Deadly Dates: The Effect of Holy Days on Terrorism*

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Abstract

How do religious holidays affect the incidence of terror attacks? I argue multiple incentives exist that encourage violence on these days. For example, attacks on holidays allow terrorists to signal their religiosity and impose extra terror on their targets. Governments understand they are triggers for violence though and increase security surrounding them. However, their ability to do this is limited by the length of the holiday due to resource constraints and practical concerns. I consequently expect the probability of an attack occurring on holidays that last a few days to be lower than on non-holidays since state security is at its peak. However, holidays that last weeks are more difficult to protect and still provide payoffs to terror groups. They should therefore have a higher likelihood of witnessing an attack than non-holidays. Data from all available Arab League countries (2001-2016) support these claims.

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1 Motivation

A great deal of research exists that explores the effect of religion on terrorism. Scholars argue that, due to a variety of factors, religion is positively associated with violence (Toft 2011; Asal and Rethemeyer 2008; Horowitz and Potter 2014). For example, conflicts fought over religious issues are difficult to resolve due to their indivisibility (Toft 2006; Hassner 2009) and religious armed groups are particularly durable (Toft and Zhukov 2015; Berman and Laitin 2008). Competition within and between religious groups might also explain this positive relationship (Breslawski and Ives 2019; Isaacs 2017). To understand when and how this increase in terrorism occurs, recent studies focus on attacks conducted on religious holy days. However, these studies produce mixed results and differ in their theoretical expectations. Some scholars predict more terrorism surrounding holy days since coordination costs for armed groups are relatively lower during these times (Toft and Zhukov 2015). Others expect the opposite, as committing violence during holy periods risks offending a group's civilian supporters (Reese, Ruby, and Pape 2017).

I contribute to this debate by developing a novel theory regarding the way in which religion informs the strategy of terrorists and, in turn, the government. I argue that the symbolic and spiritual meaning that religion assigns to certain days creates focal points that are natural objectives for terrorists. This is the case for several reasons. Attacks conducted during these times are particularly shocking for civilians and disrupt sacred ceremonies. They consequently impose relatively more terror on victims than attacks during other times (Hassner 2011). More so, attacks on religious holidays can be used to expose the government's weakness, demonstrate resolve, activate societal divisions, and punish the supporters of a group's opponent. Armed groups can strategically target the government and areas inhabited by supporters of their enemies to prevent angering their own constituency. In this way, my theory suggests that religion informs the organization and timing of terrorism due to strategic and rational calculations by armed groups.

However, the occurrence of violence is also influenced by the strategies of the govern-

ment, which is embedded in the same religious context as the terrorists. Governments understand that religion can inform the strategy of terror groups and that focal points exist that incentivize attacks. Protecting civilians and political targets during these times is crucial to maintaining their support and legitimacy. Governments therefore seek to deter violence surrounding natural religious focal points. As such, they commonly implement broad counter-terror measures and increase police patrols during religious commemorations along with increasing security around sacred spaces (Petra 2015; Walker 2016; Zaptia 2016). However, since governments face resource constraints and fear backlash resulting from continuously applying harsh counter-terror measures, they are limited in their ability to consistently employ security procedures that can prevent attacks. Instead, states cluster their efforts to prevent attacks on dates that are most likely to be perceived as focal points for terrorists. In this manuscript, I argue that terrorists and governments both perceive dates of religious importance as focal points for violence.

While existing research regarding religious observances and terrorism generally predicts *either* a positive or negative association, my argument suggests a heterogeneous effect exists. I argue that expectations about a government's counterterrorism capacity will influence terrorists' decisions to engage in violent acts on religious holidays. Although terrorists expect greater benefits from attacking on religious dates, they are only likely to do so when they believe they will be able to execute attacks with minimal costs. When the government is able to raise the costs of attacking sufficiently high on these dates, terrorists will refrain from conducting an attack. Instead, terrorists will select a proximate date that they expect to provide less resistance from the government, but which still provides the benefits of conducting violence on a religious holiday. This argument builds on an existing literature that finds counter-terrorism strategies can create substitution effects, where groups are deterred from attacking their primary objective and consequently target their secondary goal (Enders, Sandler, and Cauley 1990; Enders and Sandler 1993; Sandler and Lapan 1988). These substitution effects, the role of the government, and this

possible heterogeneity are ignored in existing research concerning religious observance and terrorism.

My specific expectation is therefore that temporally short holidays, those that last a few days or less, experience less terrorism than nonholidays. This is because, despite these days being attractive targets for terrorists, the government is able to cluster counter-terror resources on them to prevent violence from occurring. Due to the increased costs and risks associated with added security during short holidays, I expect terror groups to be restrained by the state and commit fewer attacks on these days. However, most states are unable to implement similarly complex security plans during holidays that are much longer, such as the holy month of Ramadan. While such holidays often experience a marginal increase in security, resource constraints and the fear of backlash resulting from employing lengthy counter-terror policies prevent the government from deploying large numbers of troops consistently throughout long holidays. My expectation is therefore that terrorists seize on these days to commit attacks, as they are opportunities to benefit from the religious nature of a day that with only marginally higher costs to overcome security.

I test this argument by conducting a series of statistical tests with all available data for Arab League countries (2001-2016) and find robust support for this theory. The probability of terrorism occurring on short Islamic holidays is lower than on nonholidays. However, terrorism is more likely to occur on days within a long holiday. I focus on the Arab League for two reasons. First, a large majority of individuals that live in the region identify as Muslim and practice their faith. An important scope condition of my theory is a society with awareness and general observance of religious holidays. Second, the region represented by the Arab league is conflict-prone (Sørli, Gleditsch, and Strand 2005) and experiences relatively high levels of terrorism. Due to this, counter-terrorism is a salient security issue for countries member countries. I provide qualitative evidence that their governments design and implement security measures to prevent terror attacks. However, while I focus on Islamic countries, I expect my theory to generalize to other religions

and do not argue this effect is specific to Islam. There are benefits to focusing on a single region with a dominant religion in this study though, as it provides a clear inclusion criteria for the data simplifies dependency issues related to analyzing large-N, cross-national data.

This article aids our understanding of terrorism in several ways. I provide evidence that religion affects the contours of political violence within a country. Governments understand that religious holidays create focal points for violence and seek to deter armed groups from conducting attacks surrounding them. This paper disaggregates a common finding, that religious conflicts are more deadly, and explores the production of that violence. Particularly, I engage an important debate concerning the effect of religious holidays on the incidence of terror attacks. Disparate findings and theories have been posited to explain whether or why terror groups commit violence on holy days. I demonstrate that important heterogeneity exists within holidays and argue that substitution effects caused by government security policies can assist in harmonizing the results of these studies. More so, scholars of religion and terrorism, along with civil conflict more broadly, are interested in the rationality and strategic nature of terror groups (Abrahms 2012; Bloom 2007; Thomas 2014; Pape 2006). This article provides additional evidence that these organizations are calculating actors. Terrorists appear to be selective about which holidays they target; the timing of their attacks appear to be consistent with efforts to avoid holidays that are likey to attract considerable counterterrorism efforts. They instead focus their attention on dates where state resources are more likely to be constrained. Finally, this articles contributes to our understanding of the strategic logic that informs the timing of terror attacks, particularly in relation to those perpetrated by groups that espouse a religious ideology (Toft 2011; Juergensmeyer 2017).

2 Theory

2.1 Existing Explanations

Extant research emphasizes three broad factors to explain a terror group's logic regarding whether to commit violence on a religious holiday. First, some authors argue violence on these days is appealing for reasons internal to the group. For example, building on research suggesting that a group's ideology affects its behavior, Jurgensmeyer (2017) argues religious groups might seek to communicate with the divine through terror attacks. Their choice to attack on holy days could therefore be a result of their desire to appease or worship a higher authority. Such an approach deemphasizes the role of a group's relationship with civilians in favor of their ideological commitment. However, these groups might still rationally calculate the relative costs and benefits of various attacks and plan accordingly.

Second, groups might also commit violence on these days to gain a tactical advantage. For example, Hassner (2011) contends that leaders of religious groups may recognize the usefulness of holy days to motivate or encourage their fighters. This can lead them to fight harder and with more eagerness. Their civilian supporters might share this sentiment and support attacks on these days. Toft and Zhukov (2015) similarly emphasize the tactical benefits to committing violence around Islamic holidays. They argue these days can reduce coordination costs by gathering individuals espousing similar ideologies together. Given these lower costs, groups are more likely to conduct attacks on days surrounding holidays. They expect that groups are more likely to attack on holidays that match their ideological type (i.e. religious or nationalist). Their study regarding groups in the Caucasus finds robust statistical support for this theory.

Third, extant research also emphasizes the sensitivity of terror groups to civilians' perceptions and the potential costs associated with conducting attacks on sanctified dates. Reese, Ruby, and Pape (2017) argue that civilians are generally offended by violence during such occasions and will punish terror groups that violate a day's importance with blood-

shed. They contend this is the case when there is unambiguous agreement in a society concerning a day's importance, which they argue is the case when religious holy days are also public holidays. Such days should experience relatively lower levels of terror attacks because terror groups fear civilian sanctions. They find support for this argument using data from Iraq, Afghanistan, and Pakistan. However, this theory does not consider the benefits that can be gained by terrorizing opponents on holy days (Hassner 2011). An additional complication is the effect of credit claiming, as a large majority of terrorist attacks are perpetrated by unknown individuals, particularly in Muslim-majority countries (Kearns, Conlon, and Young 2014). Terror groups are not presented with the binary choice of assuming the cost of committing an attack or not committing an attack at all. Rather, groups can commit and claim attacks that they forecast will enhance their political position (Bueno de Mesquita and Dickson 2007; Thomas 2014) or increase the likelihood of meeting some other strategic end (Kearns, Conlon, and Young 2014).

The existing research tends to either prioritize a terror group's decision to either abstain from violence on Islamic holidays or their choice to utilize them strategically. I argue that they do both. Groups' choices will be influenced by expectations of government efforts to deter terror attacks. When terrorists believe that governments will make a concerted effort to increase security to prevent violence on holidays, they will abstain from engaging in violence on holidays. However, terrorists will choose to utilize violence when governments are unable to effectively deter terrorism on holy days. This represents an important theoretical contribution, as scholars have yet to integrate the role of the state and its ability to deter attacks within this literature. Instead, they either overlook the effect of counter-terror measures implemented during these periods (Hassner 2011) or dismiss their efficacy (Reese, Ruby, and Pape 2017). The theory I develop in this manuscript explains why terror groups have an incentive to commit violence on religious holidays, while emphasizing the ability of the state to deter attacks during certain periods.

2.2 Evidence of Synchronizing Attacks and Religious Holidays

Terror groups[1] regularly synchronize their attacks and activities with religious holidays. For example, the Islamic State proclaimed itself the leader of Muslims worldwide and declared an Islamic caliphate on the first day of Ramadan (BBC 2014), a holy month in Islam.[2] They utilized the yearly commemoration to publicize the announcement in their founding document, released concurrently with the declaration of their caliphate.[3] Directly acknowledging the significance of the group's timing, the document ends with the following text-

> *In conclusion, we congratulate the Muslims on the advent of the blessed month of Ramadan. We ask Allah (the Exalted) to make it a month of victory, honor, and consolidation for the Muslims, and make its days and its nights a curse for the rāfidah, the sahwāt, and the murtaddīn.*

<div align="right">-The Islamic State's Founding Document</div>

The Islamic State links the achievement of "victory, honor, and consolidation" with graphic rhetoric regarding corpses and rivers of blood in the preceding pages. Their founding document consequently associates the month of Ramadan intimately with violence. Further, it employs the religious symbolism of the month to emphasize the group's opposition against so-called Muslim apostates and nonbelievers. They pray that Ramadan will be a curse for the rāfidah (a derogatory term for Shiite Muslims), the sahwāt (a derogatory term for Sunnis that do not side with the group), and the murtaddīn (apostates more generally).[4] Similarly, the spokesperson for the Islamic State encouraged the group's followers to "rush and go to make Ramadan a month of disasters for the infidels" and said greater rewards are given to such acts committed during this time (Hubbard 2015).

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[1]I follow Phillips (2015) and employ an expansive definition of terror groups - any subnational political organization that uses terrorism.

[2]See Tariq Ramadan (2017) for the religious importance of the month.

[3]The Islamic State's founding document is available from the author upon request.

[4]Shortly after this declaration, the group used a prayer service on Friday, Islam's weekly holy day, to release another statement that threatened Christians with death if they refused to convert to Islam or pay a tax (Khan 2014).

The connection between religious holy days and violence is not limited to the Islamic State's rhetoric and public statements. It is also manifested in their actions. Following the announcement of their Islamic Caliphate, during the holy month of Ramadan, the group executed, tortured, and injured hundreds of people, particularly minorities (HRW 2014). They have also committed massive terror attacks on holy days and against religious targets.[5] During one such spate of suicide bombings during Ramadan in 2016, an attacker suspected of being affiliated with the group killed himself and several individuals outside al-Masjid an-Nabawi ("the Prophet Muhammad's Mosque") in Madina, Saudi Arabia. Further, the United Nations Assistance Mission in Afghanistan recorded over 675 civilian casualties resulting from the Islamic State targeting Shiite civilians while at places of worship in Afghanistan between January 2016 and November 2017 (UNAMA 2017).

This behavior is not unique to the Islamic State. Other violent non-state groups also employ violence on religiously important days. For example, the Armed Islamic Group of Algeria killed nearly one thousand individuals during Ramadan in 1998 (Moghadam 2008, 161). Boko Haram killed some 300 people during Ramadan in 2015 and committed multiple suicide bombings on Eid al-Fitr, an Islamic high holy day (BBC 2015). Hamas supported gunmen that killed four Israeli citizens on the third day of Ramadan in 2016 by declaring the attack "the first prophecy of Ramadan" (Baker 2016). Such violence is not always claimed, suggesting non-state groups might develop strategies that enable them to exploit a holiday's importance while limiting possible civilian sanctions. For example, a suicide bomber in Afghanistan in 2018 targeted an event celebrating the Prophet Muhammad's birthday, an Islamic holiday (Graham-Harrison 2018). The attack killed over 40 people, most of whom were religious scholars.

The examples provided in this section illustrate the ways in which terror groups can time their attacks to co-occur with holy days to signal their religiosity, justify the use vio-

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[5]The Islamic State is suspected of killing some three hundred Sufi Muslims attending Friday prayers at a mosque in a town comprising just over eight hundred people (Mohamed Y. 2017).

lence, or to reinforce a conflict's sectarian divide. Matusitz (2014) demonstrates this more generally with a range of case studies from around the world. He argues terror groups benefit from synchronizing their attacks with important religious dates and against sanctified targets. Such symbolism is an alluring quality to terror groups and often a key consideration when they plan attacks. Matusitz argues they serve as shared frames of meaning through which a group or individual can communicate. This is interpretative and can occur within a religious, social, or cultural lens. I develop a theoretical explanation for this behavior in this paper that integrates the ability of the state to alter the costs of committing attacks on certain holidays.

2.3   The Relationship Between Holidays and Violence

I argue that committing violence on days of religious importance is appealing to terror groups for several reasons. First, it allows a group to signal religious devotion and elicit support from their constituency. For example, armed groups commonly exploit the fact that Muslim theology generally suggests that good deeds performed during Ramadan are multiplied many times over in the eyes of Allah. Saud Bin Hamoud al-Utaybi, a deceased senior leader of al-Qaeda, did this in one of the group's official publications. He wrote that "[Ramadan] has come with all its blessings and with the double reward [granted to Jihad fighters] in its course. Come closer to Allah through the blood of infidels, do not relent in spilling [their blood]...!" (Aaron 2008, 86). Groups like the Taliban and the so-called Islamic State also exploit this belief by telling their followers that violence committed during this time is especially effective at gaining Allah's favor (McKernan 2013; Hubbard 2015). Similarly, the Islamic State declared in the tenth issue of Dabiq, one of their English-language magazines, that "[Ramadan] is a noble month in which good deeds are multiplied and lowly desires are subdued." They also exhorted their readers to "not allow another Ramadān after this one to pass you by except that you have made hijrah

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[emigrated] from the lands of kufr [infidel] to the lands of the Islamic State!"[6]

The examples provide evidence of terror groups exhorting their followers to join their armed struggle by using the symbolism of an Islamic holidays, particularly Ramadan. Groups can consequently commit violence on holy days to enhance their legitimacy as a religious organization and manifestation of a divine cause. Further, they can establish certain holidays, such as Ramadan, as religiously important periods for violence. This can garner increased support from their civilian constituencies and positively frame terror campaigns for their financial sponsors. More so, as the excerpts from the Islamic State's publication above demonstrate, they can exploit these periods to make appeals to potential recruits.

Second, committing attacks on holy days amplifies their effect and imposes additional terror on their targets.[7] These days are often host to sanctified ceremonies and cherished religious practices. Families congregate and expect a secure environment in which to celebrate during these special periods. A terror attack on a holy day that disrupts these religious practices and the safety surrounding them generates more terror than the same attack on an ordinary day (Matusitz 2014). Consequently, all else equal, the payoff for a terror group to conduct an attack against their target on a holy day is higher than on all other days. There are abundant examples of this in practice. Terror groups are known to exploit the celebrations or spiritual ceremonies of their targets to launch an attack. For example, data from Iraq demonstrates a majority of attacks against Christians occur on Sundays, the Christian Sabbath (Hassner 2011). The Islamic State uses Islam's weekly holy day (Friday) to attack Shiites inside their mosques and shrines (UNAMA 2017).

Terrorists can employ multiple strategies to mitigate the possibility of offending or angering their supporters for committing violence during holy days. First, as discussed earlier, they can justify attacks during these periods by framing them as divinely ordained.

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[6]See pages 26-29 of the tenth issue of Dabiq, which was released in July (Ramadan) 2015.

[7]Hassner (2011) argues that terror attacks on holy days can be force multipliers.

Second, terrorists can target the supporters of their opposition in their attacks to ensure their civilian constituency is not physically affected. This is a common tactic employed more generally by armed groups (Goodwin 2006). Third, groups are not bound to claim responsibility for these attacks publicly, which insulates them from possible blowback. They may benefit from simply executing attacks on these days and privately claiming responsibility among their sponsors (Kearns, Conlon, and Young 2014). Indeed, unclaimed attacks can serve a number of strategic ends, particularly during important holy periods. For example, armed group might commit a terror attack to affect how the public perceives the state's ability to maintain a secure and peaceful environment during religious holidays.

However, governments are not passive actors in this process. They anticipate the incentives for terror groups to exploit holy days and react accordingly. They increase patrols, implement specialized security measures, and police public areas more heavily. For example, the Iraqi government banned women in Mosul from wearing the niqab[8] during Ramadan shortly after retaking the city from the Islamic State (McKernan 2017). The authorities worried about terrorists (male or female) using the piece of clothing to conceal their face in order to commit an attack or escape. The order was implemented despite a public backlash.

General security measures like these are possible during Ramadan, but maintaining the enhanced levels of policing that are common across short holidays during an extended period is difficult for two reasons. First, counter-terror measures meant to deter or root out terrorism can backfire and actually result in a net increase in attacks because they are perceived as being repressive. For example, Benmelech, Berrebi, and Klor (2015) demonstrate that indiscriminate policies like curfews and precautionary house demolitions that do not directly target terrorists can lead to an increase in suicide attacks. This is in line with research that shows that governments that violate the physical integrity rights of their citizenry experience more terrorism than those that do not (Walsh and Piazza 2010; Pi-

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[8]A niqab is a garment worn by females that covers all of their head except for the eyes.

azza and Walsh 2010). This domestic security dilemma forces governments to balance the costs of various counter-terror measures with their associated benefits (Field 2017).

Second, resource constraints prevent governments from maintaining high levels of security for extended periods or across their whole territory due to limited personpower and budgets. Powell (2007) argues that governments allocate their scarce resources across physical sites (e.g. nuclear reactors) to defend against terror attacks. He argues that terrorists attack where expected payoffs are large and costs are low. By increasing security around important sites, governments can increase the costs of attacking targets that have the highest payoffs for terror groups. This changes the incentives for terror groups and encourages violence where payoffs are still high, but costs are lower. Evidence of counter-terror strategies producing these types of substitutions is abundant (Enders, Sandler, and Cauley 1990; Enders and Sandler 1993; Sandler and Lapan 1988; LaFree, Dugan, and Korte 2009). I apply the framework developed by Powell to symbolic days and argue that counter-terror resources can create *temporal* substitution effects.

I apply the logic of substitution effects to the case of Islamic holidays. As discussed, terror groups have multiple incentives to commit attacks on these days. However, they do not all offer the same payoff. Attacks on short holidays that last a few days or less advertise their purpose unambiguously. For example, it is unlikely the general public would think of an attack on the Islamic new year as being unrelated to the religious occasion. Further, short holidays are also some of the most religiously meaningful. For example, the two Eid holidays in Islam, both of which last a few days, are some of the only holidays mentioned directly in the Quran. They command both enormous theological significance and involve multiple religious rites. Targeted violence on such days can consequently be incredibly powerful and poses a significant challenge to the government's legitimacy. The payoff for committing terror attacks is therefore generally highest during short holidays, or those that last only a few days or less. As a result, governments have incentives to focus their

efforts on mitigating the risk of attacks during these these holidays in particular.[9]

Evidence of this in practice is plentiful. State security forces around the world commonly implement strict and oftentimes extraordinary measures during short holidays such as Eid al-Adha and Eid-al-Fitr. Indeed, they often implement comprehensive plans to reduce the likelihood of an attack during these days (Petra 2015; Walker 2016). Such plans often include massive increases in the number of police officers and military troops deployed to the streets (Berwani 2012) and the expanded use of checkpoints around the country.[10] They commonly scan public areas for explosive devices, shutter historic sites, and encourage citizens to report suspicious activity. For example, in order to protect the day of Ashura during 2012, the Iraqi government deployed some 30,000 troops to a shrine in Karbala that Shiite Muslims visit on the holiday. They also banned vehicles from entering the area and worked with their intelligence services to identify and prevent attacks in the planning phase. Consequently, the holiday did not suffer a terrorist attack (McKernan 2012).

It is unsurprising that governments are generally aware of the increased threat these days pose and respond accordingly. They strategically cluster counter-terrorism efforts on days where the payoffs to terror groups are high and the efficacy of their efforts is the highest. Since they can muster massive amounts of military and police for any short Islamic holiday, terror groups are deterred from committing violence on these days. A testable implication of this logic is that the probability of observing a terror attack on a short Islamic holiday is lower than on a nonholiday.

Hypothesis 1 *The probability of terrorism occurring on a short Islamic holiday is lower than the probability of an attack on a day that is not an Islamic holy day.*

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[9]Governments with sufficient capabilities to wage more perpetual counter-terrorism still face domestic restraints that lead them to strategically distribute their activity across time (Field 2017).

[10]http://www.thebaghdadpost.com/en/story/13543/Security-measures-taken-to-protect-Iraqi-citizen-in-Eid-al-Fitr-days

Religious celebrations that last multiple weeks, such as Ramadan, are attractive platforms for terror attacks. I argue that these holidays are more likely to experience terrorism for several reasons. First, as discussed, these long holidays allow terror groups to impose extra terror on targets and exploit the religiousness of the occasion. At the same time, the cost to conduct an attack on these days is lower than on a short holiday, as shorter holidays are likely to be more heavily guarded by the government.[11] Again, resource constraints and caution regarding the use of repressive security measures prevent the government from implementing broad counter-terror policies during weeks-long holidays. These holidays consequently present the highest ratio of benefits to costs for terror groups.

Second, these holidays allow terror groups more opportunity to conduct attacks since they last multiple weeks. Since plans for an attack are subject to perturbations caused by logistics, counter-terrorism efforts, and practical concerns, it is difficult for terror groups to be confident that an attack intended to occur on a short holiday will actually occur during that minimal window. This is especially likely due to the government's active role in trying to prevent terrorism on major holidays. Long holidays offer a larger temporal window that can forgive these problems. I expect these factors to encourage terror groups to plan and execute more attacks during long Islamic holidays than nonholidays. This logic leads to my second hypothesis. I expect these factors to encourage terror groups to plan and execute more attacks during long Islamic holidays than nonholidays. This logic leads to my second hypothesis.

Hypothesis 2 *The probability of terrorism occurring during a long Islamic holiday is higher than the probability of an attack on a day that is not an Islamic holy day.*

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[11]Note that short holidays sometimes occur within and around prolonged holidays. For example, Eid al-Fitr is a celebratory feast at the end of Ramadan.

3   Data and Research Design

I collect data regarding a sample of countries where Islam is the predominant religion to test my hypotheses regarding the occurrence of terrorism on Islamic holidays. Specifically, I analyze the 22 members of the Arab League.[12] I use this regional organization, which is mostly comprised of countries in the Middle East and North Africa, for several reasons. First, the vast majority (>90%) of their citizens identify as Muslim. This meets a scope condition of the theory- a society with awareness and general observance of Islamic holidays.[13] Second, the region that the organization represents is a conflict-prone area (Sørli, Gleditsch, and Strand 2005) and experiences high levels of terrorism. Counter-terrorism is consequently a salient security issue for member countries. Their governments design and implement security measures aimed to prevent attacks from occurring within their territory. Third, the regional organization provides a sampling frame that avoids the analysis of an ad hoc collection of countries. As such, it is possible to test the implications of my theory using these countries by assessing whether there is a lower probability of a terror attack during short holidays and a higher probability during long holidays. I use country-days as the unit of analysis, as my theory relates to variation at that temporal level.[14]

3.1   Dependent Variable

I use the Global Terrorism Database (GTD), one of the most comprehensive sources of terrorism data (Findley and Young 2012), to code the outcome variable (LaFree and Dugan

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[12]The countries analyzed in this study are as follows: Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Qatar, Saudi Arabia, Sudan, Tunisia, Yemen, the United Arab Emirates, and the West Bank/Gaza Strip. I exclude Oman and the Union of the Comoros because they did not experience any terrorism during the study's timeframe. Somalia and Syria are dropped due to missing data. As such, 18 of the League's 22 countries are represented in the data.

[13]A few of these countries (e.g. Egypt and Lebanon) have established populations of people of other faiths. The results are consistent when countries with sizable populations of non-muslims (>10%) are excluded from the data.

[14]A number of Islamic holidays last only a day, such as Ashura and Laylat al-Qadr.

2011). The GTD codes specific incidents of terror across the world from a diverse set of newspapers and news-related sources. The GTD considers an event "terrorism" if it is intentional, employs violence, and is conducted by a subnational actor. Attacks must also be outside of legitimate warfare, conducted to attain social or religious goals, and be used to intimidate individuals beyond the immediate victims.[15]

Specifically, the outcome variable is a dichotomous variable representing whether or not an attack occurred on a specific country-day (*Terror Attack*).[16] This variable includes attacks against all targets regardless of whether they killed anyone. I include both claimed and unclaimed attacks[17] because it is likely terror groups commit violence on holy days anonymously to achieve their goals while limiting the possibility of public backlash. Approximately 15% of the country-days experience a terror attack. A dichotomous measure is appropriate since 97% of country-days experienced three attacks or fewer.[18] I also use the count of terror attacks as an outcome variable and the regression results do not substantively change. The results are displayed in table A.4 of the Online Supplementary Appendix.

3.2   Key Independent Variable

The key independent variable (*Day Type*) sorts each country-day, the unit of analysis, into one of three mutually exclusive categories based on its religious nature. A simple coding scheme is employed to differentiate these categories that is derived from the natural groupings within Islamic holidays. *Short Holidays* are Islamic holidays that last less than a month or less while *Long Holidays* include days within the important month-long holiday

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[15]GTD requires that at least two of three of these criteria must be met in order for an event to be classified "terrorism."

[16]The unit of analysis is country-days, so it is unusual that an observation contains more than a couple attacks. However, the results are consistent when a count model is fitted to the data.

[17]The majority of terror attacks are not claimed.

[18]Due to this, other dependent variables analyzed in studies of terrorism, such as the ratio of attacks to population (Jetter and Stadelmann 2019), are ill-suited for this study.

of Ramadan. The difference between these two categories is clear, as the longest *Short Holiday* is only three days while Ramadan lasts about 30 days. I provide a visualization of this in the Online Supplementary Appendix. *All Other Days* is the baseline category, which is comprised of days that are not in either of the other categorizations (a nonholiday).

Short Holidays are observed widely. They carry deep religious importance and might prescribe some religious act, such as a special prayer or engaging in a large feast. Due to their importance, social sanctions potentially result from public nonobservance. As such, religious observance and respect is generally at its peak on these days. This variable includes the weekly liturgical service held on Friday afternoon.[19] Adherents observe this holy day by partaking in attending a communal sermon and prayer service at a mosque. It also includes the important holidays of Eid al-Fitr and Eid al-Adha along with the Day of Arafah, which commemorates Muhammad's final sermon.

Long Holidays are days that occur within the holy month of Ramadan, which lasts about 30 days. Muslims are generally expected to abstain from food and drink between sunrise and sunset during this time. The length of Ramadan prevents the state from maintaining consistently high levels of security due to practical and budgetary constraints, but attacks during this time still offer a payoff to terrorist groups. If a day is both a *Short Holiday* and a *Long Holiday*, such as a Friday, I code it as *Short*. I perform this step since my expectation is that the government will still cluster security measures on these days even though they occur within the month of Ramadan. Collectively, this categorical variable gives me leverage to test my hypotheses concerning the effect of individual days on the incidence of terrorism.

While the timing of months in the Gregorian calendar is reliable, they are not in the Islamic calendar. The beginning of each month is determined by the first unaided sighting

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[19]The weekly liturgical day (Friday) could arguably constitute another category because it occurs so regularly and is possibly qualitatively different from the other short holidays. As such, I estimate models with Friday as its own category in *Day Type* and with Friday excluded from the variable altogether. The results are consistent with the main model in both of these robustness checks.

of the moon after a new moon. Since the average length of a lunation varies, months are typically 28-30 days long. The Islamic calendar is consequently not fixed to the Gregorian calendar. It is also not consistent across space, as lunar sightings occur at different times across the world. The calendar does behave predictably, with the Islamic New Year occurring about two weeks earlier each year in relation to the Gregorian New Year. Due to these issues, most Islamic countries rely on Saudi Arabia's calendar to code the occurrence of holidays. This helps synchronize holidays that otherwise would occur on different days around the world. I therefore rely on Saudi Arabia's Umm al-Qura calendar to code the occurrence of Islamic holidays. The full specification of the *Day Type* variable is displayed in table 1.[20] The baseline category of *Day Type* is all other days, or nonholidays.

Table 1: *Day Type* - Short and Long Holidays

Islamic Holiday	Hijri Date	Length	Type
Islamic New Year	1/1	1 day	Short
Ashura	1/10	1 day	Short
Prophet's Birthday	3/12	1 day	Short
Isra & Miraj	7/27	1 day	Short
Laylat al-Bara'at	8/15	1 day	Short
Laylat al-Qadr.	9/27	1 day	Short
Eid al-Fitr	10/1	3 days	Short
Day of Arafah	12/9	1 day	Short
Eid al-Adha	12/10	3 days	Short
Friday	Weekly	1 day	Short
Ramadan	9th Month	1 month	Long

3.3   Control Variables

I include a number of variables in the model that also affect the incidence of terror attacks to decrease the probability of a confounder biasing the results.[21] Since terror attacks can be

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[20]The results are consistent when holidays that are specific to Shiite Muslims, such as Ashura, are included in the coding of the *Day Type* variable. Shiites are a minority of the Muslim population both globally and in the Arab League.

[21]I scale continuous predictors to avoid convergence issues with the multilevel model by subtracting their means and dividing by their standard deviations (Gelman and Hill 2006).

a result of conflict between armed groups and the state (Findley and Young 2012; Stanton 2013), I include a count of battlefield events lagged by one day. This is measured at the country-day level and is taken from the Uppsala Conflict Data Program Georeferenced Events Dataset (Sundberg and Melander 2013). I also include a dichotomous variable that indicates whether a country-day is a secular national holiday, as it might be the case that there is not a religious component to how terrorists time their attacks. I code this variable using information from Q++Studio, a company with a team of researchers that collect data regarding holidays in virtually every country and licenses it to calendar and diary manufacturers. I use holidays from 2019, which are posted online, as older records are only available through a license and do not cover the full temporal range of this study (2001-2016). The results are consistent without including this variable.

Beyond that, I include a variety of controls related to characteristics of the countries represented in the data that might affect the incidence of terrorism. I add the country's population since it affects the number of potential targets of an attack and is linked to a range of societal issues that can produce violence. This variable records the total yearly population and is logged. In order to control for disparate levels of economic attainment across countries, I also include the country's gross domestic product per capita. I collect both of these variables from the World Bank (Bank 2018). Beyond that, I include a co-variate to control for the variation in terrain across countries. Research demonstrates that more rugged and inhospitable territory decreases the state's ability to project power and is associated with civil conflict (Fearon and Laitin 2003; Tollefsen and Buhaug 2015). These landscapes provide insurgent groups more opportunities to hide and engage in rebellion. I therefore also include the country's area in square kilometers (Zhukov, Davenport, and Kostyuk 2017).[22] Table A.1 in the Online Supplementary Appendix displays these variables' descriptive statistics.[23] I also include a linear counter of time within countries to

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[22]The results are robust to other geographic variables, such as a country's mean elevation, as well.

[23]I scale all of the continuous controls.

control for temporal dependence and a lagged dependent variable.

3.4   Research Design

The data used in my analysis exhibit a clear nested structure. Days occur within years that are grouped in countries. The characteristics of each of these levels are important predictors of whether any individual country-day will experience a terror attack. Due to this, I employ a multilevel model to test my hypotheses.[24] Multilevel modeling allows estimating parameters that take these spatial and temporal groupings into account. It also allows the inclusion of covariates at the same level of the various groupings.

Recent research concerning terrorism recognizes the usefulness of employing this type of model in this substantive domain. Johnson argues that studying terrorism is "inherently a multilevel enterprise" (Johnson 2017, 252), with observations grouped across different levels of analysis such as terror groups and countries. Building models that reflect this not only makes theoretical sense, but also ensures standard errors and parameters estimates are properly estimated given the different dependent levels of analysis represented in the data (Gelman 2006; Gill and Womack 2013). Related studies use these models to study variation in terrorist tactics across regime types (Lee 2013), investigate the effect of conflict on public opinion (Hutchison 2014), and to study the use of domestic and international attacks by terror groups (Boyd 2016).

The outcome variable in my regression model is binary and indicates whether a country-day experienced a terror attack.[25] Since the outcome variable is dichotomous, I estimate a logistic regression model.[26] The first level in the hierarchical model occurs at the country-day and is indexed with i in the equation below. I include a lag$_{t-1}$ of the dependent variable, a lag$_{t-1}$ of the number of battlefield events, the *National Holiday* indicator variable, and a

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[24]The results are robust to fixed effects specifications.

[25]I provide the results of a count model in table A.4 of the Online Supplementary Appendix. The substantive results are the same.

[26]The results are consistent with a probit link function as well.

linear counter of time at this level along with the categorical *Day Type* variable. Country-years constitute the second level of the model and are indexed with *j* in the equation. I include a random intercept at this level and the variables *Population* and *GDP PC*, both of which vary across country-years. The third level of the model occurs at the country level and is indexed with *k*. I include a random intercept at this level as well and *Land Area*, as it is a time-invariant measure. I estimate the model using maximum likelihood and display its equation below. I assume the random intercepts are drawn from a normal distribution, which is standard with this type of model (Gelman and Hill 2006).

$$p(y_{ijk} = 1) = \text{logit}^{-1} \left(\beta_0 + \beta_1 \cdot X_{1ijk} + \beta_2 \cdot X_{2jk} + \beta_3 \cdot X_{3k} + \text{country}_k + \text{country year}_{jk} \right)$$

4   Results

Table 2 provides the results of the estimated multilevel regression model.[27] Both of the variables extracted from *Day Type* are significantly different from the baseline (days that are nonholidays). The coefficient on *Short Holiday* is negative and statistically significant. This supports my first hypothesis, which predicted this relationship. Terrorism is less likely to occur on Islamic holidays that are relatively short, such as Eid al-Fitr or the celebration of Prophet Muhammad's birthday, than on nonholidays. I argue this is the case because the government is able to effectively deter terror groups from conducting operations on these days.

Further, the coefficient on *Long Holiday* is positive and significant, suggesting that days within the holy month of Ramadan are associated with an increase in the likelihood of a terror attack. The model consequently also supports my second hypothesis. My theory

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[27]The results are robust to various fixed and mixed effects specifications. A likelihood ratio test suggests the main model is significantly different from a null model that only includes the multilevel structure (province-years nested within provinces) along with a fully specified model that excludes *Day Type*, the key independent variable.

suggests this is the case because the government is unable to effectively deter terrorism during these holidays due to resource constraints and a fear of backlash resulting from long-term repressive counter-terror measures. Terror groups strategically conduct attacks on these days since they offer a higher payoff than nonholidays and the cost of overcoming security is relatively lower than on short holidays.

Table 2: Main Model

	Dependent variable:
	Terror Attack
Day Type - Long Holiday	0.180***
	(0.057)
Day type - Short Holiday	−0.197***
	(0.040)
Terror Attack Lag$_{t-1}$	0.483***
	(0.036)
Battlefield Events$_{t-1}$	0.054***
	(0.011)
log(Population)	0.553
	(0.594)
GDP PC	−1.521***
	(0.534)
Land Area (km²)	0.257
	(0.560)
National Holiday	−0.140
	(0.118)
Intercept	−5.010***
	(0.501)
Observations	99,712
Var(Country)	4.149
Var(Country Year : Country)	2.466
Num(Country)	18
Num(Country Year : Country)	273
Log Likelihood	−15,604.420
Akaike Inf. Crit.	31,232.850
Bayesian Inf. Crit.	31,346.970
Note:	*p<0.1; **p<0.05; ***p<0.01

While the regression coefficients and their significance support my hypotheses, I also

calculate the predicted probability of a terror attack occurring across the categories of the *Day Type* variable using the estimated regression model. This enables a better substantive understanding of the effects different types of holidays have on encouraging or restraining violence. I employ the observed value approach to calculate these probabilities (Hanmer and Kalkan 2012). This calculates average effects within the population, rather than effects on an average observation, by utilizing the actual data (the observed values) used when estimating the model to calculate predictions.

I generate these predicted probabilities by creating a profile for each category within the *Day Type* variable (Nonholiday, Short Holiday, and Long Holiday) and sampling the distributions of the coefficients in the estimated regression model 1,000 times. The results suggest that, on average and controlling for other factors, terror attacks are least likely to occur on a *Short Holiday*. Indeed, the mean predicted probability of an attack on a *Short Holiday* is 7.6% lower than on a nonholiday. Again, this supports my first hypothesis, which theorized these days experience less terrorism because the government clusters its counter-terror efforts on them. The predictions also support my second hypothesis, as the probability of an attack on a *Long Holiday* is 7.3% more likely than on a nonholiday. I argue terror groups commit attacks during these longer holy periods because they offer a number of payoffs without the additional costs related to conducting operations on highly protected days.

I also estimate the first differences between these categories in order to verify there is a significant difference between their predictions. To do this, I calculate the mean difference between the predicted probabilities of the categories (exhausting the combinations). I display the difference between *Nonholidays* (the baseline) and both *Short Holidays* and *Long Holidays* in figure 1. Both differences are significantly different from the baseline (nonholidays). The dot represents the mean difference and the line segment is a 95% prediction interval. We can substantively interpret the results by noting whether the difference is positive or negative. A positive value suggests that the value being subtracted from

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is more likely to experience a terror attack than the baseline (nonholidays). A negative value conveys the opposite.

In this case, the difference between the baseline and *Short Holidays* is negative. These holidays are therefore less likely to experience a terror attack than nonholidays. As mentioned, the difference is also significant. I argue this is because terror groups are deterred from committing terrorism on *Short Holidays* due to security measures put in place by the government. The difference between *Long Holidays* and the baseline (nonholidays) is positive and significant. This suggests that these holidays are more likely to experience terrorism than nonholidays and supports my second hypothesis. I provided evidence that demonstrated this is due to terrorists exploiting these holidays for their symbolic value.
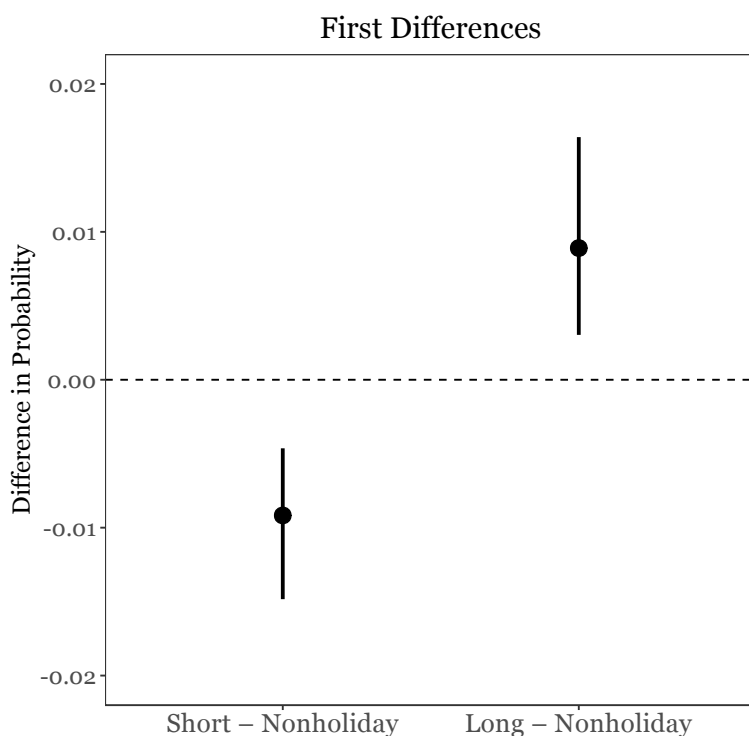

Figure 1: Dots represent the mean difference between predictions while line segments represent a 95% prediction interval.

I return to the regression results to interpret the coefficients on the control variables, which conform to the popular understanding of their effect. *Population* is positive and

significant, suggesting that increases in population is associated with higher probabilities of experiencing a terror attack. *GDP PC* is negative and significant which suggests that countries with relatively higher GDP PC are less likely to experience terror attacks. Both of these relationships conform to findings in existing studies regarding terrorism. The count of battlefield events is also significant and positive. *Land Area (km²)* is positively associated with the incidence of a terror attack, but not significantly. Finally, *National Holiday*, which coded secular, national holidays, is negative but not significant. The negative relationship makes sense, as the state might also protect secular holidays.

I consider several alternate codings of the *Day Type* variable to ensure the robustness of these results. Recall that the coding of this variable is straightforward. *Short Holidays* are Islamic holidays that last less than a month while *Long Holidays* are those that last a month. However, the weekly liturgical day (Friday) could arguably constitute another category because it occurs so regularly and be qualitatively different from the other short holidays. I include it in the *Short Holidays* category since it is only a day in length. This allows the government to anticipate its value to terrorists and cluster preventative measures on the holiday. However, it occurs very regularly and holds important religious symbolism. I therefore estimate two additional models. First, I include Friday as a separate category within the *Day Type* variable (table A.2). *Friday* is negatively associated with terrorism and statistically significant. The coefficients on the other holiday variables do not substantively change. This supports my theory, as Fridays are still associated with a decrease in the likelihood of terrorism when estimated separately. Second, I estimate a model with Friday excluded from the *Short* category altogether (table A.3). Again, the results do not substantively change.

5 Conclusion

In this article I argued that Islamic holidays are attractive outlets for terror attacks due to their symbolic value. Interrupting the religious practices associated with these days and violating their sanctity with violence can amplify the effect of an attack and signal a group's religiosity. Extant research regarding this questions produces mixed findings though; holidays are expected to increase (Toft and Zhukov 2015) and decrease (Reese, Ruby, and Pape 2017) the risk of violence on these days. This article attempts to resolve these disparate conclusions by arguing that a substitution effect exists. More terrorism occurs during long holidays because state security is only marginally increased while less terrorism occurs on short holidays because state security is massively increased. A statistical analysis that uses data regarding terror attacks in all available Arab League countries (2001-2016) supports these claims.

The principle contribution of this article is disaggregating a common finding, that religious conflicts are more deadly, and exploring the production of that violence. I argue that religion informs the organization and timing of terrorism due to strategic and rational calculations by armed groups. Their perception of the government's counter-terror capacity is central to their choice of whether or not to conduct an attack during religious holidays. I also provide evidence that terrorists are calculating actors and respond strategically to deterrence and incentives in their environment. Finally, this article aids our understanding of the logic terrorists use when timing their attacks, which is important to both academics and policy makers.

However, these results may be hampered by a number of issues. First, the effect of increased security on the variation in attacks is not directly tested. Obtaining data that varies across time and space that captures the amount or type of state security is difficult. Military and police forces have an incentive to keep such details of their operational histories confidential. Future studies could conceive of a reasonable proxy or use data from a specific city or region to test the mechanism more directly. Second, this study analyzes

predominantly Islamic countries. I expect these findings to generalize to other religions, but future research could consider possible heterogeneous effects and the applicability of this theory elsewhere. Finally, my analysis sorts individual days into holidays or nonholidays. For example, the exact day in which the Prophet's Birthday occurs is coded as a short holiday while the days before and after it are nonholidays. However, terror groups might commit violence on these surrounding days to extract the benefits of the holiday. This intuition is derived from insights made by Toft and Zhukov 2015, who conceive of holidays at the week-level. For example, in the case of the Prophet's Birthday, the entire week in which it occurred would be coded as a holiday. This enables them to capture broader attempts to exploit these holidays but offers this specificity than a day-level coding. Counter-terror measures that the government clusters on short holidays might create an immediate substitution effect where more violence happens directly before and after the holiday. Future studies could consider this dynamic further and consider its implications for conflict research.

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A Online Supplementary Appendix

A.1 Descriptive Statistics

Table A.1

Statistic	N	Mean	St. Dev.	Median
Terror Attack	99,712	0.11	0.31	0
Terror Attack Lag^{t-1}	99,712	0.11	0.31	0
Battlefield Events$_{t-1}$	99,712	0.33	1.62	0
log(Population)	99,712	16.05	1.24	16.00
GDP PC	99,712	27,431.25	32,781.45	10,860.52
Land Area (km²)	99,712	741,312.90	850,779.50	472,021.50
National Holiday	99,712	0.02	0.12	0
Day Type - Nonholiday	99,712	0.76	0.43	1
Day type - Short Holiday	99,712	0.17	0.38	0
Day type - Long Holiday	99,712	0.07	0.25	0

A.2 Holiday Coding

Day Type Coding
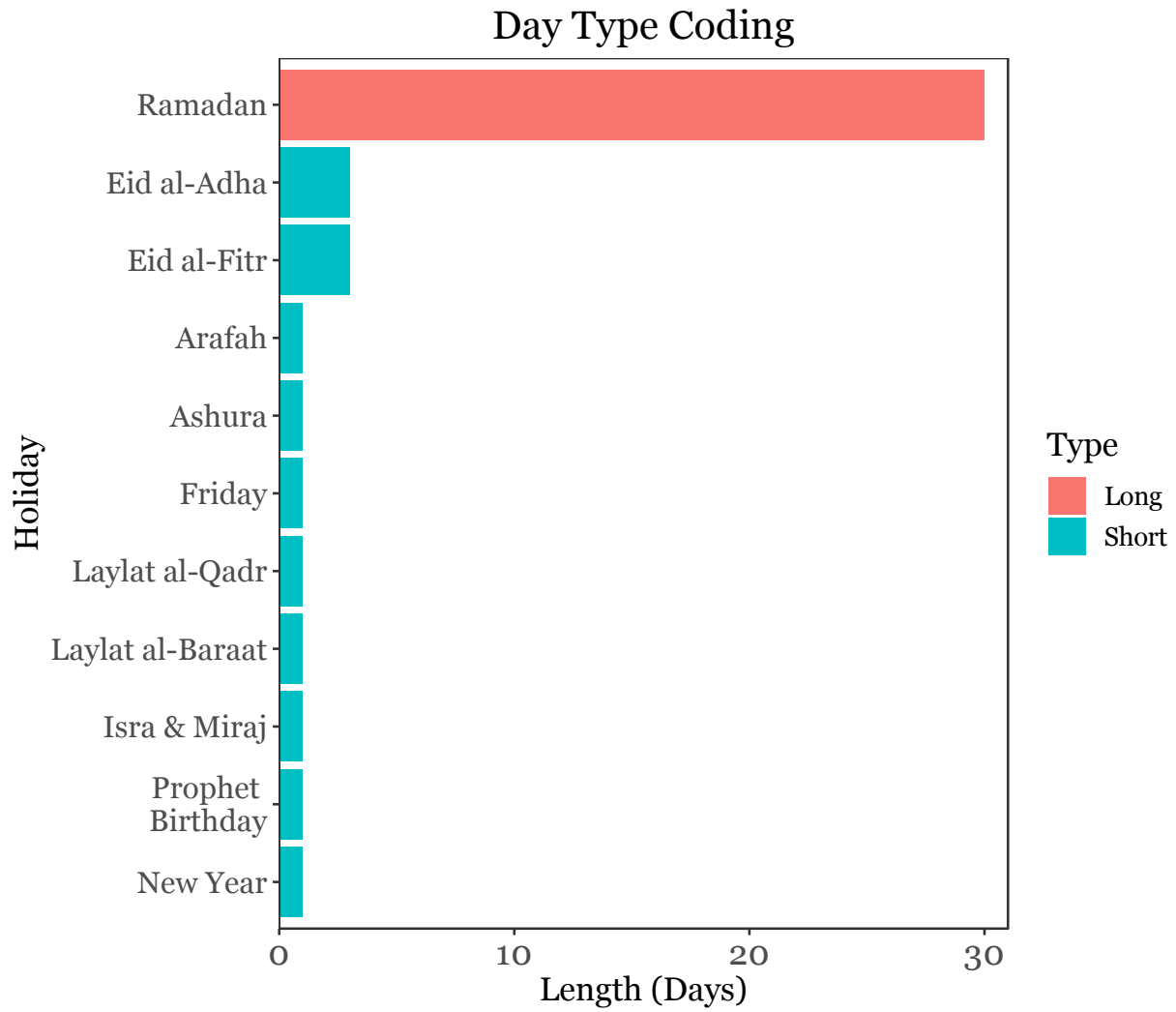
A.3 Alternative Model Specifications

Table A.2: This model is estimated with Friday, which hosts Islam's weekly liturgical service, as a separate variable. I move these days from the *Day Type - Short Holiday* to the indicator variable *Friday*. Everything else is identical to the main model in table 2.

	Dependent variable:
	Terror Attack
Day Type - Long Holiday	0.180***
	(0.057)
Day type - Short Holiday	−0.305***
	(0.085)
Friday	−0.171***
	(0.044)
Attack Lag$_{t-1}$	0.483***
	(0.036)
Battlefield Events$_{t-1}$	0.054***
	(0.011)
log(Population)	0.541
	(0.596)
GDP PC	−1.526***
	(0.537)
Land Area (km²)	0.263
	(0.562)
National Holiday	−0.139
	(0.118)
Counter	0.915***
	(0.115)
Intercept	−5.011***
	(0.503)
Observations	99,712
Var(Country)	4.153
Var(Country Year : Country)	2.465
Num(Country)	18
Num(Country Year : Country)	273
Log Likelihood	−15,603.380
Akaike Inf. Crit.	31,232.760
Bayesian Inf. Crit.	31,356.390
Note:	*p<0.1; **p<0.05; ***p<0.01

Table A.3: This model is estimated with Friday, which hosts Islam's weekly liturgical service, omitted from the *Short Holiday* category of *Day Type*. Everything else is identical to the main model in table 2.

	Dependent variable:
	Terror Attack
Day Type - Long Holiday	0.206***
	(0.057)
Day type - Short Holiday	−0.278***
	(0.085)
Attack Lag$_{t-1}$	0.481***
	(0.036)
Battlefield Events$_{t-1}$	0.054***
	(0.011)
log(Population)	0.549
	(0.596)
GDP PC	−1.523***
	(0.531)
Land Area (km²)	0.259
	(0.562)
National Holiday	−0.141
	(0.118)
Counter	0.912***
	(0.115)
Intercept	−5.035***
	(0.504)
Observations	99,712
Var(Country)	4.152
Var(Country Year : Country)	2.466
Num(Country)	18
Num(Country Year : Country)	273
Log Likelihood	−15,610.950
Akaike Inf. Crit.	31,245.900
Bayesian Inf. Crit.	31,360.030
Note:	*p<0.1; **p<0.05; ***p<0.01

Table A.4: This poisson model is estimated with a count of daily terror attacks as the outcome. The results are consistent with the main model, which uses a logistic link function.

	Dependent variable:
	Terror Attacks
Day Type - Long Holiday	0.094***
	(0.021)
Day type - Short Holiday	−0.250***
	(0.016)
Attack Lag$_{t-1}$	0.029***
	(0.001)
Battlefield Events$_{t-1}$	0.004*
	(0.002)
log(Population)	1.695***
	(0.655)
GDP PC	−1.158**
	(0.531)
Land Area (km²)	−0.272
	(0.587)
National Holiday	0.107***
	(0.035)
Counter	0.330***
	(0.077)
Intercept	−4.908***
	(0.512)
Observations	99,712
Var(Country)	4.2
Var(Country Year : Country)	2.831
Num(Country)	18
Num(Country Year : Country)	273
Log Likelihood	−35536.1
Akaike Inf. Crit.	71096.1
Bayesian Inf. Crit.	71210.2
Note:	*p<0.1; **p<0.05; ***p<0.01