidemiology & Community Health*, 50(Suppl 1), S12–S18.
- Kavanagh, J. (2011). Selection, availability, and opportunity: The conditional effect of poverty on terrorist group participation. *Journal of Conflict Resolution*, 55(1), 106–132. doi:10.1177/0022002710374713
- Kelman, I., & Koukis, T. (2000). Disaster diplomacy: Discord disintegrated. *Cambridge Review of International Affairs*, 14(1), 214. doi:10.1080/09557570008400338
- Kennedy, D. (2002). Science, terrorism, and natural disasters. *Science (New York, N.Y.)*, 295(5554), 405–405. doi:10.1126/science.295.5554.405
- Kılıç, C., Aydın, I., Taşkıntuna, N., Özçürümez, G., Kurt, G., Eren, E., Lale, T., ... Zileli, L. (2006). Predictors of psychological distress in survivors of the 1999 earthquakes in Turkey: Effects of relocation after the disaster. *Acta Psychiatrica Scandinavica*, 114(3), 194–202. doi:10.1111/j.1600-0447.2006.00786.x

- Kinzer, S. (1999, 25 August). Quake's desolation eases anger between Turk and Kurd. *The New York Times*, 8. Col. 1.
- Kirk, D. S. (2009). A natural experiment on residential change and recidivism: Lessons from Hurricane Katrina. *American Sociological Review*, 74(3), 484–505. doi:10.1177/000312240907400308
- Kirk, D. S. (2012). Residential change as a turning point in the life course of crime: Desistance or temporary cessation? *Criminology*, 50(2), 329–358. doi:10.1111/j.1745-9125.2011.00262.x
- Kirk, D. S. (2015). A natural experiment of the consequences of concentrating former prisoners in the same neighborhoods. *Proceedings of the National Academy of Sciences*, 112(22), 6943–6948. doi:10.1073/pnas.1501987112
- Kubicek, P. (2002). The earthquake, civil society, and political change in Turkey: Assessment and comparison with Eastern Europe. *Political Studies*, 50(4), 761–778. doi:10.1111/1467-9248.00006
- Kydd, A. H., & Walter, B. F. (2006). The strategies of terrorism. *International Security*, 31(1), 49–80. doi:10.1162/isec.2006.31.1.49
- LaFree, G., & Ackerman, G. (2009). The empirical study of terrorism: Social and legal research. *Annual Review of Law and Social Science*, 5(1), 347–374.
- LaFree, G., Dugan, L., & Korte, R. (2009). The impact of British counterterrorist strategies on political violence in Northern Ireland: Comparing deterrence and backlash models. *Criminology*, 47(1), 17–45. doi:10.1111/j.1745-9125.2009.00138.x
- LaFree, G., & Dugan, L. (2007). Introducing the global terrorism database. *Terrorism and Political Violence*, 19(2), 181–204.
- LaFree, G., Dugan, L., & Miller, E. (2014). Putting terrorism in context: *Lessons from the Global Terrorism Database*. New York, NY: Routledge.
- Lowrey, W., Evans, W., Gower, K. K., Robinson, J. A., Ginter, P. M., McCormick, L. C., & Abdolrasulnia, M. (2007). Effective media communication of disasters: Pressing problems and recommendations. *BMC Public Health*, 7(1), 1–8. Retrieved from <https://bmcpubhealth.biomedcentral.com/articles/10.1186/1471-2458-7-97>
- Liu, B. (2012). Sentiment analysis and opinion mining. *Synthesis Lectures on Human Language Technologies*, 5(1), 1–167. doi:10.2200/S00416ED1V01Y201204HLT016
- Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, 65(3), 272–292. doi:10.1006/obhd.1996.0028
- Mandel, R. (2002). Security and natural disasters. *Journal of Conflict Studies*, 22(2).
- Masozera, M., Bailey, M., & Kerchner, C. (2007). Distribution of impacts of natural disasters across income groups: A case study of New Orleans. *Ecological Economics*, 63(2–3), 299–306. doi:10.1016/j.ecolecon.2006.06.013
- Nagin, D. S. (1998). Criminal deterrence research at the outset of the twenty-first century. *Crime and Justice*, 23, 1–42. doi:10.1086/449268
- Nagin, D. S. (2013). Deterrence: A review of the evidence by a criminologist for economists. *Annual Review of Economics*, 5(1), 83–105. doi:10.1146/annurev-economics-072412-131310
- National Academy of Sciences. (2002). *Countering terrorism: Lessons learned from natural and technological disasters*. Washington, DC: National Academies Press.
- National Consortium for the Study of Terrorism and Responses to Terrorism (START). (2013). Global terrorism database. Retrieved from <http://www.start.umd.edu/gtd>
- Nel, P., & Righarts, M. (2008). Natural disasters and the risk of violent civil conflict. *International Studies Quarterly*, 52(1), 159–185. doi:10.1111/j.1468-2478.2007.00495.x
- Neumayer, E., Plümper, T., & Barthel, F. (2014). The political economy of natural disaster damage. *Global Environmental Change*, 24, 8–19. doi:10.1016/j.gloenvcha.2013.03.011
- Nesser, P. (2008). Chronology of jihadism in Western Europe 1994–2007: Planned, prepared, and executed terrorist attacks. *Studies in Conflict & Terrorism*, 31(10), 924–946. doi:10.1080/10576100802339185
- Nikolova, E., & Marinov, N. (2017). Do public fund windfalls increase corruption? Evidence from a natural disaster. *Comparative Political Studies*, 50(11), 1455–1488. doi:10.1177/0010414016679109
- Özcan, A. (2006). *Turkey's Kurds: A theoretical analysis of the PKK and Abdullah Öcalan*. London: Routledge.

- Paul, J. A., & Bagchi, A. (2018). Does terrorism increase after a natural disaster? An analysis based upon property damage. *Defence and Peace Economics*, 29(4), 407–439. doi:10.1080/10242694.2016.1204169
- Perry, R. W., & Lindell, M. K. (2003). Preparedness for emergency response: Guidelines for the emergency planning process. *Disasters*, 27(4), 336–350. doi:10.1111/j.0361-3666.2003.00237.x
- Quilala, D. (2018). Narratives and counter-narratives: Responding to political violence in the Philippines. *Southeast Asian Affairs*, 285–296. Retrieved from <https://www.jstor.org/stable/26492782>
- Robison, K. K., Crenshaw, E. M., & Jenkins, J. C. (2006). Ideologies of violence: The social origins of Islamist and leftist transnational terrorism. *Social Forces*, 84(4), 2009–2026.
- Rodoplu, U., Arnold, J., & Ersoy, G. (2003). Terrorism in Turkey. *Prehospital and Disaster Medicine*, 18(2), 152–160.
- Rummel, R. (1991). *The conflict helix: Principles and procedures of interpersonal, social, and international conflict and cooperation*. New Jersey, NJ: Transaction Publishers.
- Santifort, C., Sandler, T., & Brandt, P. T. (2013). Terrorist attack and target diversity: Change-points and their drivers. *Journal of Peace Research*, 50(1), 75–90. doi:10.1177/0022343312445651
- Sayari, S. (2010). Political violence and terrorism in Turkey, 1976–80: A retrospective analysis. *Terrorism and Political Violence*, 22(2), 198–215. doi:10.1080/09546550903574438
- Schwartz, J., Spix, C., Touloumi, G., Bacharova, L., Barumamdzadeh, T., Le Tertre, A., ... & Saez, M. (1996). Methodological issues in studies of air pollution and daily counts of deaths or hospital admissions. *Journal of Epidemiology & Community Health*, 50(Suppl 1), S3–11.
- Sentiment Analysis Online. (2016). Documentation. Retrieved from <http://www.sentimentanalysis-online.com/page/documentation/>
- Shomer, R. W., Davis, A. H., & Kelley, H. H. (1966). Threats and the development of coordination: Further studies of the Deutsch and Krauss trucking game. *Journal of Personality and Social Psychology*, 4(2), 119. doi:10.1037/h0023553
- Siddiqi, A. (2014). Climatic disasters and radical politics in southern Pakistan: The non-linear connection. *Geopolitics*, 19(4), 885–910. doi:10.1080/14650045.2014.920328
- Simon, H. (1982). *Models of bounded rationality: Empirically grounded economic reason*. Boston, MA: MIT Press.
- Slettebak, R. T. (2012). Don't blame the weather! Climate-related natural disasters and civil conflict. *Journal of Peace Research*, 49(1), 163–176. doi:10.1177/0022343311425693
- Smith, Brent L.; Gruenewald, Jeff; Damphousse, Kelly R.; Roberts, Paxton; Ratcliff, Katie; Klein, Brent R.; and Brecht, Ian, "Sequencing Terrorists' Precursor Behaviors: A Crime Specific Analysis" (2016). Projects. 11. <https://scholarworks.uark.edu/tercpr/11>
- Sönmez, S. F., Apostolopoulos, Y., & Tarlow, P. (1999). Tourism in crisis: Managing the effects of terrorism. *Journal of Travel Research*, 38(1), 13–18. doi:10.1177/004728759903800104
- Waugh, W. L. Jr, (2006). The political costs of failure in the Katrina and Rita disasters. *The Annals of the American Academy of Political and Social Science*, 604(1), 10–25. doi:10.1177/0002716205284916
- Victoroff, J. (2005). The mind of the terrorist: A review and critique of psychological approaches. *Journal of Conflict Resolution*, 49(1), 3–42. doi:10.1177/0022002704272040
- Wallace-Wells, D. (2019). *The uninhabitable earth life after warming*. New York, NY: Penguin Random House.
- Zhuang, J., & Bier, V. M. (2007). Balancing terrorism and natural disasters—Defensive strategy with endogenous attacker effort. *Operations Research*, 55(5), 976–991. doi:10.1287/opre.1070.0434

APPENDIX

Table 3. Coefficients and standard errors for the impact of the perception of the government's response to a natural disaster on terrorism for statistically significant models in Philippines, Turkey, and the UK (* p < 0.05, ** p < 0.01, *** p < 0.001, 1-tailed)

Variable	Philippines		Turkey		Turkey		Turkey		Turkey		UK	
	5 Lags β (SE)	1 Lag β (SE)	6 Lags β (SE)	8 Lags β (SE)	9 Lags β (SE)	10 Lags β (SE)	12 Lags β (SE)	1 Lag β (SE)				
Disaster	-0.506* (0.264)	-1.619*** (0.336)	-0.759* (0.454)	-0.767* (0.414)	-1.059** (0.402)	-1.031** (0.393)	-0.644* (0.367)	-1.322* (0.52)				
Sum of Killed	-0.009 (0.008)	0.004 (0.004)	-0.017 (0.036)	-0.007 (0.009)	0.004 (0.688)	-0.005 (0.08)	0.016 (0.093)	-0.011 (0.009)				
GDP	0.003* (0.001)	-0.002 (0.006)	-0.004 (0.007)	0.002 (0.007)	0.003 (0.007)	-0.002 (0.007)	-0.004 (0.008)	-0.005*** (0.001)				
Population (Millions)	0.005 (0.019)	0.142 (0.08)	-0.027 (0.102)	-0.086 (0.103)	-0.138 (0.109)	-0.086 (0.108)	-0.054 (0.114)	0.069*** (0.018)				
GFCE	-0.118*** (0.02)	0.047 (0.037)	0.112** (0.039)	0.139*** (0.039)	0.149*** (0.041)	0.255*** (0.041)	0.261*** (0.046)	-0.104 (0.069)				
FDI	-0.114 (0.074)	0.317* (0.142)	-0.211 (0.16)	-0.369* (0.156)	-0.404* (0.16)	-0.348* (0.154)	-0.24 (0.149)	-0.013 (0.034)				
DAC	0.993*** (0.231)	0.855*** (0.171)	0.392* (0.201)	0.318 (0.195)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)	0.565*** (0.059)				
Unemployment	0.315*** (0.062)	-0.103 (0.064)	0.03 (0.068)	0.064 (0.066)	0.096 (0.067)	0.133* (0.062)	0.128* (0.06)	-0.004 (0.058)				
General Election Year	-0.554*** (0.111)	-0.31 (0.174)	-0.116 (0.211)	0.067 (0.2)	0.175 (0.203)	0.06 (0.192)	0.163 (0.178)	0.176 (0.119)				
GTD January 1998 - March 2008	-1.452*** (0.207)	-0.825** (0.288)	-0.452 (0.308)	-0.262 (0.303)	-0.223 (0.311)	0.134 (0.296)	-0.049 (0.292)	0.199 (0.286)				



Table 4. Coefficients and standard errors for the impact of the perception of the government's response to a natural disaster on terrorism for statistically significant models in Philippines, Turkey, and the UK (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, 1-tailed)

Variable	Philippines - Islamist Terrorism		Turkey - Kurdish Terrorism		Turkey - Non-Kurdish Terrorism		Turkey - Non-Kurdish Terrorism		UK - Non-Republican Terrorism	
	4 Lags β (SE)	4 Lags β (SE)	5 Lags β (SE)	1 Lag β (SE)	6 Lags β (SE)	8 Lags β (SE)	1 Lag β (SE)	1 Lag β (SE)		
Perceived Adequacy	-1.718* (0.764)	-0.167* (0.075)	-0.184* (0.075)	-0.1* (0.044)	-0.157** (0.061)	-0.169*** (0.033)	-1.461** (0.571)			
Sum of Killed	0.013* (0.006)	-0.047*** (0.009)	0.014** (0.005)	-0.025 (0.015)	-0.17 (0.115)	-0.058*** (0.013)	0.098 (0.066)			
GDP	0.001 (0.002)	0.008 (0.006)	0.014* (0.006)	-0.026*** (0.005)	-0.023*** (0.005)	-0.018*** (0.005)	-0.003*** (0.001)			
Population (Millions)	0.027 (0.025)	-0.222* (0.088)	-0.315*** (0.089)	0.262*** (0.067)	0.222** (0.071)	0.159* (0.072)	0.565*** (0.123)			
GFCE	-0.009 (0.033)	0.066 (0.038)	0.095* (0.037)	0.146*** (0.031)	0.175*** (0.031)	0.166*** (0.031)	-0.284*** (0.059)			
FDI	-0.201 (0.119)	-0.118 (0.141)	-0.317* (0.141)	0.081 (0.136)	0.018 (0.132)	-0.057 (0.133)	0.011 (0.032)			
DAC	0.003 (0.004)	0.003 (0.002)	0.002 (0.002)	0.008*** (0.001)	0.006*** (0.001)	0.005*** (0.001)	0.016 (0.017)			
Unemployment	0.125 (0.075)	0.554*** (0.048)	0.498*** (0.044)	0.35*** (0.051)	0.354*** (0.05)	0.387*** (0.051)	0.219*** (0.059)			
General Election Year	-0.434 (0.1)	-0.954*** (0.097)	-0.781*** (0.1)	-0.002 (0.076)	-0.016 (0.082)	-0.067 (0.087)	0.464*** (0.072)			
Constant	-2.382 (3.773)	5.163 (5.788)	5.665 (5.673)	-20.579 (4.938)	-22.147 (5.103)	-18.999 (5.114)	-20.596 (5.405)			
Log-Likelihood	-837.5545	-1370.8907	-1325.6729	-995.03429	-1006.9594	-1015.584	-843.150			