Terrorism Financing, Recruitment and Attacks*

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Abstract

This paper investigates the effect of terrorism financing and recruitment on attacks. A Sharia-compliant institution in Pakistan induces exogenous variation in the funding of terrorist groups through their religious affiliation. I isolate the supply of terrorist attacks by following multiple terrorist groups with different affiliations operating in various cities. Higher terrorism financing, in a given location and period, generates more attacks in the same location and period. This effect increases in recruitment, measured through dark-web data, inputs by two judges and machine-learning. I estimate the elasticity of terrorist attacks to financing (0.25), indicating that financial counter-terrorism can lower attacks.

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1 Introduction

Global terrorism driven by radical Islam proliferated in the past two decades because of advances in the funding and recruitment of extremist movements (Feldstein (2008)). The nature of these events stimulated academics and policymakers to study the organisational economics of terrorist groups (Berman (2003), Berman (2011), Shapiro (2013)). In so doing, a consensus emerged on the importance of financial counter-terrorism (Bueno de Mesquita (2005a,b, 2007, 2013)), resulting in various initiatives and policies with this mandate.[1] Despite innovative theoretical contributions on this topic, there is a lack of quantitative evidence on the predictions of these models, which led to a debate on the costs and existence of financial counter-terrorism.[2]

In this research, I offer an empirical contribution to understanding the role of terrorism financing and recruitment in promoting terrorist attacks. This investigation departs from a critical question grounded in economic theory: do the timing and location of terrorism financing affect the timing and location of terrorist attacks? The answer is negative if terrorist organisations can costlessly store or transfer funds. However, in the presence of high costs to moving funds over time and across locations, terrorist organisations may decide to deploy local attacks, and there can then emerge a correlation between the timing and location of financing and attacks. In such cases, local conditions (like the availability of recruits) can be pivotal to the success of an attack and, at the same time, financial counter-terrorism can effectively curb violence and casualties. This work complements recent papers investigating the importance of terrorism financing (Shapiro (2007), Shapiro and Siegel (2007), Shapiro (2013)) and the identification of financing flows to extremist and violent groups (Dube and Vargas (2013), Sanchez de la Sierra (Forthcoming)).

A key challenge to empirically test this hypothesis is thus to identify unexpected changes in the funding available to terrorist groups. As a result, it necessary to detect a source of quasi-experimental variation affecting the supply of terrorist attacks due to extremist organisa-

[1] The United Nations adopted the 'International Convention for the Suppression of the Financing of Terrorism' on 9 December 1999. Refer to the UN website, https://www.un.org/law/cod/finterr.htm. On September 24th, 2001, President George W. Bush signed an executive order to block the funds of charitable organisations suspected of being involved with terrorism. Refer to the State Department archive from September 24, 2001, https://2001-2009.state.gov/s/ct/rls/rm/2001/5041.htm At the same time, the Treasury Department of the United States took the lead in this direction by empowering the OFAC (Office of Foreign Assets Control) and the TFI (Office of Terrorism and Financial Intelligence) to extend their financial counter-terrorism operations.

[2] Refer to the Economist in 2005, https://www.economist.com/special-report/2005/10/20/looking-in-the-wrong-places. Refer to the Foreign Affairs in 2017, https://www.foreignaffairs.com/articles/2017-06-13/dont-follow-money.

tions, without influencing the local economy, which may alter the demand of terrorist attacks (i.e. changes in policing, radicalisation). For this reason, I combine a natural experiment given by a Sharia-compliant institution in Pakistan, with a novel method to isolate the supply of attacks. This quasi-experimental variation affects a specific form of terrorism financing, charitable donations, and treats terrorist groups heterogeneously through its institutional design. To dissect the demand and supply of terrorist attacks, I follow multiple terrorist groups operating in various cities over time. As a result, I can focus on variation taking place within a group and within a city, and study how terrorist groups exposed to the unexpected financing react relative to unexposed groups in the same city and at the same time. This setting advances the work of Dube and Vargas (2013), offering a novel method to isolate the effect of shocks on violent groups and conflict.

I study two specific questions: 1) Do the timing and location of terrorism financing correspond to terrorist attacks? 2) What is the relation between financing and recruitment in generating attacks? To answer the first question, I follow 1,545 cities over 96 quarters between 1992 and 2015, containing the universe of terrorist attacks (e.g. 12,000 events). I also build a panel of 20 terrorist groups operating in 485 cities over the same period. To address the second question, I combine data from Jihadist fora operating in the dark web, with the work of two judges and a machine learning algorithm, leveraging novel techniques from the computer science literature.

A natural experiment affects a specific form of charitable donation, and terrorism financing, through an Islamic institution: the Zakat. During the Ramadan period, Muslim individuals offer this Sharia-compliant contribution to the poor. While its amount is a personal choice, the Pakistani government collects a mandatory payment through a levy on bank deposits applied immediately before Ramadan.[3] When the tax hits fewer people due to its unique design, there is an increase in donations reaching private-sector charities in Pakistan (as documented in Section 2). This expansion in charitable donations boosts the probability that funds reach terrorist organisations, due to lax oversight of charities and multiple extremists groups having their legal charity branch.[4]

[3]Such funds are then directly appropriated by the government and spent on vulnerable soon after Ramadan (e.g., the poor, blind, and disabled, etc.). Refer to the government website for an overview of Zakat programs: http://www.zakat.gop.pk/Programs.

[4]A typical example is the case of Lashkar-e-Taiba, one of the largest terrorist groups in Pakistan. Hafiz Saeed, who was one of the founders of this organisation, was also the head of a charitable foundation in Pakistan until

Two features of the Zakat levy induce exogenous variation in the time-series of charitable donations and terrorism financing. First, there exists a deposit threshold, and it generates a notch. Individuals with fewer deposits than the announced threshold enjoy a zero levy, while those above pay 2.5% on the overall deposited amount. Second, the deposit threshold corresponds to the monetary value of 612.32 grams of silver and is announced only a few hours before the collection. As a result, when silver prices are high, the threshold increases; hence, some individuals escape the 2.5% notch, are no longer taxed, and offer more charitable donations. Therefore, I exploit the international price of silver to verify how individual contributions and attacks evolve. Using a representative dataset on individual charitable donations, I show that donations by Sunni individuals increase with silver prices. However, individuals in the middle of the income distribution are responsible for this result, as they tend to be hit-or-missed by the threshold.

Another feature of the Zakat levy generates cross-sectional variation in the effect of silver prices: religious affiliation. Pakistan is a Sunni Islamic Republic, with the Sunni sect being closer to the Saudi Arabian interpretation of Islam. For this reason, such tax only applies to Sunni Muslims, while other religious groups are exempt (including the Shia sect, closer to the Iranian interpretation of Islam). As a result, changes in the international price of silver affect donations heterogeneously for Sunni (treated) or non-Sunni (control) cities and the financing of Sunni (treated) and non-Sunni (control) terrorist organisations. A religious map of Pakistan and intelligence reports lead to classify cities and organisations based on their religious affiliation.

My results indicate that Sunni-majority cities experience more terrorist attacks only when silver prices are high and exclusively during the quarter of Ramadan and the following one. This terror escalation takes place only for highly capital-intensive activities (e.g. bombs, chemical, biological and radiological weapons). On the contrary, events characterized by a low capital-intensity are unresponsive to changes in terrorism financing (like knifings, unarmed assaults). To isolate changes in the supply of attacks, I move from studying a city-time variation to a city-organisation-time setting. This novel setting offers a critical insight: the entire increase in terror in Sunni-majority cities is due to Sunni terrorist groups being more active compared to non-Sunni ones.

February 2018. Refer to Reuters https://www.reuters.com/article/us-pakistan-militants-financing/pakistan-bans-charities-linked-to-founder-of-militant-group-idUSKCN1FY1SN.

I also study a higher level of geographic aggregation (Pakistani divisions, equivalent to counties in the United States), and combine data on terrorist events with charitable donations. Beyond confirming the city-level results at this higher aggregation, I exploit the Zakat variation to estimate a novel parameter: the elasticity of terrorist attacks to terrorism financing. While the ordinary least squares (OLS) estimates indicate this parameter to be 0.17, once I use the Zakat experiment and instrument donations using silver prices and groups' religious affiliations, this coefficient becomes 50% larger, 0.25. Therefore, if terrorist groups double their funding in a given period, this leads to 25% more attacks. This quantification is useful for two reasons. First, it validates the theoretical findings of Bueno de Mesquita (2005b), showing that terrorism financing is a central determinant of attacks. Second, this parameter may enter the cost-benefit analysis of a policymaker assessing the returns of countering terrorism financing, given the costs of funding financial counter-terrorism.

To understand the technology of terrorist attacks, I investigate the relation between terrorism financing and recruitment in producing attacks. For this reason, I construct a measure of terrorist recruitment by analysing more than 2.5 million messages from seven Jihadist fora operating in English in the dark web between 2000 and 2012. I build an algorithm that analyses this data and identifies all conversations containing recruitment materials through supervised learning and natural language processing. Such method relies on the initial work of two judges who evaluated a sample of random messages and, manually and independently, highlighted those containing an intent to recruit violent extremists to some group or movement. After training the algorithm on this initial sample, I predict this evaluation to all other messages, de facto replicating the work of several judges marking each post. This method builds on the work of Scanlon and Gerber (2014) in computer science and is conceptually in line with Mueller and Rauh (2018), who use machine learning to predict the onset of a conflict. By combining this dataset with the Zakat experiment, I find that the effect of terrorism financing on attacks doubles when terrorist recruitment is one standard deviation more intense. This result is consistent with a complementarity between capital (finance) and labour (recruits) in producing terrorist events, in line with the theoretical work of Bueno de Mesquita (2005b).

To address possible confounders, I offer a rich series of alternative specifications to verify the robustness of my results and, in particular, one placebo. First, I exploit an alternative Islamic celebration, Eid Adha, which takes place in proximity to the Ramadan, also implies charitable donations but without a link to silver prices. As a result, I replicate my empirical strategy replacing the silver price at Ramadan with the silver price preceding the Adha celebration and cannot reject a zero effect of silver on terror in Sunni-majority areas following this celebration. This evidence corroborates the fact that religious holidays do not generate a heterogeneous uptake of terrorist attacks. In line with the Adha placebo, I verify that outside of the Ramadan period, the price of commodities does not produce a differential effect on terror in Sunni-majority areas, which strengthen my finding that the Ramadan effect of silver is due to the tax and not other unobservables. An additional section explores a series of alternative specifications, showing that the results are robust to confounding effects (local shocks, state-specific trends, presence of mines, etc.). To verify whether religiosity varies in Sunni-majority locations with silver at Ramadan, I use Google Trends data on religious readings and prayers and cannot reject a zero effect.

This work joins the literature on the organisational economics of terrorist and violent groups. I contribute by providing empirical evidence that terrorist groups face non-negligible costs in storing and moving their funding and quantify this through the elasticity. Berman (2003), Berman (2011) and Shapiro (2013) pioneered this field, showing that terrorist organisations are sophisticated in their reward structure and go beyond religion. The role of finance and its relation to terrorism is introduced by Shapiro (2007) and Shapiro and Siegel (2007), who note that while large scale organisations enjoy significant funding, their local level operatives are cash-constrained because of agency problems (e.g., monitoring the funds), as also noted by Shapiro (2013). This argument is consistent with my results since a funding shock to local operatives may complement centralised funding and promote attacks. My results are in line with Crost et al. (2016) and Wright (2016), who show how conflict and tactics change with financing by exploiting commodity prices in Colombia and in the Philippines, as highlighted by Bueno de Mesquita (2013). Sanchez de la Sierra (Forthcoming) shows that the funding of violent groups affects not only their internal organisation, but also their control of the territory, by relating the institution of stationary bandits to the degree of commodity concealability in the Democratic Republic of Congo. Bueno de Mesquita (2005a,b, 2007) argue the importance of financial counter-terrorism compared to alternative crackdown strategies, and my paper offers an estimate of the elasticity of terrorist attacks to financing, which may be useful in calibrating structural models of counter-terrorism. An alternative perspective on finance and terrorism is offered by Berman et al. (2011), Fetzer (2014) and Beath et al. (2017), who show that an increase in funding and strengthening of local public goods lowers terrorist attacks respectively in Iraq, India and Afghanistan. Regarding the role of donations in the Islamic world, Bazzi et al. (Forthcoming) study the waqf, an inalienable charitable trusts in Islamic law, in Indonesia and show the strategic use of such donations generated long-term effects and increased sharia adoption.

This paper is also connected to the literature on crime and conflict in developing countries, especially for the empirical strategy. Dube and Vargas (2013) advanced this literature by exploiting shocks to commodities of different labour-intensity to identify the demand and supply of conflict. My method offers an alternative approach to address the same problem by comparing multiple groups, with heterogeneous exposure to a shock, operating in the same geography and at the same time. My results are also in line with papers showing that conflict emanetes from development projects (Crost et al. (2014)), local trade shocks (Martin et al. (2008), Amodio et al. (Forthcoming)), the transmission of international prices (Dube et al. (2016), Berman et al. (2017)) and that its consequences can have long-term implications (Sviatschi (2019)).

This paper contributes to literature on the determinants of terrorism (Krueger and Malečková (2002), Abadie (2006), Jaeger and Paserman (2006), Krueger (2008), Jaeger and Paserman (2008), Krueger and Malečková (2009), Blair et al. (2013)), particularly to the work of Benmelech and Berrebi (2007). They show the importance of human capital in producing terrorist attacks, which is in line with my finding on the complementarity between capital and labour in producing attacks. Finally, it is useful to highlight that the existence of a relation between the donations, terrorism financing and attacks has been noted in different settings since 9/11.[5]

In Section 2, I present a theoretical framework and offer some institutional aspects of the Zakat levy and the role of silver prices. Section 3 investigates the reduced-form evidence on Zakat donations and terrorism. In Section 4, I describe two methods to dissect the demand

[5]Basile (2004) notes the link between Zakat donations, their misuse by charities and attacks through a qualitative study. Levi (2010) discusses how such specific donations are hard to tackle given the current anti-money laundering initiatives. Milton-Edwards (2017) shows how a stricter oversight of the Palestinian Zakat committees by Israel and the Palestinian Authority became a powerful device of counter-terrorism. Aman-Rana (2014) and Aman-Rana (2017) explore the economic causes of terror and analyse the effect of charity donations on violence in Pakistan. Regarding terrorism and Ramadan, Reese et al. (2017) do not find evidence of an increase in violent attacks during Ramadan in Iraq, Afghanistan and Pakistan.

and supply of terrorism and measure terrorist recruitment. In Section 5, I describe the Eid Adha placebo and some additional robustness checks. Finally, Section 6 offers some concluding remarks.

2 Framework and Institutional Setting

In this section I present a theoretical framework relating terrorism financing, recruitment and attacks and introduce the natural experiment in terrorism financing. Through the theoretical model, I highlight two key elements consistent with my empirical findings: 1) the presence of non-negligible costs in the capital transfers within a terrorism group; 2) a partial complementarity between labour and capital in the technology of attacks. Only in the presence of these two elements there emerges the correspondence between the timing and the location of financing and attacks and the key role of recruitment.

In the remaining part of this section I provide evidence on a natural experiment that induces a source of exogenous variation in terrorism financing. Through the eyes of this model, Section 3 shows that there is a correspondence between the timing and the location of terrorism financing and attacks, while Section 4 verifies the existence of the complementarity between terrorism financing and recruitment in promoting attacks.

2.1 Theoretical Framework

A terrorist organisation O is composed of multiple cells c that operate at local level. Each c shares the mission stated by O and can raise funding locally: it finds capital K with probability p or zero with probability $1-p$. The cell can allocate such funds in its local activities, k_c, which generate an increase in terrorist attacks, and these increase the probability of achieving the mission $y_c = f(k_c)$. Alternatively, cell c can send these resources to the central organisation, k_O, which organises other activities to increase the probability of success through $y_O = f(k_O)$.

The capital transfers from c to O are expensive, and I model this cost through the parameter $\tau \in (0, 1)$. Such cost can be interpreted as the probability that the transfer fails, as the police may stop the payment, in the case of a transfer using a traditional payment system (a bank wire et cetera). Alternatively, τ may be the cost of using an alternative transfer method (like individuals carrying money, storage in remote locations). From a theoretical standpoint, this is equivalent to an iceberg cost: if cell c transfers K units of capital to the organisation O, its net transfer is $(1-\tau)K$, as τK is lost as a transfer cost.

This cost can be interpreted as a reduced-form measure of the costs associated to moving funds faced by terrorist groups: under $\tau = 0$, they do not face any costs across cells, while in the extreme case of $\tau = 1$, the costs are extreme and capital is not transferable; hence, there is no movement of funding across cells, and the organisation is a sum of independent cells.

To simplify the intuition of the model, I assume that both production technologies of terrorist attacks $f(k_c)$ and $f(k_O)$ are linear. I measure the relative productivity of executing an attack by O with respect to cell c with the parameter π: for $\pi \in (-1, 0)$, the attacks by organisation O are less productive than those of the cell c, while for $\pi \geq 0$, the attacks are equally or more productive.

The capital allocation problem of cell c can be summarised as follows

$$\max_{k_c} k_c + (1+\pi)(1-\tau)k_O$$

$$s.t. \quad pK = k_c + k_O$$

which leads to the solutions

$$k_c^* = \begin{cases} pK & if \quad (1+\pi)(1-\tau) < 1 \\ 0 & if \quad (1+\pi)(1-\tau) \geq 1 \end{cases} \quad and \quad k_O^* = \begin{cases} 0 & if \quad (1+\pi)(1-\tau) < 1 \\ pK & if \quad (1+\pi)(1-\tau) \geq 1 \end{cases}.$$

If the marginal return of investing the capital locally, 1, exceeds the return of an attack by organisation O once the capital loss is netted out, $(1+\pi)(1-\tau)$, then cell c retains all pK funding in k_c and invests exclusively in its own production technology. On the contrary, if the opposite takes place, then all resources flow from cell c to the organisation O. While in the first case there is a one-to-one response between the timing and location of local financing and attacks, this does not take place when the financing of terrorism moves from the cell to the organisation.

2.1.1 Terrorism Financing and Recruitment

This simple framework can also offer an intuition on the relation between the capital shocks that cell c may receive at any period and the local availability of recruited terrorists, $l_c \geq 0$. To tailor the model to the empirical analysis, I consider the shocks to K to be unexpected and labour l_c to be predetermined at the time the shock is realised.

By enriching the production function to include both capital and labour, hence $y_c = g(k_c, l_c)$, it is then possible to expand the previous results on the optimal capital allocation of cell c. In this section I only focus on a production function that presents a partial complementarity between labour and capital, as this case delivers an unambiguously positive effect of local terrorism financing on local terrorist attacks and an unambiguously positive interaction between capital and labour in producing attacks. This is not the case in general and, in fact, in Appendix A I show that under perfect complementarity and perfect substitutability, this does not take place.

Partial Complementarity I assume a Cobb-Douglas production function with constant returns to scale both for the attacks of cell c, $y_c = k_c^{\alpha} l_c^{1-\alpha}$, and those of organisation O, $y_O = k_O^{\alpha} l_O^{1-\alpha}$. For tractability, I simplify $l_O = 1$. The capital allocation problem of cell c is thus expressed by

$$\max_{k_c} k_c^{\alpha} l_c^{1-\alpha} + (1+\pi)(1-\tau) k_O^{\alpha}$$

$$s.t. \quad pK = k_c + k_O$$

which leads to the following results

$$k_c^* = \frac{l_c}{A(\pi,\tau,\alpha) + l_c} pK \quad and \quad k_O^* = \frac{A(\pi,\tau,\alpha)}{A(\pi,\tau,\alpha) + l_c} pK$$

with

$$A(\pi,\tau,\alpha) = [(1+\pi)(1-\tau)]^{\frac{1}{1-\alpha}}$$

As a result, a share of the capital pK remains in cell c through k_c^*, while the remaining share (deflated by the transaction cost) goes to the central organisation O. The number of terrorist attacks performed by cell c are embodied by

$$y_c^* = \left(\frac{l_c}{A(\pi, \tau, \alpha) + l_c} pK\right)^{\alpha} l_c^{1-\alpha}.$$

The proposition below summarises the results of this theoretical framework.

Proposition A positive shock to the availability of capital in the location of cell c, K, leads to an increase in the local terrorist attacks performed by the cell, y_c, as $\frac{\partial y_c^*}{\partial K} > 0$. This effect is increasing in the availability of recruited individuals, l_c, as $\frac{\partial^2 y_c^*}{\partial K \partial l_c} > 0$. These results are derived in Appendix A.

2.2 Institutional Setting

In this section I present the relation between the Zakat donation and the price of silver and how it affects the financing of charities and terrorist organisations. Each subsection presents a stylised fact and some additional institutional features. First, I describe in detail how the Zakat levy works, its relation to silver prices and the religious map of the country, and I show that the government revenue declines in silver prices. Second, I analyse the data on charity donations at the individual level and verify that donations increase with silver prices in Sunni-majority areas and, in particular, by individuals that are marginally tax-free because of silver fluctuations. Third, I provide some anecdotes on the small distance between some charities in Pakistan and terrorist groups and verify that their funding is positively and highly correlated with silver prices.

2.2.1 Government Revenue, Zakat and Silver Prices

The Zakat donation is one of the five pillars of Islam and part of Sharia law. As Ramadan begins, Muslims are required to donate to the poor and vulnerable in exchange for a religious regeneration of their wealth. While this donation is left as an individual contribution in most countries, Malaysia, Saudi Arabia and Pakistan adopt a government-run scheme to collect and allocate these resources.

However, Pakistan offers a unique system to manage Zakat, which leads to a useful natural experiment. In 1981, a conservative government introduced the mandatory Zakat payment to the country.[6] This was implemented as a Sharia-compliant obligation corresponding to a 2.5% levy on those deposit accounts above an eligibility threshold (*Nisab-i-Zakat*). The definition of the threshold is grounded in the local interpretations of the Sharia law by Pakistani scholars and is defined by the international price of silver. As a result, the yearly threshold is calculated as the price of 612.32 grams of silver on the day of the threshold announcement. This is a levy that affects individuals across a large part of the income distribution: the average value of the threshold is 250 United States dollars (USD), with 65% of Pakistan's deposit accounts being above this.

Two key characteristics in the implementation of this levy play an important role. First, Pakistan is an Islamic Republic professing the Sunni school of Islam, closer in its interpretation to Saudi Arabia, and only Sunni Pakistanis are subject to this levy, accounting for 76% of the population. The other religious groups are exempted, in particular the Shia, who are the second largest group adhering to the Shia school of Islam (closer to the Iranian interpretation) and accounts for 19% of the country. The remaining 5% is composed of Hindus, Christians, Animists and other smaller groups. Given that only one particular religious sect is subject to the levy, I exploit a religious map of the country published by the Gulf/2000 project at Columbia University to compare Sunni-majority versus non Sunni-majority cities. Figure 3 reports the map and its geographic specification across religious groups, with Sunni-majority areas being specified in bright grey, Shia-majority areas in black, and mixed areas are reported in grey with black diagonal lines, while dashed areas are Hindu or Christian majority areas. It is crucial to emphasise that using the census to describe the religious composition of cities is not possible, as the publicly available version contains only macro-classifications (Muslim, Hindus, Christians).[7]

Second, the local authorities (State Bank of Pakistan and Ministry of Religious Affairs) announce the threshold only two days before the collection. This implies that the international price of silver at the announcement day determines the threshold and, consequently, the tax base and revenue collection. Figure 1 shows the one-to-one correlation between the Zakat

[6] Refer to the Zakat and Ushr Ordinance, 1980, available at http://www.zakat.gop.pk/system/files/zakatushr1980.pdf. For a historical review, refer to Nasr (2004).

[7] As an example, refer to http://www.pbs.gov.pk/content/population-religion.

threshold and the international price of silver on the day of the announcement. It is important to note that the average value of the threshold is relatively low: on average 250 USD. with 65% of Pakistani bank accounts being above this and the average account containing 868 USD.

The left panel of Figure 2 reports the country-wide government collection of Zakat revenue, while the right panel shows the high and negative correlation of such revenue with silver prices, -0.86. The average Zakat in real USD stands at 363 million, with a standard deviation of 283 and a minimum of 31 and a maximum of 904. These facts are important because the tax collection is high but not particularly large (equivalent to an average of 363 million real USD per year). While this is not a sizaeble amount for the Pakistani government, given that the overall tax revenue lies between 15 and 19 billion USD,[8] this amount may be sufficiently large to impact the behaviour of charities and terrorist organisations.

Finally, Figure 7 in Appendix B plots the volatility of the international price of silver, showing that the exact value of the threshold, and hence the revenue and donations. may be hard to predict ex ante given that silver is one of the most volatile metallic commodities. Figure 7 offers two plots in this direction. The left panel compares the quarterly volatility in the price of silver (solid blue line) and gold (dashed red line) for the past 15 years and shows that silver is 43% more volatile than gold. The right panel offers a long-term perspective on silver volatility, showing its large swings between 1980 and 2015.

A key point related to the application of this levy needs to be discussed in detail. In the year 2000, the Supreme Court of Pakistan challenged the mandatory payment of the Zakat levy by Sunni individuals. It could be thought that this ruling could weaken our identification, as the link between silver and deposit volatility may become feebler. While this legal challenge was considered and ruled upon by the Supreme Court, its implementation was significantly less straightforward, and its effect on depositors' behaviour was rather marginal. Four elements can reassure us about this, from a practical, legal, anecdotal and statistical standpoint.

First, from a practical perspective, Sunni individuals wishing to not pay this levy are subject to a specific procedure. This is costly in terms of time, money and especially personal risk over the disclosed information. In terms of money and time, an individual wishing to be deselected from this levy needs to fill a judicially-stamped paper, have it signed by a notary public official

[8] Refer to the International Monetary Fund report available at https://www.imf.org/external/pubs/ft/scr/2016/cr1602.pdf.

and two witnesses, and, finally, provide it to their bank branch through a lengthy and costly procedure.[9] Most importantly, this exposes the individual to personal risk, as such a process forces the individual to reveal both his/her religion and choice not to pay the levy. Both of these topics are sensitive in Pakistan given the existence of sectarian violence. Finally, there is limited public knowledge regarding this opt-out procedure, as discussed in a 2009 article on the *Pakistan News Service*. The same article encourages the government and banks to engage in information campaigns promoting the adoption of this procedure and, effectively, challenging the government intentions to follow the ruling adopted several years before.[10] In the same tone, an article by *Dawn* in 2013 reports that banks do not have straightforward procedures on permitting this exemption and highlights that the central bank warned banks on the need to uniform their behaviour on the practice.[11]

Second, the legal debate on this ruling has been fierce since its approval, with multiple authorities and courts challenging its validity. For example, in 2007 the Federal Shariat Court presented a petition to the Supreme Court and 'described certain provisions of the ordinance as repugnant to the Holy Quran'.[12] The presence of this legal uncertainty may have dissuaded many individuals to engage in the procedure given the certainty of exposing their information against the uncertainty on how long and whether this ruling would last.

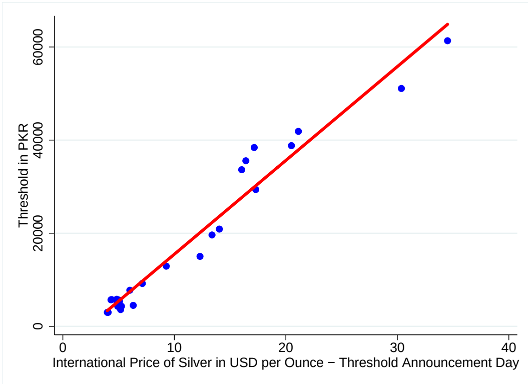
Third, in terms of statistical evidence, I offer two pieces of evidence. First, I verify in the next section that individual charitable donations respond to silver prices at Ramadan only in Sunni-majority areas, consistent with this levy lowering the disposable income of individuals who are exposed to the mandatory Zakat payment. Second, I report the correlation between the Zakat revenue collected by the government and silver prices: there is no evidence of a change in this correlation over time, which is in line with the previous arguments.

All in all, the Supreme Court ruling is not a problem for our identification for two reasons. First, it does not eliminate effect of silver prices on individual behaviour and therefore the correlation between silver price and donations (as I show extensively in the next section). A central explanation behind this finding needs to be highlighted: I am exploiting the changes in charitable donations by individuals who are likely to be around the threshold and change their

[9] Details are available at https://www.dawn.com/news/833270.
[10] Available at http://paktribune.com/news/Stop-Zakat-deductions-216762.html.
[11] Refer to https://www.dawn.com/news/1012932.
[12] Available at https://www.dawn.com/news/265997.

donations as a consequence of being subject to the levy. As we show, wealthy Sunni individuals do not respond to silver prices in their charitable donations, as they are always subject to the levy. Second, I separate the effect of silver prices in any other period by focusing on a different Islamic celebration and verifying that silver prices in that period do not generate a differential effect on terrorism.

Figure 1: Zakat Threshold and the International Price of Silver



Notes: This figure reports a scatterplot between the Zakat threshold in Pakistani rupees (PKR), on the y-axis, and the international price of silver per ounce at the announcement day, x-axis. The correlation between the two is 0.98***.

Figure 2: Zakat Revenue over Time and Silver Prices

Notes: The left panel shows the evolution in the Zakat revenue collected by the Pakistani government between 1981 and 2015 in millions of real PKR. The right panel correlates the revenue in natural logarithm of million PKR with the international price of silver in the day of the announcement in the natural logarithm of USD. These two variables are correlated at -0.86***.

2.2.2 Individual Donations and Zakat

In this section, I use individual data on charitable donations and verify that silver prices affect both donors and charities. I find that when silver prices are high, individual donations increase in Sunni-majority areas (treatment group) compared to non-Sunni areas (control), and charities receive more funds. It is important to note that because I focus on the differential effect of silver prices between Sunni and non-Sunni-majority areas, this nets out the possible increase in donations due to a wealth effect of higher silver prices that may similarly affect Sunni and non-Sunni individuals.

Before presenting the data on donations, it is important to note that the distance between charities and terrorism financing in Pakistan is particularly blurry. This country is in fact on the 'grey list' of the Financial Action Task Force, and the ambiguity of charity oversight is a key problem behind this.[13] While several local NGOs conduct admirable work, others are different. In fact, multiple charities have been directly associated to terrorist groups over the past decade. For example, this link was direct for Hafiz Saeed, who was one of the founders of a prominent terrorist group (Lashkar-e-Taiba) and, at the same time, head of a charitable foundation in Pakistan until February 2018.[14] Similarly, the terrorist group Jihad bi al-Saif has been linked to the charity Tablighis Jamaat.[15] Other groups have actively used charities to promote their fundraising. This has been the case of Harkat-ul-Mujahedeen, led by Maulana Fazlur Rehman Khalil, and Jammat-ul-Furqan, led by Maulana Abdullah Shah Mazhar, two banned militant outfits linked to the Tehrik-i-Taliban terrorist group (TTP) and Al-Qaeda. These terrorist groups created charitable foundations, under the new names Ansar-ul-Umma and Tehreek-e-Ghalba Islam, to boost their funding.[16] Given the difficulty in measuring the financing of terrorist groups, Pakistan is an ideal setting to study this question because its charities are particularly opaque, and this permits a neater exploration of terrorism financing. It is important to highlight that there is clear knowledge on the association between the Zakat donations and terrorism financing: in 2015, the Minister of Information (Pervaiz Rashid) 'ha[d] advised people to pay Zakat and charity to institutions which save lives and not to those producing suicide bombers', as reported by the newspaper *Dawn*.[17]

It is also important to highlight that while terrorist groups may face high costs in moving their funding across locations and over time, it could be argued that their charity-branch may store funds or move across locations, as Pakistan authorities have been relatively tolerant of such charities.[18] While it is plausible to argue that Pakistani security forces are tougher with

[13]Refer to this Dawn article https://www.dawn.com/news/1428015.

[14]Refer to this Reuters article https://www.reuters.com/article/us-pakistan-militants-financing/pakistan-bans-charities-linked-to-founder-of-militant-group-idUSKCN1FY1SN.

[15]Refer to this Stratfor/WorldView article: https://worldview.stratfor.com/article/tablighi-jamaat-indirect-line-terrorism.

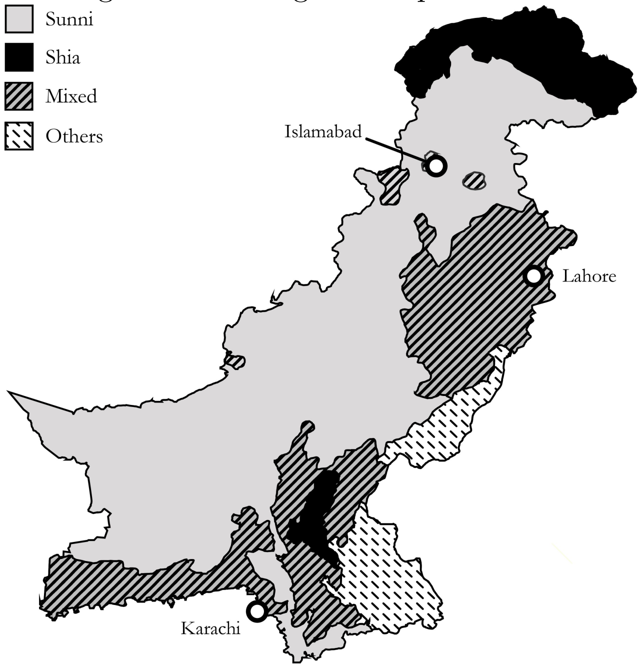
[16]Refer to this Global Ecco article https://globalecco.org/it/pakistan-money-for-terror.

[17]Refer to https://www.dawn.com/news/1194098.

[18]Refer to the Financial Action Task Force website http://www.fatf-gafi.org/countries/#Pakistan

terrorist groups, than with charitable organisations in relative terms; it is also true that such charitable groups receive routine checks by Pakistani security forces. In several cases, the police and counter-terrorism forces seized the assets of significant charities related to terrorist groups.[19] As a result, the cost of transfering funds over time and across locations is significant both for terrorist and charitable groups.

Figure 3: A Religious Map of Pakistan



Notes: This map reports the geocoding of the main religions and their composition for all of Pakistan. Sunni-majority cities are indicated by the full colour in light grey, and these account for 76% of the Pakistani population. Shia cities are marked in black and account for 19% of the population. Areas coloured in white and dashed lines are cities with other religious minorities (Hindus, Christians and Animists) and account for the remaining 5% of the population. This is build on the original map of Dr Izady and the Columbia University Project.

In terms of data, the 'Pakistan Social and Living Standards Measurement Survey' (PSLM) conducted by the Pakistan Bureau of Statistics offers information on individual donations of Zakat. Such survey contains a repeated cross-section and reports several economic indicators across the divisions of Pakistan for five years (2005, 2007, 2010, 2011 and 2013), with divisions being second-order administrative units equivalent to counties in the United States. The survey is stratified at this aggregated geographic level rather than city; as a result, the analysis concerning charity donations and in Section 4.1.1 take place at this higher administrative level.

[19]Refer to the case of the Falah-i-Insaniat Foundation, blocked in 2019 as reported by Dawn, https://www.dawn.com/news/1465548. Refer to the case of Jamaat-ud-Dawa, also blocked in 2019, as reported by Reuters, https://www.reuters.com/article/us-pakistan-militants/pakistan-reimposes-ban-on-islamist-charities-linked-to-militant-leader-idUSKCN1QB0RU. Refer to the police raid against charity boxes in 2015, https://www.dawn.com/news/1159304.

The survey asks the amount that an individual donates for Zakat through relatives, friends and NGOs (excluding transfers to the public sector and hence the deposit levy), and this makes it an ideal source of data for my analysis. I analyse this dataset to verify how donations respond to silver prices in Sunni-majority divisions through a difference-in-difference model. For this reason I run the following regression

$$\ln\, Zakat_{idt} = a_1\, Silver_t \times Sunni_i + a_2 Income_{idt} + \iota_d + \iota_t + u_{idt} \tag{1}$$

in which the Zakat donated by individual i in division d at time t is regressed over an interaction between the standardised international price of silver and a dummy identifying a Sunni individual, $Silver_t \times Sunni_i$; a control for the income of the individual, $Income_{idt}$; and then division and time fixed effects, ι_d and ι_t. Given that I cannot identify the whether an individual is Sunni from the survey, I proxy this with a dummy for whether the division is Sunni majority. Table 1 reports the results of equation (1): I do not control for income in column (1) and subsequently introduce it in (2). Two interesting results emerge from these regressions. First, when silver prices are one standard deviation higher, Zakat donations increase by 7%–9% in Sunni-majority divisions. Second, people with a higher income offer more Zakat donations (1% higher income corresponds to 0.160% more donations).

In addition to the previous test, I offer additional evidence linking a higher silver-induced tax to donations. The price of silver only affects the charitable donations of individuals around the silver threshold, hence in the middle of the deposit distribution. Very wealthy people are always taxed regardless of the price of silver, as they stand well above the threshold. On the contrary, very poor individuals are never taxed, as they may lack a bank account or do not hold sufficient deposits. As a result, in the absence of data on bank deposits from the PSLM, I exploit information on the income distribution, which is available, and verify whether the elasticity of donations to silver prices differs across quartiles.

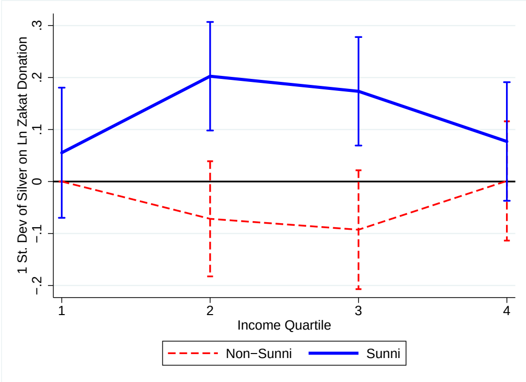
The mean income per individual in the survey is roughly 240,000 Pakistani rupees (PKR), corresponding to 2,100 USD, and the average threshold between 2005 and 2013 is approximately 25,000 PKR (corresponding to 215.93 USD). I use the information on income to study how donations respond across different income quartiles by interacting the coefficient $Silver_t \times Sunni_d$ in equation (1) with a series of dummies for each income quartile. Figure 4 shows how individuals respond to a one standard deviation increase in silver prices depending on their income quartile and whether they are in a Sunni or non-Sunni division. The red dashed line shows that individuals living in non-Sunni areas do not change their donations depending on the price of silver, independent of their income. This is consistent with the fact that non-Sunni are not affected by the deposit tax and hence do not change their charity behaviour based on silver. On the contrary, the solid blue line shows that individuals living in Sunni-majority areas react positively to changes in the price of silver, with the second and third quartiles being the only areas with a strong and statistically significant reaction in charity donations. For these quartiles, a one standard deviation increase in silver generates a 20% increase in donations by these two groups. As expected, the effects are significantly smaller and insignificant for individuals placed in the first and forth quartile: the taxes on both very poor and very wealthy individuals are unlikely to change with silver price fluctuations.

Table 1: Zakat Donations and Silver

	(1)	(2)
Variables	Zakat Donations in Ln(PKR)	
$Silver_t \times Sunni_i$	0.0753**	0.0940**
	(0.0371)	(0.0396)
Ln Yearly Income		0.160***
		(0.0196)
Observations	5467	5467
Division FE	Yes	Yes
Year FE	Yes	Yes
Adj. R sq.	0.139	0.187
Mean Dep. Var.	8.043	8.043
S.D. Dep. Var.	1.330	1.330

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is individual i in division d in year t. Division and year fixed effects are present in all columns, and standard errors are clustered at individual level. The dependent variable in columns is the natural logarithm of the Zakat donated by an individual. This is regressed over an interaction between the international price of silver at the announcement of the Zakat threshold, $Silver_t$, and a dummy taking unit value for Sunni-majority districts, $Sunni_d$. In all columns the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation (S.D.) of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Figure 4: Heterogeneous Effect of Silver by Income Quartile



Notes: This picture shows the coefficients of a regression estimating the effect of a one standard deviation increase in silver prices on Zakat donations of individuals living in Sunni and non-Sunni cities, depending on their income quartile. The model is expressed in equation (1), and the standard errors are clustered at individual level. The red dashed line shows the coefficient for individuals living in non-Sunni- majority cities, while the blue solid line shows the coefficients for individuals living in Sunni-majority cities.

3 Terrorism Financing and Attacks

3.1 Data

To study the effect of charity donations on terrorist attacks, I build a panel that reports the terrorist attacks recorded in 1,545 Pakistani cities over 96 quarter-years between 1992 and 2015. The Global Terrorism Database (GTD) published by the National Consortium for the Study of Terrorism and Responses to Terrorism, START (2017), contains the universe of terrorist attacks in Pakistan, which reports around 12,000 events and covers 4,600 periods in which a city is hit by at least one attack. To make the panel reliable and usable, I harmonise the names of the cities that could present multiple spellings (given the transliteration from Urdu to English) and code each city with a dummy for whether they are in a Sunni-majority area by using the map presented in Figure 3.

The database contains information on whether a terrorist attack took place as well as the number of attacks and attack-related casualties (defined as the sum of killed and wounded individuals). It also reports the specific type of attack (e.g., bombing explosion, assassination, armed assault, infrastructure attack, etc.) and the corresponding number of casualties. The dataset is then combined with information on specific quarters in which Ramadan took place in every year and the international price of silver at the announcement day of every Zakat payment.

Table 2 reports the summary statistics for the main variables in each dataset. Panel A presents three variables: a dummy that takes unit value whenever a city is hit by at least one terrorist attack in a quarter-year, the probability of an attack, and the number of attacks and casualties. The first variable shows that the unconditional probability of a terrorist attack in a quarter-year in Pakistan is 3.1%, with a high standard deviation given that more than 50% of Pakistani cities experience only one attack between 1992 and 2015. Similarly, the other two variables (number of attacks and casualties) present a similar pattern: low means, high standard deviations and high maxima. Panel B shows that 53.4% of Pakistani cities are coded as being Sunni-majority, as expected since 76% of the local population professes the Sunni school of Islam. Finally, Panel C reports statistics on the international price of silver per ounce in USD, based on data widely available through online platforms (e.g., Bloomberg, etc.). For every year, I only focus on the price of silver at the threshold announcement and report it for all other quarters. The mean price of silver is 10.829 USD, with a high standard deviation that implies a strong volatility of silver prices, as clarified by the minimum and maximum price of this commodity ranging between 3.640 and 39.892 USD.

Table 2: Summary Statistics on Attacks, Cities and Silver

Variable	(1) Obs.	(2) Mean	(3) S.D.	(4) Min	(5) Max
Panel A - Terrorist Attacks					
Probability of Attack	148,320	0.031	0.174	0	1
Number of Attacks	148,320	0.081	1.363	0	211
Number of Casualties	148,320	0.370	7.057	0	651
Panel B - Sunni-Majority Cities					
$Sunni_c$	1,545	0.534	0.499	0	1
Panel C - International Price of Silver					
$Silver_t$	96	10.829	8.814	3.640	39.892

Notes: This table presents the summary statistics for the three databases used in this section. Panel A reports the summary statistics for all the variables related to terrorist attacks in city and quarter-year period: 1) the probability of an attack in a city, 2) number of terrorist attacks, and 3) the number of attack-related casualties. Panel B presents the summary statistics for the dummy variable coding whether cities are Sunni-majority. Panel C summarises data on the international price of silver at the announcement of the Zakat threshold. Column (1) reports the number of observations, (2) and (3) the mean and standard deviation of each variable, while (4) and (5) indicate their corresponding minimum and maximum values.

3.2 Empirical Model and Results

The empirical analysis proceeds in two steps. First, I offer a lead-and-lag analysis to study the differential evolution of terrorist attacks in Sunni-majority cities around Ramadan and depending on silver prices. The identification of these effects is possible because of the lunar calendar and the fact that the Ramadan begins in different quarters between 1992 and 2015. This additional variation also nets out the effect of seasonality and agricultural cycles on terrorism, as the Ramadan dates shift yearly because of the lunar calendar. Since I find that there is an increase in terrorist attacks only in the quarter in which the financing takes place (Ramadan) and the following quarter, I bundle these two quarters into a single dummy and proceed with a difference-in-difference-in-difference estimation.

The following empirical model presents the lead-and-lag evaluation

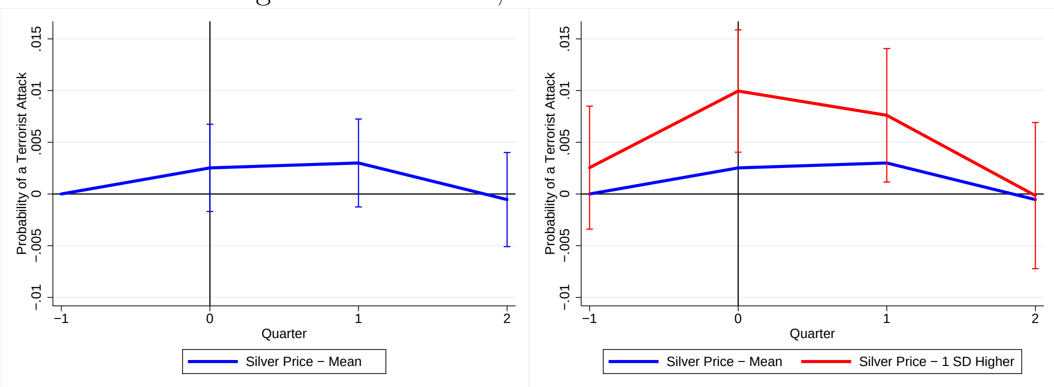
$$Terror_{ct} = \sum_{t=0}^{2} b_{1t} Sunni_c \times Q_t + \sum_{t=-1}^{2} b_{2t} Sunni_c \times Silver_t \times Q_t + \iota_c + \iota_t + \varepsilon_{ct} \tag{2}$$

Equation (2) regresses a terror variable in city c at quarter-year t, $Terror_{ct}$, on a set of Ramadan fixed effects, Q_t, which corresponds to the quarter before Ramadan (Q_{-1}), the Ramadan quarter (Q_0) and subsequent quarters (Q_1 and Q_2), which are interacted with the dummy coding Sunni-majority cities, $Sunni_c$. The same two variables are interacted again with the standardised price of silver at the threshold announcement, $Silver_t$. Fixed effects are included for each city, ι_c, and quarter-year period, ι_t, and standard errors are clustered at the city level. In equation (2), all coefficients are relative to the quarter prior to Ramadan (Q_{-1}) when silver prices are at the mean value; hence, the coefficient c_{-1} is the omitted category.

The coefficients reported by b_{1t} verify the differential evolution between Sunni-majority cities (treatment) and non-Sunni-majority cities (control) when the price of silver is at its average value. The coefficients b_{2t} embody this differential effect when the price of silver is one standard deviation above the mean. This is the key source of variation in the regression: high silver prices imply low government Zakat revenue and high charity donations, which finance terrorist organisations. Note that because Ramadan takes place every year, I cannot include dummies going back more than one period or going forward more than two periods, as they would be collinear with the previous or following Ramadan.

Figure 5 reports the results of this lead-and-lag analysis for the probability of terrorist attacks. The left panel shows that in periods of silver prices at the mean, the probability of terrorist attacks in Sunni-majority cities is not statistically higher in any quarter around Ramadan. The right panel displays the corresponding results when silver prices are one standard deviation above the mean. While there is no statistical difference in the quarter before Ramadan (Q_{-1}) and the two quarters after Ramadan (Q_2) between Sunni-majority and non-Sunni-majority cities, there is a statistically higher probability of an attack in the quarter in which Ramadan takes place and the following quarter. Beyond being statistically significant, the spike is quantitatively large, as it implies a 1% higher probability of an attack, against a baseline probability of an attack of 3.1%, as Table 2 shows. Appendix A reports the table including all the coefficients presented in Figure 5 and the corresponding figures for the number of terrorist attacks, which present a similar pattern.

Figure 5: Terrorism, Zakat and Silver Prices



Notes: Both panels show the differential evolution in the probability of a terrorist attack between Sunni-majority and non-Sunni-majority cities across different quarters around Ramadan. The x-axis measures the quarter prior to Ramadan (-1), during Ramadan (0), following Ramadan (1) and two quarters following Ramadan (2). The vertical line in 0 corresponds to the quarter during Ramadan. The left panel shows the differential probability of a terrorist attack in a Sunni-majority city when silver prices are at the mean, while the right panel exhibits the same coefficients when silver is one standard deviation above the mean. Equation (2) presents the empirical model behind these panels, and Appendix A contains the table with the corresponding coefficients. The bars around each observation represent the 95% confidence interval, and standard errors are clustered at the city level.

Given that the effect is concentrated only in two quarters, I define a dummy variable that takes unit value for each quarter of a year that contains Ramadan and the subsequent quarter, $Ramadan_t$, and proceed with a difference-in-difference-in-difference model

$$Terror_{ct} = f_1 Sunni_c \times Silver_t + f_2 Sunni_c \times Ramadan_t +$$

$$+ f_3 Sunni_c \times Silver_t \times Ramadan_t + \iota_c + \iota_t + \varepsilon_{ct} \tag{3}$$

in which the terror variable observed in city c at time t, $Terror_{ct}$, is regressed on 1) an interaction between the Sunni-majority dummy, $Sunni_c$, and the price of silver at the threshold announcement, $Silver_t$; 2) an interaction between $Sunni_c$ and $Ramadan_t$; and 3) a triple interaction between these variables. The coefficient f_1 measures the differential effect of silver prices at the threshold announcement date on terrorist attacks in Sunni-majority cities across all quarters of a year; f_2 shows the differential probability of a terrorist attack in Sunni-majority cities at Ramadan; and f_3 identifies the key coefficient of equation (3), which is the differential effect in attacks in Sunni-majority cities, when silver prices are one standard deviation higher in the Ramadan quarter and following one quarter.

Table 3 reports the results of (3) for the probability of a terror attack in column (1), the natural logarithm of the number of terror attacks (column (2)), and the number of terror-related casualties (column (3)). In all cases the price of silver does not produce a differential effect on the probability of a terrorist attack in Sunni-majority cities, as I cannot reject a zero effect for the variable $Sunni_c \times Silver_t$. The second coefficient highlights that there is an increase in the probability of a terrorist attack when Ramadan arrives in Sunni-majority cities and the price of silver is at its mean. This effect is statistically different from zero only for the probability of an attack, but not for all other variables, and its size is not large, as it corresponds to a 10% increase on the 3.14% baseline probability. The final row shows that there is a large increase in terrorist activities when Ramadan takes place in Sunni-majority cities, and the price of silver is one standard deviation above its mean. The quantitative effect is large, as the increase in the probability of a terrorist attack is overall 1%, which corresponds to a 33% higher probability of an attack than the baseline probability, and is significantly different from zero below 1%. The effect is similar for the number of attacks in terms of size and magnitude (20% above the baseline mean) and is significantly different from zero below 5%. Regarding the triple interaction for the last variable of Table 3, the number of casualties, this is always positive, quantitatively large but borderline significant at the 5%. One reason behind this may be the relatively high measurement error of this variable. While these estimates are based on a linear probability model, in Appendix A, I verify their robustness to a conditional Poisson fixed-effect estimator, as in Dube and Vargas (2013).

To verify whether the results of Table 3 are compatible with an organisation-financing channel, I study which type of attacks change at Ramadan. I analyse whether capital-intensive ones increase as funding flows towards terrorist groups. For this reason, I exploit the fact that the Global Terrorism Database attaches to each attack a specific category and defines a new variable, called "capital-intensive" terrorist attacks, which groups three categories of attacks. The following definitions are quoted from the codebook of START (2017):

1. Bombing/Explosion: This includes attacks where the *'primary effects are caused by an energetically unstable material undergoing rapid decomposition and releasing a pressure wave that causes physical damage to the surrounding environment*'. Different types of explosives belong to this classification (high, low, dirty bombs), while nuclear events (attacks in which the decomposition takes place at a slower rate and exclusive use of firearms) are excluded.

2. Unarmed Assault: This classifies events whose *'primary objective is to cause physical harm or death directly to human beings by any means other than explosive, firearm, incendiary, or sharp instrument (knife, etc.). Attacks involving chemical, biological or radiological weapons are considered unarmed assaults*'.

3. Assassination: This is an act whose *'primary objective is to kill one or more specific, prominent individuals. Usually carried out on persons of some note, such as high-ranking military officers, government officials, celebrities, etc.*'. This is included as a capital-intensive attack, as most assassinations of prominent figures in Pakistan occur through bombings, but these are classified as assassinations given that if *'an assassination is carried out through the use of an explosive, the Attack Type is coded as Assassination, not Bombing/Explosion*'.

Table 3: Terrorist Attacks, Sunni Cities and Silver

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t$	0.001	0.002	-0.001
	(0.002)	(0.004)	(0.006)
$Sunni_c \times Ramadan_t$	0.003**	0.001	0.001
	(0.001)	(0.001)	(0.002)
$Sunni_c \times Silver_t \times$	0.007***	0.005**	0.007*
$Ramadan_t$	(0.002)	(0.002)	(0.003)
City FE	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes
Obs.	148320	148320	148320
Adj. R sq.	0.183	0.280	0.226
Mean Dep. Var.	0.0314	0.0311	0.0428
S.D. Dep. Var.	0.175	0.198	0.333

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is city c in quarter-year t. City and quarter-year fixed effects are present in all columns and standard errors are clustered at the city level. The dependent variables are the probability of a terror attack in column (1), Terror Dummy; the natural logarithm of the number of terrorist attacks in column (2), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in column (3), Casualties $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

The remaining classifications tend to have a lower capital-intensity (e.g., firearm assault, hijacking, hostage taking, kidnapping, etc.) and are not included in this variable. As a result, I study whether these specific attacks respond to the funding shock according to equation (3). Table 4 presents the results from this test, with column (1) measuring the probability of a capital-intensive attack, column (2) the number of capital-intensive attacks and (3) the corresponding number of casualties. In line with Table 3, I find that the first two interactions ($Sunni_c \times Silver_t$ and $Sunni_c \times Ramadan_t$) are small in magnitude and not statistically different from zero. On the contrary, the triple interaction ($Sunni_c \times Silver_t \times Ramadan_t$) is positive, presents large magnitudes in all four columns as in Table 3 and is statistically different from zero in columns (1) and (2). In Sunni-majority cities, a one standard deviation increase in silver prices during the Ramadan period leads to a higher probability of capital-intensive terrorist attacks (20% of the baseline mean of 2.33%), a larger number of attacks (14% of the baseline mean) and more attack-related casualties (14%). The results on the borderline significance for casualties can be explained either as a result of measurement error (the standard deviation of these variables is particularly high, as the last row of Table 4 shows) or as due to these additional attacks having a low marginal product of capital. Appendix C reports the results of equation (3) for the non-capital-intensive attacks and highlights that in this case I cannot reject a zero effect of an increase neither in their probability nor in the number of attacks and casualties. Also, the magnitudes of the corresponding effects on the triple interaction ($Sunni_c \times Silver_t \times Ramadan_t$) for these attacks are between three to four times smaller than those in Table 4.

Table 4: Capital-Intensive Attacks and Zakat

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t$	0.002	0.002	0.000
	(0.002)	(0.003)	(0.004)
$Sunni_c \times Ramadan_t$	0.002*	0.001	0.000
	(0.001)	(0.001)	(0.002)
$Sunni_c \times Silver_t \times$	0.004***	0.003**	0.004
$Ramadan_t$	(0.001)	(0.001)	(0.003)
City FE	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes
Obs.	148320	148320	148320
Adj. R sq.	0.167	0.247	0.200
Mean Dep. Var.	0.0233	0.0224	0.0297
S.D. Dep. Var.	0.151	0.164	0.284

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is city c in quarter-year t. City and quarter-year fixed effects are present in all columns and standard errors are clustered at the city level. The dependent variables consider terrorist attacks that are defined "capital-intensive", which are executed through bombings, unarmed events (chemical, biological or radiological) and assassinations of high-ranking officials, as described in the text. Column (1) reports the probability of a capital-intensive terror attack, Terror Dummy; the natural logarithm of the number of capital-intensive terrorist attacks in column (2), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in a capital-intensive attack in column (3), Casualties $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. Appendix C reports the same table for non-capital intensive attacks. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Section 5 offers some additional tests that refine the results of Table 3. In Section 5.1, I replicate the same results of equation (3) but for another Islamic celebration, Eid Adha, and I compute the price of silver traded two days before this celebration; using this specification, I cannot reject a zero on all coefficients. In Section 5.2, I address various additional robustness checks. First, I control for city-specific seasonality by introducing a city-quarter fixed effect that nets out city-specific confounding factors (e.g., local agricultural cycle, local rain season, etc.). Second, I control for the fact that different Pakistani states may evolve following different trends (e.g., income, inflation, etc.), and I can exclude such state-year common shocks through fixed effects. Third, I follow the same approach as Crost et al. (2016) by replacing the silver variable with time fixed effects and show that these effects are highly correlated with silver prices. Fourth, I find that silver, as well as other commodities (e.g., gold, copper, tin), do not have an effect on terror attacks outside the Ramadan period. Forth, I verify that the proximity of a city to a mine does not generate differential effects in the probability of a terrorist attack at Ramadan, in Sunni cities and with higher silver prices.

4 Additional Results and Empirical Methods

4.1 Dissecting the Supply and Demand of Terrorist Attacks

The results on the relation between financing and terrorist attacks may be rationalised through two complementing stories: 1) an increase in the supply of terrorist attacks by extremist organisations as a result of increased funding given by charitable donations and 2) a higher demand of terrorist attacks by the local population of a city because of changes in local characteristics due to lower donations reaching poor people or local institutions (e.g., more policing/military, increase in labour supply, etc.). It is typically hard to dissect these elements in the terrorism and conflict literature, and Dube and Vargas (2013) pioneered this field by focusing on different types of shocks to isolate the 'rapacity' effect (supply) from the 'opportunity cost' effect (demand).

I introduce an alternative method to investigate the effect of this natural experiment, which can be generalised in other studies on conflict and violence. I build an additional panel in which I follow 485 cities and 20 terrorist organisations over the 96 quarter-year periods between 1992 and 2015 containing almost one million observations. In addition, I enrich and cross-check information on terrorist organisations from the GTD database with local newspapers (in English and Urdu) and cross-validate the names/affiliations of the terrorist organisations claiming the attack. As a result, I am able to

1. exploit a finer level of variation by separately identifying city and organisation time-varying heterogeneity;

2. code each terrorist organisation as Sunni, which is likely to receive the exogenous change in charity donations and hence is treated, or non-Sunni, who are unlikely to receive it and hence are a control; and

3. combine this novel panel with the individual data on charity donations from the PSLM survey and estimate the elasticity of terrorism financing on attacks (Section 4.1.1).

The combination of 1 and 2 uncovers a novel identification in this literature. In fact, I can isolate the supply an extremist organisation's terrorist attacks by analysing the within-city variation and exploiting the cross-sectional variation in attacks between Sunni and non-Sunni organisations. Analogously, I can focus on the demand of terrorist attacks that could be due to city shocks to policing or labour markets, by studying the within-organisation and exploit the cross-sectional variation between Sunni-majority and non-Sunni-majority cities. If the findings reported in Table 3 are robust to changes in city time-varying unobservables (accounted by city-time fixed effects), then the relation between the timing and location of donations and attacks offers evidence consistent with terrorist organisations facing significant costs in their capital allocation.

Unfortunately, it was impossible to identify all of the terrorist organisations behind each attack either because of inaccurate/conflicting sources or simply due to the lack of an organisation claiming the attack. As a result, this panel contains fewer cities, from 485 compared to the original 1,545. However, all the major Pakistani cities and terrorist organisations are still part of the sample, and, in fact, these results are close to those presented in Table 3 in terms of sign, magnitude and statistical significance.

Table 16 in Appendix D reports the list of terrorist organisations and their corresponding religious affiliations. As Pakistan is a Sunni-majority country, most religious groups are associated with the Sunni school of Islam (15 out of 20), while only a minority can be identified as non-Sunni. Most of these groups typically fight against the Pakistani government, with varying degrees of political ambition. For example, the Taliban (Tehrik-i-Taliban Pakistan or TTP) fight for a more extensive application of the Sharia law, and others favour an Islamic state across South Asia (Lashkar-e-Taiba) or have more restricted territorial ambitions (Baloch groups in the Balochistan state, Jaish-e-Mohammad in Kashmir, the Sindhu army in the Sindh state), while others engage in sectarian violence (most Sunni groups, Sipah-I-Mohammed among the non-Sunni, etc.). Appendix D reports a detailed description of each group, including materials that support the religious classification. In Section 5.2, I offer two robustness checks to address some heterogeneities across terrorist organisations.

In this setting, I study only the probability of a terror attack by an organisation in a city in a given quarter-year, because only the top 0.02% of observations present more than one attack by an organisation in a given quarter-year (typically the largest cities, Karachi, Lahore and Islamabad). Given this novel method, I expand equation (3) through this richer empirical model

$$Terror_{cot} = h_1 Sunni_c \times Silver_t + h_2 Sunni_c \times Ramadan_t +$$

$$+ h_3 Sunni_c \times Silver_t \times Ramadan_t + h_4 Sunni_o \times Silver_t + h_5 Sunni_o \times Ramadan_t +$$

$$+ h_6 Sunni_o \times Silver_t \times Ramadan_t + \iota_c + \iota_o + \iota_t + \varepsilon_{cot} \tag{4}$$

Equation (4) regresses the probability of a terror attack from organisation o in city c in quarter-year t on the fixed effects for city, organisation and quarter-year (ι_c, ι_o, ι_t). It includes the same regressors from equation (3), hence the interactions between the standardised price of silver, $Silver_t$; the Ramadan dummy, $Ramadan_t$; and the Sunni-majority dummy, $Sunni_c$. Finally, to account for the supply of terrorist attacks, it presents the same first two variables ($Silver_t$ and $Ramadan_t$) interacted with a dummy coding each terrorist organisation as being Sunni, $Sunni_o$. Standard errors are two-way clustered at the level of the city and organisation. While the expression reported in equation (4) only exploits the within-city and within-organisation variation, in Table 5, I also separately introduce city-time, ι_{ct}, and organisation-time fixed effects, ι_{ot}, to eliminate respectively city-time varying unobservables (demand of terrorist attacks) and organisation-time varying unobservables (supply of terrorist attacks).

Table 5 reports the results of equation (4). In column (1), I introduce only city, organisation and quarter-year fixed effects; in column (2), I introduce the organisation-time fixed effects to remove the supply of terrorist attacks; in column (3), the city-time fixed effects remove the corresponding demand. The main result from this table highlights that only the supply of attacks is statistically different from zero, and it presents a quantitative magnitude in line with Table 3. Hence only the interaction between $Sunni_o$, $Silver_t$ and $Ramadan_t$ is statistically different from zero. This implies that as Sunni terrorist organisations receive higher donations during the Ramadan period, implied by a one standard deviation in silver prices, they exhibit a higher probability of carrying out an attack 1.79% higher than the baseline average probability. This result is quantitatively in line with Table 3 and highlights the importance of organisations behind the increase in terrorist attacks. Once the role of organisations is explicitly acknowledged, the triple interaction $Sunni_c \times Silver_t \times Ramadan_t$ is not statistically different from zero neither in column (1) nor in (2) once organisation-time fixed effects are included.

In terms of the result's robustness, the point estimate of the coefficient on $Sunni_o \times Silver_t \times Ramadan_t$ does not change as the city-time variation is introduced in column (3), as there is only a mild increase in the precision of the estimate. This could be due to the fact that the exogenous shock to the funding of terrorist organisations is orthogonal from city-specific characteristics. As a result, the city-time fixed effects remove confounders and add precision.

The finding that the Zakat shock affects only terrorist organisations but not city-specific characteristics is consistent with additional data on wages from the Pakistani Bureau of Statistics. I digitise the monthly-level data on the wages of four worker categories (unskilled workers, carpenters, electricians and construction workers) from the Pakistani Intercity Consumer Price survey for the 40 largest cities between September 2014 and September 2017. I replicate the city-level strategy previously presented and verify whether wages change differentially in Sunni-majority cities in presence of high silver prices around Ramadan. An inspection of Table 15 in Appendix C leads me to not reject the null hypothesis, which is that salaries do not respond differentially.

Table 5: Dissecting the Demand and Supply of Attacks

	(1)	(2)	(3)
Variables	Probability of a Terrorist Attack		
$Sunni_c \times Silver_t$	-0.014	-0.014	
	(0.010)	(0.011)	
$Sunni_c \times Ramadan_t$	0.000	0.000	
	(0.003)	(0.003)	
$Sunni_c \times Silver_t \times$ $Ramadan_t$	0.004	0.004	
	(0.003)	(0.003)	
$Sunni_o \times Silver_t$	0.025		0.025
	(0.031)		(0.030)
$Sunni_o \times Ramadan_t$	0.002		0.002
	(0.004)		(0.003)
$Sunni_o \times Silver_t \times$ $Ramadan_t$	0.0179**		0.0179**
	(0.0079)		(0.0078)
City FE	Yes	Yes	Yes
Organisation FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
City-Time FE			Yes
Organisation-Time FE		Yes	
Obs.	931,200	931,200	931,200
Adj. R sq.	0.0171	0.0373	0.0149
Mean Dep. Var.	0.0009	0.0009	0.0009
S.D. Dep. Var.	0.0311	0.0311	0.0311

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is organisation o in city c in quarter-year t. Oganisation, city and quarter-year fixed effects are present in all columns. Column (2) also introduces organisation-time fixed effects, while column (3) adds city-time fixed effects. Standard errors are two-way clustered at the level of the city and organisation. The dependent variable is the standardized probability of a terror attack. This is regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; a dummy taking unit value for Sunni organisations, $Sunni_o$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

4.1.1 Estimating the Elasticity of Terrorist Attacks to Financing

Section 2 introduced the PSLM survey conducted by the Pakistan Bureau of Statistics, which is a representative survey that contains an individual measure of donations across the divisions of Pakistan. I use this survey to derive a time-varying measure of charity donations per division by aggregating the individual donations at this geographic unit. Similarly, I aggregate the city-organisation panel, which reports the city-level statistics on terror events, to a higher geographic level (a division-organisation panel) and track all the variables at this aggregated level.

To identify the share of the charity donations that an organisation receives in a given division and period, I use a simple Bartik-style instrument and the following formula

$$Donations_{odt} = Exposure_{odt-1} \times Donations_{dt} = \frac{\sum_{c=1}^{N} Attacks_{ocdt-1}}{\sum_{c=1}^{N} Attacks_{cdt-1}} \times Donations_{dt}$$

in which I model the donations received by the terrorist organisation o in division d at time t as the product between the overall donations given in division d at time t, $Donations_{dt}$, multiplied by the exposure of organisation o in division d in the quarter before the Zakat donations $t-1$, $Exposure_{odt-1}$. I define this measure of exposure as the share of attacks executed by organisation o in all cities c of division d in the quarter prior to Ramadan $t-1$. Once this local variable is defined, I can explore the following model

$$Terror_{odt} = l_1\, Donations_{odt} + \iota_o + \iota_d + \iota_t + \varepsilon_{odt} \tag{5}$$

relating the number of terror events that organisation o implements in division d in the quarter of Ramadan and the following quarter t, $Terror_{odt}$, to the natural logarithm of the overall donations received by the same organisation in that division and time, $Donations_{odt}$, including organisation, division and time fixed effects. The Zakat experiment is particularly useful because creates a natural instrument for equation (5)

$$Donations_{odt} = m_1\, Sunni_o \times Silver_t + \iota_o + \iota_d + \iota_t + u_{odt} \tag{6}$$

which focuses on the increase in donations exogenously determined by changes in the international price of silver for the days before Ramadan directed to Sunni terrorist groups. Because the Zakat donations take place exclusively around Ramadan, I estimate equations (5) and (6) only for the attacks taking place at Ramadan the and subsequent quarter and only for the years included in the PSLM survey waves. As a result, I study 20 terrorist groups operating in 26 divisions and over 5 waves, resulting in 2,600 observations.

Before estimating this equation, it is important to highlight that the coefficient l_1 in equation 5 represents the elasticity of terrorist attacks to charitable donations, not to terrorism financing. To identify the relevant elasticity, I employ the following accounting identity

$$Terrorism\ Financing = n_1 + n_2 Donations \tag{7}$$

which states that a unit increase in donations generates an n_2 increase in terrorism financing, and hence this parameter is the elasticity of terrorism financing to charitable donations. As a result, I need to divide l_1 by n_2 to measure the elasticity of terrorist attacks to financing. While l_1 is identified through equations (5) and (6) and Table 6, I cannot identify the parameter n_2 in my data. For this reason, I research this number in the national security literature and policy reports: Nguyen (2012) measures n_2 to be 0.1 (hence, 10% of charitable donations are transformed in terrorism financing); Al-Jarani (2016) reports 0.2, also in line with the US Treasury[20], while Crimm (2003) and Ryder (2015) report this to be 0.3. I take the median report of this estimate to calculate the elasticity and follow Al-Jarani (2016), assuming $n_2 = 0.2$.

Table 6: Donations and Attack, OLS and IV

Variables	(1) Donations Ln(1+N)	(2) Terror Dummy	(3) Terror Dummy	(4) Terror Dummy
			OLS	IV
$Sunni_o \times Silver_t$	0.227***	0.011***		
	(0.0715)	(0.00417)		
Donations			0.034***	0.050***
			(0.004)	(0.011)
Elasticity			0.17	0.25
Division FE	Yes	Yes	Yes	Yes
Organisation FE	Yes	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes
Obs.	2600	2600	2600	2600
Adj. R sq.	0.200	0.134	0.544	0.456
Mean Dep. Var.	0.212	0.007	0.007	0.007
S.D. Dep. Var.	1.609	0.074	0.074	0.074

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is organisation o in division d at quarter-year t. Division, organisation and quarter-year fixed effects are present in all columns, and standard errors are clustered at the division and organisation. The dependent variables are the natural logarithm of the charity donations received by an organisation in a division in column (1), Donations Ln(1+N); and the probability of a terror attack in columns (2), (3) and (4), Terror Dummy. These are regressed over a dummy taking unit value for Sunni organisations, $Sunni_o$, and the price of silver at the announcement of the Zakat threshold, $Silver_t$, in columns (1) and (2). In column (3), the Terror Dummy is regressed on Donations through an OLS and, in column (4), through an IV exploiting the first stage presented in column (1). The row titled "Elasticity" measures the elasticity of terrorist attacks to terrorism financing and is calculated dividing the point estimates in columns (3) and (4) by 0.2, as described in the text. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

[20] Refer to the National Terrorist Financing Risk Assessment, 2015, Department of the Treasury of the United States, Washington, D.C.

Table 6 presents the results of equations (5) and (6) for the probability that a terror attack takes place in division d at time t. Column (1) reports the first stage, in which I regress the donations over the interaction between the price of silver and the religious affiliation of a terrorist group, as presented by equation (6). Column (2) shows the reduced-form estimates, in which I regress the Terror Dummy over the instrument given by the interaction between the Sunni organisation dummy, $Sunni_o$, and the price of silver, $Silver_t$. Both results are in line with the findings of Table 1, for donations, and Table 3 for attacks. Column (3) shows the OLS regression, in which the probability of a terror attack is regressed on the donations variable, as displayed by equation (5). This elasticity indicates that a 100% increase in the donations received by an organisation leads to a 3.4% increase in the probability of a terrorist attack, corresponding to 45% of a standard deviation. This effect is significantly higher in column (4), in which I combine equations (5) and (6) and present the IV estimates of the elasticity of terrorist attacks to financing. In this case, the elasticity of attacks to donations increases by almost 50%, with the effect totalling a 5% increase and corresponding to 67% of a standard deviation. In the row titled 'Elasticity', I calculate the elasticity of terrorist attacks to terrorism financing by dividing l_1 by n_2, under the assumption of $n_2 = 0.2$. By comparing the results of columns (3) and (4), it is possible to observe that this elasticity goes from 0.17 under the OLS to 0.25 under the IV.

The point estimate is in line with the findings of Table 7, in which I also report the OLS and IV coefficients for the number of events and casualties. The estimate is more precise for the number of attacks and less precise for the number of casualties, as these are noisier measure of terrorism. In all cases, the OLS coefficient is smaller than IV, reinforcing the result that terrorism financing has an important effect on attacks and offering a quantitative benchmark to evaluate the gains from disrupting the financial networks of terrorists.

Table 7: Donations, Number of Attacks and Casualties, OLS and IV

Variables	(1) Attacks Ln(1+N)	(2) Casualties Ln(1+N)	(3) Attacks Ln(1+N)	(4) Casualties Ln(1+N)
	OLS	OLS	IV	IV
Donations	0.036***	0.038***	0.049***	0.045**
	(0.007)	(0.010)	(0.013)	(0.018)
Elasticity	0.18	0.19	0.25	0.23
Division FE	Yes	Yes	Yes	Yes
Organisation FE	Yes	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes
Obs.	2600	2600	2600	2600
Adj. R sq.	0.408	0.340	0.374	0.339
Mean Dep. Var.	0.007	1.107	0.007	1.107
S.D. Dep. Var.	0.083	0.113	0.083	0.113

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is organisation o in division d at quarter-year t. Division, organisation and quarter-year fixed effects are present in all columns, and standard errors are clustered at the division and organisation. The dependent variables are the natural logarithm of the number of terrorist attacks in columns (1) and (3), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in column (2) and (4), Casualties $Ln(1+N)$. These are regressed over a variable measuring the amount of donations, Donations, through an OLS in columns (1) and (2) and an IV in columns (3) and (4). The IV estimation exploits the first stage presented in column (1) of Table 6, in which donations are regressed over a dummy taking unit value for Sunni organisations, $Sunni_o$, and the price of silver at the announcement of the Zakat threshold, $Silver_t$. The row titled "Elasticity" measures the elasticity of terrorist attacks to terrorism financing and is calculated by dividing the point estimates in columns (1) to (4) by 0.2, as described in the text. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

4.2 Measuring Terrorist Recruitment

High silver prices induce a positive funding shock to terrorist organisations: as charities receive more donations, some of them channel these funds towards illicit activities. The result on the funding shock suggests that terrorist organisations face non-trivial costs in transferring and storing funds. Therefore, even small increases in their assets lead to a significant and immediate increase in attacks. In this section, I verify a related mechanism: whether such positive funding shocks generate more attacks in periods of stronger recruitment by terrorist organisations. This result is consistent with a production function of terrorist attacks exhibiting a complementarity between human and financial capital. Measuring the "recruitment" of terrorist or criminal organisations is an inherently hard task because it is distinctively unobservable. For this reason, I adopt an innovative method relying on novel data from the dark web to measure terrorist recruitment.

This is an alternative internet network requiring a specific software for its access/navigation and is unavailable through browsers or search engines. The most common dark web networks are accessible through TOR ('The Onion Router'). Websites, fora and platforms on the dark web contain discussions on sensitive topics and the trade of illicit material: 17% of the content is adult-only, 15% drug-related, 9% political, 4% weapons, etc. (Biryukov et al. (2014)).

To analyse a consistent and impartial reference, I access data from the Dark Web Forums published by the AI Lab Dark Web project of the University of Arizona. This database contains more than 2.5 million messages from 7 message boards containing messages in English between 2000 and 2012. Appendix D contains a detailed report on the platforms used in the analysis and their characteristics. Each dataset contains the universe of messages exchanged on platforms and fora in which members sympathise with extremist and terrorist groups or the concept of war against the unfaithful (Jihad). This is a rich database that includes a set of specific characteristics per forum: the thread under which the topic is under discussion, the date/time of each message, the name of the member as registered on the platform and the content of each specific message.

I measure terrorist recruitment by following a method in the computer science literature by Scanlon and Gerber (2014) on the automatic detection of cyber recruitment by violent extremists. The authors apply this exclusively to one platform in English (Ansar Al-Jihad Network), while I collect also data from six additional Jihadi message boards and replicate and expand their method.

The following steps lead to construct an algorithm identifying whether a post presents recruitment material:

1. I use the same sample of random messages from the Ansar Al-Jihad Network used by Scanlon and Gerber (2014);

2. Two judges in the US were asked to separately and independently evaluate whether each post presents the intent to recruit violent extremists to some group or movement;

3. The judges marked each post with a dummy for *'contains violent extremist recruitment'* (11%);

4. I create an algorithm using supervised learning and natural language processing to back out the textual regularities of "recruitment" posts using a support vector machine algorithm (SVM); and

5. The algorithm codes a recruitment dummy to all messages and an additional dummy for recruitment messages that specifically focus on Pakistan.

This method replicates the work of thousands of judges in marking each post with a dummy for recruitment. To provide some anecdotal material, in Appendix F I report two messages that are graded as containing recruitment material by the algorithm. The performance of the algorithm is satisfactory, as it achieves an 82% success rate. It is initially trained on 80% of the original posts and marks correctly 82% of the remaining posts, not used for the initial training.

This constitutes an innovative way to measure terrorist recruitment, which may offer a useful method for future studies involving the use of experts in assessing third-party material. However, it is important to underline that this is a specific measure of recruitment, and there exists alternative channels of recruitment beyond this specific record (e.g., recruitment through social media, interaction in public spaces, schools and religious events). At the same time, it is plausible that these measures are correlated, and this indicator is likely to capture the ability of terrorist groups to reach out to new recruits across various platforms and locations over time.

I define a measure of recruitment intensity as the ratio between the number of posts identified as recruitment in quarter-year t, $Recruitment\ Messages_t$, and the total number of posts in the period, $Total\ Messages_t$; $Recruitment_t = \frac{Recruitment\ Messages_t}{Total\ Messages_t}$. To capture a measure that is more closely related to this specific setting, I focus on recruitment posts that specifically mention Pakistan, which may better proxy the specific recruitment intensity.

Table 8 reports the summary statistics on five key variables collected through the previous exercise: the number of messages exchanged on such Jihadist fora, the number of recruitment messages and those explicitly mentioning Pakistan, and the recruitment intensity considering both the global recruitment messages and those specific to Pakistan. To measure this variable, I aggregate the information on all messages for each quarter-year in which such information is available: 42 periods, from the second quarter of 2002 to the second quarter of 2012, respectively. The average number of messages per quarter-year is 60,137, with a very high standard deviation and a large range. The algorithm measures 3,291 recruitment messages per period (5.8%) and with a standard deviation that is very high, yet lower than for the overall number of messages. Among these messages, only 665 on average explicitly discuss Pakistan (1.1%) and are used in the following empirical analysis.

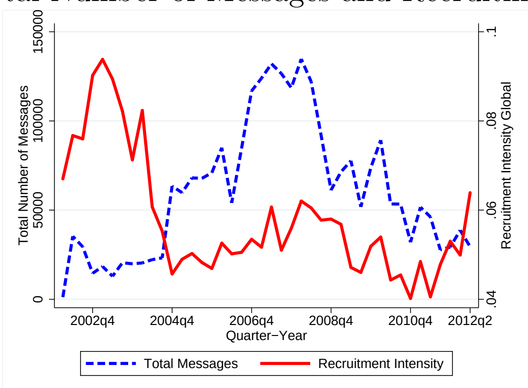
Figure 6 reports the evolution over time for the number of messages and recruitment intensity between 2002 and 2012. The overall number of messages is reported with a dashed blue line, while the intensity of recruitment through a solid red line. It is interesting to note the sharp increase in the number of messages around 2004, with a peak activity between 2006 and 2008, and then a slow decline as more and more messages move towards encrypted mobile apps. Interestingly enough, recruitment intensity seems to move inversely to the overall number of messages: high in periods of low number of messages, with an average of 8% before 2004, and lower in periods of many messages, with a mean of 5% from 2004 onward.

Table 8: Summary Statistics on Jihadist Messages and Recruitment

Variable	(1) Obs.	(2) Mean	(3) S.D.	(4) Min	(5) Max
Number of Messages	42	60137	37262	1192	134728
Number of Recruitment Messages	42	3291	2058	80	8357
Number of Recruitment Messages on Pakistan	42	665	588	14	2369
Recruitment Intensity	42	0.058	0.013	0.040	0.093
Recruitment Intensity on Pakistan	42	0.011	0.006	0.003	0.026

Notes: This table presents the summary statistics for terrorist recruitment. It shows the overall number of messages exchanged in the platforms per quarter-year, the number of messages rated by the algorithm as containing recruitment material and the number of messages rated by the algorithm as containing recruitment material and explicitly mentioning Pakistan. It also offers summary statistics on the recruitment intensity defined as the ratio between the number of recruitment messages and total number of messages and finally the recruitment intensity on Pakistan, defined as the total number of recruitment messages on Pakistan divided by the overall number of messages. The information contained here is based on seven English-speaking platforms presented in Appendix D.

Figure 6: Total Number of Messages and Recruitment Intensity



Notes: This picture shows the evolution of the total number of messages through the blue dashed line (left y-axis) and the measure of recruitment intensity through the solid red line (right x-axis). Both of these measures are calculated using the universe of messages from English-speaking platforms.

Having access to this information, I expand the model presented in equation (4)

$$Terror_{oct} = g_1 Sunni_o \times Silver_t + g_2 Sunni_o \times Ramadan_t +$$

$$+ g_3 Sunni_o \times Silver_t \times Ramadan_t + g_4 Sunni_o \times Recruitment\ Intensity_{t-1} +$$

$$+ g_5 Sunni_o \times Silver_t \times Recruitment Intensity_{t-1} + g_6 Sunni_o \times Ramadan_t \times Recruitment Intensity_{t-1} +$$

$$+ g_7 Sunni_o \times Silver_t \times Ramadan_t \times Recruitment\ Intensity_{t-1} + \iota_o + \iota_{ct} + \varepsilon_{oct} \tag{8}$$

and equation (8) regresses the probability of a terrorist attack by organisation o in city c at time t on the same model presented in equation (4) using the Sunni organisation dummy, $Sunni_o$, and embodied by the coefficients g_1, g_2 and g_3. I also introduce all the interactions with the $Recruitment\ Intensity_{t-1}$ variable previously presented, which I standardize to simplify the coefficient interpretation. This is lagged by one period and consider predetermined at the time of the uncertain financial transfer. This variable variable captures global fluctuations in the intensity of terrorist recruitment.

Given that I establish the organisation-financing channel in Section 4.1, I do not include the interactions with the Sunni city dummy and absorb all remaining city-time variation through the corresponding fixed effects. As a result, equation (8) evaluates an heterogeneity of the main Zakat effect on terrorism using the recruitment intensity of the previous quarter as given. This estimation should be interpreted as follows: if the coefficient g_7 is statistically different from zero and positive, then the effects of financing on terrorist attacks are stronger in the period in which organisations are particularly effective at recruiting individuals.

In Table 9, the result on the triple interaction between $Sunni_o$, $Ramadan_t$ and $Silver_t$ and the quadruple interaction with $Recruitment_{t-1}$ are positive, statistically different from zero and large. The first three coefficients of this table are analogous to those presented in Table 5, except the triple interaction between $Sunni_o$, $Ramadan_t$ and $Silver_t$, which reports a slightly larger point estimate that is not statistically different from Table 5. This may be due to the fact that while the previous analysis was covering all quarter-years between 1992 and 2015, Table 9 only focuses on the period in which the recruitment variable can be calculated, hence between 2000 and 2012.

Table 9: Terrorism Financing, Recruitment and Attacks

Variables	(1) Probability of a Terrorist Attack	(2)
$Sunni_o \times Silver_t$	0.010	0.007
	(0.028)	(0.026)
$Sunni_o \times Ramadan_t$	-0.000	-0.001
	(0.001)	(0.007)
$Sunni_o \times Silver_t \times Ramadan_t$	0.031***	0.038***
	(0.008)	(0.012)
$Sunni_o \times Recruitment$	0.010	0.011
	(0.010)	(0.010)
$Sunni_o \times Silver_t \times Recruitment$	-0.002	-0.003
	(0.009)	(0.009)
$Sunni_o \times Ramadan_t \times Recruitment$	0.009	0.011
	(0.006)	(0.008)
$Sunni_o \times Silver_t \times Ramadan_t \times Recruitment$	0.025**	0.028**
	(0.012)	(0.013)
Organisation FE	Yes	Yes
City-Quarter-Year FE	Yes	Yes
Organisation - Quarter FE		Yes
Obs.	397,700	397,700
Mean Dep. Var.	0.0009	0.0009
S.D. Dep. Var.	0.0310	0.0310

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is organisation o in city c in quarter-year t. Organisation and city-quarter-year fixed effects are present in both columns, column (2) also includes organisation times quarter fixed effects. Standard errors are two-way clustered at organisation and division. The dependent variable is the standardized probability of a terror attack. This is regressed over a dummy taking unit value for Sunni organisations, $Sunni_o$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$; and a measure of terrorist recruitment intensity, which is lagged by one period in column, $Intensity_{t-1}$. To simplify the interpretation of the coefficients, the price of silver and the recruitment variable are standardised; hence, I subtract the corresponding means across all periods and divide by the standard deviations. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

The most interesting effect comes from analysing the last coefficient of this table, the quadruple interaction between $Sunni_o$, $Ramadan_t$, $Silver_t$ and $Recruitment_{t-1}$, which is the only statistically significant effect among the last four. It implies a positive interaction between the financial shock of the terrorist group (as measured by the interaction between the variables $Sunni_o$, $Ramadan_t$ and $Recruitment_{t-1}$) and the ability to recruit new individuals (as measured by $Recruitment_{t-1}$). This interaction is large and not different from the main effect of the financing coefficient, $Sunni_c \times Ramadan_t \times Silver_t$. Such coefficient embodies a particularly important message for counter-terrorism strategies: a funding shock in periods of intense recruitment, one standard deviation higher, can generate an increase in attack twice as large as under average recruitment.

5 Placebo and Robustness Checks

5.1 Placebo

My identification strategy relies on silver affecting the funding of terrorist organisations through the charity donations at Ramadan and this effect being uniquely associated to the silver-related levy induced by the threshold. The lead-and-lag analysis and the difference-in-difference-in-difference specification provide evidence that silver prices in Sunni-majority cities do not have an effect on terrorism outside the Ramadan quarters. However, it could be argued that this effect may be present in any other Islamic festivity. For example, suppose that the wealth of terrorist organisations is placed in an asset that correlates with commodities during festivities; if this occurs, then an analogous result could take place. It could also be imagined that any other period might lead to the replication of Section 3's results.

In this section, I exploit another Islamic celebration: Eid Adha. This holiday also relies on the lunar calendar and occurs every year. It celebrates the submission of Abraham to God following his attempt to kill his only son, Isaac, and the appearance of angel Gabriel (Jibra'il in the Islamic tradition, also meaning Holy Spirit) to stop this from happening at the last moment. This festivity is home to several festivals and family gatherings and is ideal because it is comparable to the beginning of Ramadan in terms of importance and individual consumption. Because these variables may affect terrorist behaviour or interact with silver prices beyond the levy, I can then use this celebration to replicate the difference-in-difference-in-difference model presented by equation (3) and Table 3 and evaluate the following model

$$Terror_{ct} = g_1 Sunni_c \times Silver_t^{Eid\ Adha} + g_2 Sunni_c \times Eid\ Adha_t +$$

$$+ g_3 Sunni_c \times Silver_t^{Eid\ Adha} \times Eid\ Adha_t + \iota_c + \iota_t + r_{ct}$$

In this expression I regress the previous terror variables (probability of attacks, number of attacks and casualties) on the same variables defined in equation (3), with two important differences: 1) the price of silver in this expression is calculated in the two days before the Eid Adha celebration, $Silver_t^{Eid\ Adha}$, as done for the Zakat threshold; and 2) I define the quarter in which Eid Adha occurs and the subsequent quarter with a dummy, $Eid\ Adha_t$, similarly to what I did for Ramadan.

In addition to the previous model, I also present a specification that includes both the Ramadan and Adha specifications

$$Terror_{ct} = h_1 Sunni_c \times Silver_t^{Ramadan} + h_2 Sunni_c \times Ramadan_t +$$

$$+ h_3 Sunni_c \times Silver_t^{Ramadan} \times Ramadan_t + h_4 Sunni_c \times Silver_t^{Eid\ Adha} +$$

$$+ h_5 Sunni_c \times Eid\ Adha_t + h_6 Sunni_c \times Silver_t^{Eid\ Adha} \times Eid\ Adha_t + \iota_c + \iota_t + s_{ct}$$

Hence, I can directly compare the effects of the two treatments relative to quarters that include neither the Ramadan nor the Eid Adha dummy, which are 23.96% of the sample. In this specification, I separately analyse the Ramadan period by reporting the price of silver at the announcement of the Zakat threshold, $Silver_t^{Ramadan}$, and the Ramadan quarter and following quarter, $Ramadan_t$, and then the corresponding variables for Eid Adha, $Eid\ Adha_t$ and $Silver_t^{Eid\ Adha}$.

Table 10 reports the first specification, in which I cannot reject a zero for neither of the coefficients. Beyond the rejection of the triple interaction due to statistical significance, it is important to note that while the coefficients for the interaction between $Sunni_c \times Silver_t^{Eid\ Adha}$ and $Sunni_c \times Silver_t^{Eid\ Adha} \times Adha_t$ are positive for the probability of a terrorist attack and the number of attacks, these numbers are negative for the number of casualties. This is different from the baseline results of Table 3, in which all of these coefficients were positive. Table 11 directly compares the two periods by exploiting the fact that there are quarters over the 24 years that are not included in either celebration. As is evident from all columns, while the coefficients on the Ramadan variable stay unaffected or become marginally more precise, the coefficients on the Eid Adha celebration cannot be rejected to be statistically different from zero.

Table 10: Eid Adha and Silver

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t^{Eid\ Adha}$	0.00384	0.00448	0.00301
	(0.00292)	(0.00408)	(0.00604)
$Sunni_c \times Eid\ Adha_t$	0.00199	0.000762	-0.00124
	(0.00159)	(0.00157)	(0.00297)
$Sunni_c \times Silver_t^{Eid\ Adha} \times$	0.00196	0.000270	-0.00215
	(0.00227)	(0.00212)	(0.00407)
$Eid\ Adha_t$	(0.00227)	(0.00212)	(0.00407)
City, Quarter-Year FE	Yes	Yes	Yes
Obs.	148320	148320	148320
Adj. R sq.	0.183	0.280	0.226
Mean Dep. Var.	0.0314	0.0311	0.0428
S.D. Dep. Var.	0.175	0.198	0.333

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is city c in quarter-year t. City and quarter-year fixed effects are present in all columns, and standard errors are clustered at the city level. The dependent variables are the probability of a terror attack in column (1), Terror Dummy; the natural logarithm of the number of terrorist attacks in column (2), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in column (3), Casualties $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver two days before the beginning of Eid Adha, $Silver_t^{Eid\ Adha}$; and a dummy taking unit value for the quarter in which Eid Adha takes place and the following quarter, $Eid\ Adha_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 11: Ramadan, Adha and Silver

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t^{Ramadan}$	0.00201	0.000816	-0.000359
	(0.00355)	(0.00342)	(0.00637)
$Sunni_c \times Ramadan_t$	0.00322**	0.00149	0.00168
	(0.00157)	(0.00147)	(0.00255)
$Sunni_c \times Silver_t^{Ramadan} \times$	0.00700***	0.00469**	0.00751**
$Ramadan_t$	(0.00221)	(0.00203)	(0.00365)
$Sunni_c \times Silver_t^{Eid\ Adha}$	-0.00111	0.00166	0.000104
	(0.00428)	(0.00482)	(0.00838)
$Sunni_c \times Adha_t$	-0.00111	0.00166	0.000104
	(0.00428)	(0.00482)	(0.00838)
$Sunni_c \times Silver_t^{Eid\ Adha} \times$	0.000979	-0.000384	-0.00325
$Adha_t$	(0.00231)	(0.00220)	(0.00414)
City, Quarter-Year FE	Yes	Yes	Yes
Obs.	148320	148320	148320
Adj. R sq.	0.183	0.280	0.226
Mean Dep. Var.	0.0314	0.0311	0.0428
S.D. Dep. Var.	0.175	0.198	0.333

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is city c in quarter-year t. City and quarter-year fixed effects are present in all columns, and standard errors are clustered at the city level. The dependent variables are: the probability of a terror attack in column (1), Terror Dummy; the natural logarithm of the number of terrorist attacks in column (2), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in column (3), Casualties $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t^{Ramadan}$; a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$; the price of silver two days before the beginning of Eid Adha, $Silver_t^{Eid\ Adha}$; and a dummy taking unit value for the quarter in which Eid Adha takes place and the following quarter, $Eid\ Adha_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

5.2 Robustness Checks

In this section, I extend the previous results and explore a number of potential alternative factors and interpretations. All of the results presented in this section are reported in Appendix G.

The first four re-examine the key results presented in Table 3 on the relation between local level financing and attacks. I show their robustness to additional information on city-level seasonality and state-specific trends. Then, I verify that silver prices account for most of the variation by replacing the silver variable with time fixed effects and highlight that neither silver nor other metallic commodities (e.g., gold, tin, copper) affect terrorism outside the Ramadan period. Finally, by merging this dataset with the geocoding of mines in Pakistan, I show that the increase in attacks is indistinguishable between cities in proximity of mines and cities distant from them. In the second set of checks, I show that the findings of Table 5 on the supply of terrorism are robust to the alternative coding of two terrorist groups, which may be controversial, and taking into account issues of common support across Sunni and non-Sunni terrorist groups. Finally, I study whether changes in religiosity may change at Ramadan and correlate with silver prices.

First, given that Ramadan begins in different quarters across years, I can further exploit this empirical design to remove seasonality. On the one hand, I am already controlling for quarter-year fixed effects that remove any common shock that affects all cities in every quarter of every year (hence including the country-wide seasonality). On the other hand, I can further refine this result by controlling for the city-specific seasonality by including an interaction between the city fixed effect and a quarter fixed effect (that takes one for January–March, two for April–June, etc.). This adds an additional layer of 6,180 fixed effects (1,545 city fixed effects times 4 quarter fixed effects) that allow to net out possible local confounding factors (e.g., local agricultural cycle, local rain season, etc.), which may independently affect terrorism via income shocks. Table 17 presents these results: the coefficients do not react, neither in sign nor in magnitude. Only the coefficient on the triple interaction in column (4), which was marginally significant at 10%, slightly exceeds this level.

Second, I deepen the set of common shocks that are removed. While in Table 3, I remove shocks common to all Pakistani cities over time through the time fixed effects. In Table 18, I remove state-specific time-varying common shocks by adding a state $\times$ quarter-year fixed effect. This is important if there is a concern that the main results are driven by a specific set of cities that are hit by repeated and state-specific shocks. As Table 18 highlights, the results are in line with Table 3 and 10; again the only coefficient that marginally changes is the triple interaction on the number of wounded, which was marginally significant in Table 3 and is now above the 10% level.

Third, I replicate the results of Table 3 and replace the triple interaction with an interaction between the Sunni-majority dummy, the Ramadan dummy and a set of quarter-year fixed effects instead of silver. I subsequently verify that silver is highly correlated with the resulting coefficients and explain the majority of the variation; this parallels the work of Crost et al. (2016)

with Cavendish banana prices and conflict intensity in the Philippines. Instead of equation (2), I estimate

$$Terror_{ct} = \beta\, Sunni_c \times Silver_t + \sum_{j=1}^{96} \theta_j Sunni_c \times Ramadan_t \times \iota_t + \iota_c + \iota_t + \varepsilon_{ct} \qquad (9)$$

in which the coefficients θ_j capture the differential probabilities of a terrorist attack in Sunni-majority cities during Ramadan quarters across the different quarter-year periods. If silver prices affect these probabilities, then the θ_j coefficients should match the evolution of silver prices. Figure 10 plots θ_j coefficients from equation (9) next to the time series of silver prices, on the left panel, and their correlation through a scatterplot, on the right. The left panel shows that the coefficients and silver evolve similarly over time. This is clearer in the scatter plot that illustrates their correlation, which is high (0.51) and statistically different from zero at less than 1%. These two pieces of evidence point towards silver being the key driver of the increase in terrorist attacks observed in Table 3 and throughout this paper.

Forth, I show that the role of silver prices in promoting terrorist attacks are driven by the specific structure of the Zakat levy and not concurrent channels related to silver prices. I already presented results on the Eid Adha placebo, showing that silver prices in this period do not affect terrorist attacks. In addition to this, Table 19 provides additional evidence that neither silver nor other metallic commodities (e.g., gold, tin, copper) have a differential effect in Sunni-majority cities on terrorist attacks outside of Ramadan. To do this, I replicate the structure of equation (3), restricting my sample to exclude the Ramadan quarters and combining the time-series variation in different commodity prices with the cross-sectional variation in whether a city is Sunni. The results point towards both negligible magnitudes for all commodities and the inability to reject a zero under all specifications.

In addition to this, I verify that the results of Table 3 are not driven by the proximity to mines. It could be argued that shock to silver prices may increase the local capturing of mines (or the associated rents) and result in more terrorist attacks. To verify this, I collect data on mineral deposit from the US Geological Survey (USGS) database, and Figure 9 in Appendix C reports the geolocation. Cities are considered to be exposed to mining activities if one or more deposit lies within a circle centred at the city's coordinates with a radius of 50 kilometres. As a result, I classify each city as being within a 50 km radius from a mine with a dummy: there are 492 cities that are in proximity of a mine, while 1,053 are not. I run equation (3) on two separate samples depending on the value of this dummy and report it in Table 20. Panel A shows the results on the sample of cities in proximity of a mine, while Panel B for cities that are further than 50 km. The results on the triple interaction show that the increase in terrorist attacks is statistically different from zero only in cities that are not near mines. However, the difference in statistical precision seems to be entirely due to the lower power of Panel A given by the smaller number of cities. In fact, by comparing the point estimates of these two panels, it emerges that the results are not different according to the proximity to a mine, which excludes the possibility of an increase in terrorist attacks when silver prices are high at Ramadan and Sunni cities due to local conflict to secure the control of mines or mine-related activities.

Fifth, Table 5 shows that among the 20 terrorist organisations that are followed across 485 cities in 96 quarter-years, 15 are Sunni and only 5 are non-Sunni. As a result, it may be disputed that the results of Table 5 are due to a possible lack of action by non-Sunni groups in certain years, implying a lack of common support. In Figure 11, I plot the time series of the log number of terrorist attacks by Sunni groups (solid blue line, on left y-axis) and by non-Sunni groups (dashed red line, on right y-axis) across Pakistan from1992 to 2015. This picture highlights that the evolution of Sunni and non-Sunni groups does not seem to particularly differ, except for the years 2006, 2007, 2008 and 2009. To show that the results of Table 5 are not driven by this period in which non-Sunni groups are not active, I replicate the table by excluding those years, and as Table 21 shows, the results are unaffected in significance, sign and point estimate.

Sixth, the classification of terrorist groups into Sunni and non-Sunni was particularly labour intensive, as it required reading the documentation of various sources per each group and matching hundreds of small organisations to their corresponding umbrella organisation. The list of groups presented in Table 16 offers an aggregation and is documented in detail in Appendix D. Among the groups described in that table, there are two organisations whose classification may be disputed: the Muttahida Qami Movement and the Tribesmen Group. The former is a political group, with no particular references of sectarian or religious objectives, and as a result has been set as non-Sunni. The latter operates in the north of the country, in which the majority of the Muslim population professes the Shia school and there are many Animist-majority cities and groups, leading to a non-Sunni classification. However, it may be argued that both groups have a disputable classification or may present a non-negligible share of Sunni operatives. As a result, Table 22 replicates the results of Table 5 for column (1) and (3) in the following two scenarios: 1) I recode both groups as Sunni, and columns (1) and (2) of Table 22 report these coefficients—the point estimates are slightly larger but marginally less precise; and 2) I exclude both groups, and columns (3) and (4) of Table 22 display these results—also in this case, the magnitudes are slightly higher, but the results are not statistically different than those in Table 5.

Seventh, it may be argued that despite the city-time fixed effect and the lack of a wage response at Ramadan, there may be another factor driving my results: religiosity. To verify the extent of this alternative channel, I exploit a particular element that has been popular in the last 10 years in Pakistan, like other parts of the world: the use of smartphones to pray. Some mobile phone producers offer automatic reminders to pray five times per day[21] and there are several apps that offer bundles of reminders, prayers to read and other features[22]. Most people use the search engine services of Google to look for the words of the prayers, the direction to pray (toward Mecca) and other religious readings. As a result, I download data from Google Trends for all available years (2013-2016) on typical prayers and directions that individuals download before the Mosque. These are: a) "Dua". a spontaneous prayer of invocation to get requests or supplications; b) "Qibla", the direction of the pray; c) "Ḥadīth" is a story on the life of the Prophet and constitutes the "Sunna" (the second source of law, after the "Quran"); d) "Ṣalā", is the compulsory Islamic prayer to be recited five times daily. Therefore, I replicate the regression presented in Table 3 and verify whether these indices change at Ramadan periods, in Sunni divisions and with silver prices. As Table 23 highlights, the triple interaction is not only statistically indistinguishable from zero, but also negative in sign. Therefore, while it is difficult to observe a precise and high-frequency measure of religiosity, my results are suggestive that we cannot reject a zero with the current available evidence.

[21] Refer to this article on Huawei offering this service https://www.itp.net/616392-huawei-adds-prayer-time-feature-to-smartphones

[22] Refer to the app Muslim Prof, available on the Apple App Store https://apps.apple.com/gb/app/muslim-pro-azan-quran-qibla/id388389451

6 Concluding Remarks

This paper provides quantitative evidence on the link between terrorism financing, recruitment and attacks. My findings are in line with the existence of substantial costs in managing funding for terrorist organisations. Pakistan offers the ideal setting to verify this relation because of a unique natural experiment that induces exogenous variation in a specific source of terrorism financing over time and across cities due to a Sharia-compliant obligation. I build a variety of novel databases, in particular, a panel that follows 1,545 cities over 96 quarter-year periods between 1992 and 2015. Through this, I verify that cities with exogenously higher terrorism financing experience more terrorist attacks. The increase in attacks take place exclusively through capital-intensive attacks (e.g., bombings and chemical, biological and radiological weapons).

I introduce two methods to investigate the underlying mechanism behind this natural experiment and advance the identification of an organisation-financing channel. First, I set up a panel that follows 485 cities and 20 terrorist organisations over 96 quarter-year periods. This novel method allows dissecting the demand and supply of terrorist attacks by 1) studying the within-city and within-organisation variation, and 2) classifying each organisation as being a potential recipient of such exogenous increase in terrorism financing. I find that the entire effect of terrorism financing on terrorist attacks is due to a temporary increase in the supply of terrorist attacks by extremist organisations. This source of variation, combined with the individual data on charity donations, leads to estimating the elasticity of terrorist attacks to financing, both through an OLS and IV approach. The OLS estimation leads to a 0.17 coefficient, while the IV estimate is larger, 0.25, and implies a significantly stronger impact of finance on terrorism. Second, I measure terrorist recruitment by analysing data from the dark web on Jihadist fora using a machine-learning algorithm. Through this procedure, I verify that in periods of higher terrorist recruitment, there is a significantly larger effect of terrorism financing on attacks. The result is compatible with a complementarity between labour and capital in the production function of terrorist attacks.

These results provide an original insight to the literature on the organisational economics of terrorist and violent groups, as well as informing policymakers on a key element behind counter-terrorist strategy and the oversight of charitable organisations. The elasticity of terrorist attacks to financing shows that the funding of terrorist organisations plays a key role. These findings imply that financial counter-terrorism can lower attacks and casualties; however, quantifying its effectiveness is a topic left for further research. Finally, other settings could benefit from two methods explored in this paper. First, the organisation-city variation may be useful in the conflict and violence literature to deepen the understanding of the mechanisms driving such events. Second, the machine-learning approach may allow future researchers to identify and study various issues, for instance, cybercrime and illicit financial transactions.

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Appendix

A Additional Elements on the Theoretical Framework

Perfect Substitutability Under complete substitutability between capital and labour, the production function can be expressed by $y_c = k_c + l_c$. The capital allocation problem of cell c is unchanged and in fact:

$$\max_{k_c} k_c + l_c + (1+\pi)(1-\tau)k_O$$

$$s.t. \quad pK = k_c + k_O$$

which leads to the same solutions as in the case without labour

$$k_c^* = \begin{cases} pK & if \quad (1+\pi)(1-\tau) < 1 \\ 0 & if \quad (1+\pi)(1-\tau) \geq 1 \end{cases} \quad and \quad k_O^* = \begin{cases} 0 & if \quad (1+\pi)(1-\tau) < 1 \\ pK & if \quad (1+\pi)(1-\tau) \geq 1 \end{cases}.$$

This result generates two implications emerging from the perfect substitutability:

1. the availability of labour is independent for the capital allocation problem of cell c;
2. the elasticity of terrorist attacks to terrorism financing does not respond to recruitment l_c.

Perfect Complementarity In this case the production function can be expressed by a Leontief function, for example $y_c = \min\{k_c, l_c\}$. Under $l_c \geq k_c$, the previous results are unchanged. However, if $l_c < k_c$, then the optimal capital allocation becomes

$$k_c^* = \begin{cases} l_c & if \quad (1+\pi)(1-\tau) < 1 \\ 0 & if \quad (1+\pi)(1-\tau) \geq 1 \end{cases} \quad and \quad k_O^* = \begin{cases} pK - l_c & if \quad (1+\pi)(1-\tau) < 1 \\ pK & if \quad (1+\pi)(1-\tau) \geq 1 \end{cases}.$$

Depending on the relation between k_c and l_c, there can be either a replication of the previous results in which the capital allocation is independent of labour (if there is abundance of recruited individuals, hence $l_c \geq k_c$) or the opposite case, in which the capital allocation changes one-to-one with labour (under scarce recruitment, hence, $l_c < k_c$).

Partial Complementarity - Terrorism Financing and Terrorist Attacks As shown in section 2.1.1 the optimal number of terrorist attacks in the presence of partial complementarity between labour and capital is expressed by

$$y_c^* = \left(\frac{l_c}{A(\pi, \tau, \alpha) + l_c} pK \right)^\alpha l_c^{1-\alpha}$$

this is increasing in K and in fact

$$\frac{\partial y_c^*}{\partial K} = \alpha \left(\frac{p}{A(\pi, \tau, \alpha) + l_c} \right)^\alpha K^{\alpha-1} l_c > 0.$$

I can also show that this first derivative is itself increasing in the availability of local recruits, which implies a complementarity between labour and capital

$$\frac{\partial^2 y_c^*}{\partial K \partial l_c} = \alpha \left(\frac{p}{A(\pi, \tau, \alpha) + l_c} \right)^\alpha K^{\alpha-1} - \alpha^2 \frac{p^\alpha}{[A(\pi, \tau, \alpha) + l_c]^{-\alpha-1}} K^{\alpha-1} l_c$$

$$\frac{\partial^2 y_c^*}{\partial K \partial l_c} = 1 - \frac{\alpha}{[A(\pi, \tau, \alpha) + l_c]} l_c$$

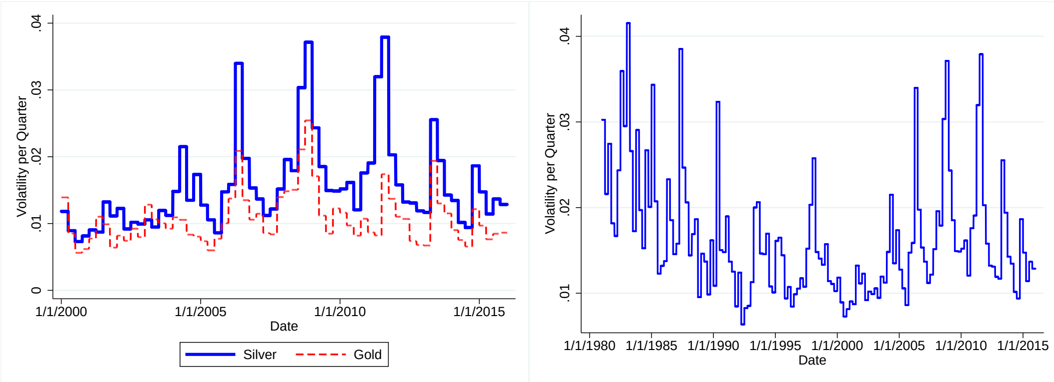
recalling that $A(\pi, \tau, \alpha) = [(1+\pi)(1-\tau)]^{\frac{1}{1-\alpha}}$, then

$$\frac{\partial^2 y_c^*}{\partial K \partial l_c} = [(1+\pi)(1-\tau)]^{\frac{1}{1-\alpha}} + (1-\alpha) l_c > 0$$

which is always unambigously positive.

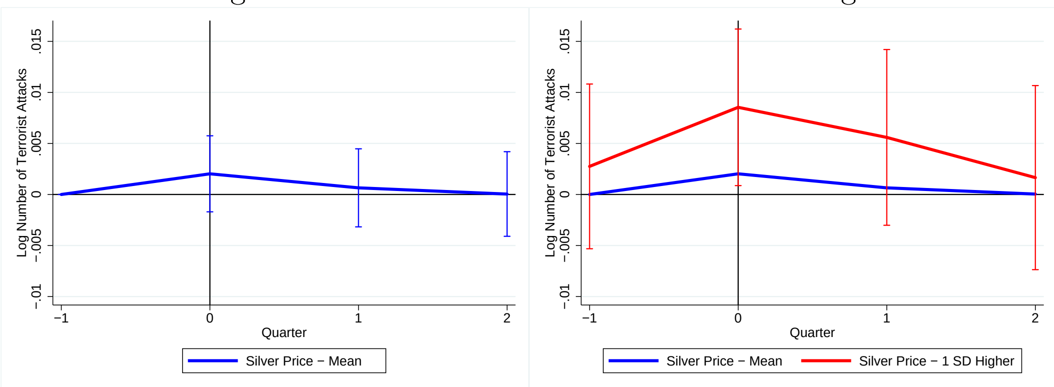
B Additional Material on the Empirical Model

Figure 7: The Volatility in Silver and Gold Prices



Notes: The left panel compares the volatility in the price of silver and gold calculated for every quarter between 2000 and 2015. The volatility is defined as the standard deviation of the daily difference in the natural logarithm of each commodity (silver and gold) in a quarter. Between 2000 and 2015, the average volatility of silver is 0.0154, while for gold it is 0.0106. Gold is 43% less volatile than silver, with this difference being -0.0067 and statistically different from zero below 1 percent. The right panel reports the same measure of volatility only for silver between 1980 and 2015 and showing large fluctuations in silver volatility over time.

Figure 8: Number of Attacks and Lead-and-Lag



Notes: Both panels show the differential evolution in the log number of terrorist attacks between Sunni-majority and non Sunni-majority cities across different quarters around Ramadan. The x-axis measures the quarter prior to Ramadan (-1), of Ramadan (0), following Ramadan (1) and two quarters following Ramadan (2). The vertical line in 0 corresponds to the quarter of Ramadan. The left panel shows the log number of terrorist attacks in a Sunni-majority city when silver prices are at the mean, while the right panel exhibits the same coefficients when silver is one standard deviation above the mean. Equation 2 presents the equation behind these panels and Table 12 contains the corresponding coefficients. The bars around each observation represent the 95% confidence interval and standard errors are clustered at city level.

Table 12: The Probability and Number Terrorist Attacks - Lead and Lag Coefficients

Variables	(1) Terror Dummy	(2) Number of Attacks Ln(1+N)	(3)
$Ramadan\, Quarter\, 0 \times Sunni_c$	0.00252	0.00232	-0.00110
	(0.00215)	(0.00203)	(0.00371)
$Ramadan\, Quarter\, 1 \times Sunni_c$	0.00300	0.00122	-0.00277
	(0.00217)	(0.00221)	(0.00370)
$Ramadan\, Quarter\, 2 \times Sunni_c$	-0.000539	-0.000141	-0.00610
	(0.00232)	(0.00230)	(0.00422)
$Ramadan\, Quarter\, -1 \times Sunni_c \times Silver_t$	0.00255	0.00260	0.00264
	(0.00303)	(0.00407)	(0.00588)
$Ramadan\, Quarter\, 0 \times Silver_t \times Sunni_c$	0.00996***	0.00773*	0.00935*
	(0.00302)	(0.00415)	(0.00500)
$Ramadan\, Quarter\, 1 \times Silver_t \times Sunni_c$	0.00761**	0.00618	0.00222
	(0.00329)	(0.00466)	(0.00638)
$Ramadan\, Quarter\, 2 \times Silver_t \times Sunni_c$	-0.000153	0.00202	-0.00498
	(0.00360)	(0.00483)	(0.00698)
City FE	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes
Obs.	148320	148320	148320
Adj. R sq.	0.183	0.265	0.226
Mean Dep. Var.	0.0314	0.0311	0.0428
S.D. Dep. Var.	0.175	0.198	0.333

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is a city c in quarter-year t. City and Quarter-Year fixed effects are present in all columns and standard errors are clustered at the city level. The dependent variables are: the probability of a terror attack in Column (1), Terror Dummy and the natural logarithm of the number of terrorist attacks in Column (2), Attacks $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; a series of dummies taking unit value for the quarter before Ramadan (-1), Ramadan (0), one quarter after Ramadan (1) and two quarters after Ramadan (2). The omitted category is the quarter before Ramadan for Sunni-majority cities given an average price of silver. In order to simplify the interpretation of the coefficients, the price of silver is standardized, hence I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 13: Terrorist Attacks, Sunni Cities and Silver - Poisson Estimation

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t$	0.0920	0.120	0.071
	(0.0596)	(0.0732)	(0.0792)
$Sunni_c \times Ramadan_t$	-0.0624	-0.0905	-0.0745
	(0.0643)	(0.0558)	(0.0711)
$Sunni_c \times Silver_t \times$ $Ramadan_t$	0.174***	0.146***	0.143**
	(0.0507)	(0.0430)	(0.0562)
City FE	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes
Obs.	148320	148320	148320
Mean Dep. Var.	0.0314	0.0311	0.0428
S.D. Dep. Var.	0.175	0.198	0.333

Notes: This table presents conditional fixed-effect Poisson estimates, where the unit of observation is a city c in quarter-year t. City and Quarter-Year fixed effects are present in all columns and standard errors are clustered at the city level. The dependent variables are: the probability of a terror attack in Column (1), Terror Dummy; the natural logarithm of the number of terrorist attacks in Column (2), Attacks $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. In order to simplify the interpretation of the coefficients, the price of silver is standardized, hence I subtract the mean across all periods and divide by the standard deviation. The last two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

C Non-Capital Intensive Attacks, Wages and Mines

Table 14: Non-Capital Intensive Attacks and Silver

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t$	-0.000540	-0.000549	-0.00254
	(0.00184)	(0.00221)	(0.00335)
$Sunni_c \times Ramadan_t$	0.0000	0.000117	0.000483
	(0.00110)	(0.000935)	(0.00183)
$Sunni_c \times Silver_t \times$	0.00192	0.00144	0.00359
$Ramadan_t$	(0.00155)	(0.00126)	(0.00258)
City FE	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes
Obs.	183921	148320	148320
Adj. R sq.	0.125	0.222	0.159
Mean Dep. Var.	0.205	0.0123	0.018
S.D. Dep. Var.	0.403	0.118	0.197

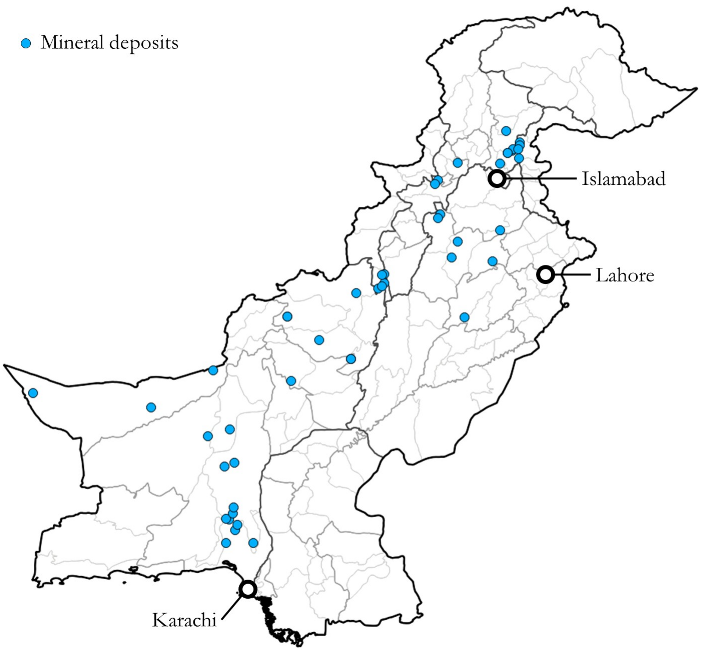
Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is a city c in quarter-year t. City and Quarter-Year fixed effects are present in all columns and standard errors are clustered at the city level.
The dependent variables consider terrorist attacks that are defined "non capital-intensive" which are executed through armed assaults, infrastructure attacks, hijacking, hostage taking. Column (1) reports the probability of a non capital-intensive terror attack, Terror Dummy; the natural logarithm of the number of non capital-intensive terrorist attacks in Column (2), Attacks $Ln(1+N)$; the natural logarithm of the number of terrorist-related casualties in a non capital-intensive attack in Column (3), Casualties $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. In order to simplify the interpretation of the coefficients, the price of silver is standardized, hence I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 15: City Wages, Sunni Cities and Silver

Variables	(1) Unskilled Wage Ln(PKR)	(2) Carpenter Wage Ln(PKR)	(3) Builder Wage Ln(PKR)	(4) Electrician Wage Ln(PKR)
$Sunni_c \times Silver_t$	0.702	0.0986	0.257	0.843
	(0.461)	(0.217)	(0.251)	(0.852)
$Sunni_c \times Ramadan_t$	0.277	0.0200	0.0213	0.418
	(0.209)	(0.128)	(0.133)	(0.411)
$Sunni_c \times Silver_t \times$	-0.665	0.0741	-0.120	0.808
$Ramadan_t$	(0.437)	(0.231)	(0.250)	(0.824)
City FE	Yes	Yes	Yes	Yes
Month-Year FE	Yes	Yes	Yes	Yes
Obs.	1480	1480	1480	1480
Adj. R sq.	0.883	0.936	0.922	0.919
Mean Dep. Var.	6.198	6.703	6.800	4.733
S.D. Dep. Var.	0.198	0.178	0.204	0.317

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is a city c in month-year t. City and Month-Year fixed effects are present in all columns and standard errors are clustered at the city level. The dependent variables are: the monthly wage of an unskilled worker expressed through the natural logarithm of PKR, the monthly wage of a carpenter expressed through the natural logarithm of PKR, the monthly wage of a builder reported through the natural logarithm of PKR and the monthly wage of an electrician expressed through the natural logarithm of PKR. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. In order to simplify the interpretation of the coefficients, the price of silver is standardized, hence I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. Note that the mean wage of the electrician is not reported over the month like the other three categories, but per worked hour. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Figure 9: Mineral Deposits in Pakistan



Notes: This map reports the geo-coding of all mineral deposits in Pakistan, data comes from the US Geological Survey (USGS) database on Major mineral deposits of the World.

D Terrorist organisations and Jihadist Platforms

This appendix describes two sources of data: the religious coding of the 20 terrorist organisations in Appendix C1 and the message boards used to measure the recruitment variable in Appendix C2.

D.1 Terrorist organisations and Religious Coding

This section categorizes the terrorist organisations listed in the Global Terrorist Dataset (GTD). Each organisation has been classified as Sunni-majority or not and the corresponding sources are reported. Because the GTD presents different terrorist groups that are part of larger scale organisations, I also present how terrorist organisations have been agglomerated.

Table 16: List of Terrorist organisations and Religious Affiliation

Sunni organisations
Al-Intiqami al-Pakistani, Baloch Liberation Front
Baloch Liberation Tigers, Baloch Waja Liberation Army
Islamist Extremists Group, Jaish Usama, Jaish as-Saiyouf
Jaish-e-Islam, Jaish-e-Khorasan, Jaish-e-Mohammad
Lashkar-e-Taiba, Majlis-e-Askari, Mutahida Majlis-e-Amal
Sunni Muslim Group, Tehrik-i-Taliban Pakistan

Non-Sunni organisations
Fedayeen Imam Mahdi (Shia)
Muttahida Qami Movement (Non Religious)
Sindhu Desh Liberation Army (Sindh/Hindu)
Sipah-I-Mohammed (Shia)
Tribesmen Group (Tribal - Animists)

Notes: This table presents a list with the religious affiliation of each terrorist group in this sample. Appendix C describes in detail each group and offers material on the classification.

Al-Intiqami al-Pakistani

This terrorist organisation, alternatively referred to as Revenge of Jehadi, Revenge of the Pakistanis and Revenge of the People of Pakistan, is mainly known for its attack against a Christian school in Murree in 2003. Al-Intiqami al-Pakistani is a religious extremist organisation which fosters resentment against western powers. According to The Guardian, the men belonging to Al-Intiqami al-Pakistani are also connected to Lashkar-e-Jhangvi, which is a terrorist organisation promoting Sunni's dominance through the use of violence. Because of the close ties between Al-Intiqami al-Pakistani and Lashkar-e-Jhangvi, I identify the former one as a Sunni organisation.

Sources:

https://terroristprofiles.wordpress.com/page/2/

https://www.nytimes.com/2002/08/07/world/after-pakistan-raid-3-mysterious-suicides.html

https://terroristprofiles.wordpress.com/2011/12/14/al-intiqami-al-pakistani/

https://www.theguardian.com/world/2002/aug/06/pakistan.rorymccarthy

Baloch Liberation Front

This terrorist organisation is a political front and militant group founded by Jumma Khan Marri in 1964 in Damascus, and played an important role in the 1968-1980 insurgency in Pakistani Balochistan and Iranian Balochistan. Baloch Liberation Front's main aim throughout the years has been imposing Balochistan's independence in Pakistan through the wide-spread use of violence. Since the organisation originated in Balochistan and maneuvered most of its attacks from Baloch areas, in which the population is for the most part Sunni, I have coded the organisation as Sunni.

Sources:

http://web.stanford.edu/group/mappingmilitants/cgi-bin/groups/view/457

https://en.wikipedia.org/wiki/Baluch_Liberation_FrontComposition.

The following organisations have been agglomerated to Baloch Liberation Front

- Balochistan Liberation United Front
- Free Balochistan Army
- Lashkar-e-Balochistan
- Balochistan National Army
- Baloch Liberation Army (BLA)

Baloch Liberation Tigers

This terrorist organisation is devoted to the promotion of Balochistan as an independence entity. The organisation has striked most of its attacks in the areas around Quetta. Since the Baloch Liberation Tigers originated in Balochistan and, being Sunni Islam the most prominent religion in the province, this was coded as Sunni.

Sources:

http://www.satp.org/satporgtp/countries/pakistan/Balochistan/2014.htm

Baloch Waja Liberation Army

This terrorist organisation is devoted to the promotion of Balochistan as an independence entity. Following the attacks in 2012, governamental agencies proscribed the movement. Since the Baloch Waja Liberation Army originated in Balochistan and, being Sunni Islam the most prominent religion in the province, this was coded as Sunni.

Sources:

http://www.satp.org/satporgtp/countries/pakistan/Balochistan/2014.htm

http://www.dopel.org/Baluchistan%20Waja%20Liberation%20Army%20(BWLA).htm

Fedayeen Imam Mahdi

The Imam Mahdi is considered by the Twelver Shia Muslims to be the ultimate savior of humankind and a leading religious figure who will bring peace and justice. Its figure is particularly revereed by Shia Muslims and Jamkaran Mosque in Qom (Iran) was built at the order of Muhammad al-Mahdi, known by Shia Muslims as Imam Mahdi. This terrorist organisation is lead by Shia leaders and was involved in various incidents. The New York Times reports the organisation as Shia. Since this organisation is not affiliated with the Sunni stream of Islamism, I have not categorized it as Sunni.

Source:

https://www.nytimes.com/2003/10/08/world/world-briefing-asia-pakistan-violence-after-
html

Islamist Extremists

This group is composed of several unaffiliated attackers who identified with Barelvi and Deobandi beliefs. In spite of the fact that those attacks have not been claimed by a specific organisation, I have categorized the group as Sunni because Barelvi and Deobandi are currents within Sunni Islam.

Sources:

https://en.wikipedia.org/wiki/Barelvi

https://en.wikipedia.org/wiki/Deobandi

Jaish Usama

Jaish Usama, also known as Jaish-e-Usama, is a terrorist organisation devoted to oppose the presence of North Atlantic Treaty organisation (NATO) in Khyber. According to online sources the organisation has ties with Taliban, which is a conglomerate of several terrorist organisation of Sunni majority. Because of those aformentioned ties, I categorized Jaish Usama as a Sunni organisation.

Sources:

https://nation.com.pk/05-Mar-2014/not-bound-to-follow-ceasefire-jaish-e-usama

https://www.highbeam.com/doc/1G1-360573709.html

Jaish as-Saiyouf (Army of Swords)

The Army of Swords is a terrorist organisation primarily operating in Balochistan. It is famous for planning a bombing at a bazar in Loralai. Official sources report that the operation was motivated by women's un-Islamic behavior. Because the organisation primarily operates in Balochistan, in which Sunni Muslims are the undisputed majority, this was categorized as Sunni.

Source:

http://public.tableau.com/views/GlobalTerrorismStaticDashboard/StaticDashboard?%3Aembed=y&%3AshowVizHome=no&%3AshowTabs=y&%3Adisplay_count=y&%3Adisplay_static_image=y

https://www.dawn.com/news/1088301

Jaish-e-Islam

This terrorist organisation mainly operates in Balochistan and has perpetrated several attacks against Shia Muslims starting in 2012. According to the Global Terrorism Database, the organisation operates in compliance with Sunni beliefs. Because of its actions against Shia Muslims, the geographic location of its operations and the reports provided by the Global Terrorism Database, this was categorized as Sunni.

Sources:

http://www.start.umd.edu/gtd/search/IncidentSummary.aspx?gtdid=201406080006

https://tribune.com.pk/story/719308/23-pilgrims-killed-in-taftan-bombing/

http://www.start.umd.edu/gtd/search/IncidentSummary.aspx?gtdid=201212300002

Jaish-e-Khorasan

This terrorist group was originally born in Khorasan, a region of Iran, but it has subsequently spread in neighboring Pakistan regions. The group has strong ties with Al-Qaeda and it operates in compliance with Salafist beliefs which greatly borrow from Sunni ideologies. Because of its ties with Al-Qaeda and its operation under the Salafist ethic code, this was coded as Sunni.

Sources:

https://en.wikipedia.org/wiki/Khorasan_group

https://en.wikipedia.org/wiki/Salafi_jihadism

Jaish-e-Mohammad

This terrorist group is a Deobandi Muslim jihadist organisation, mainly operating in Kashmir. Multiple sources have confirmed Jaish-e-Mohammad's ties with Sunni organisations like the Pakistani Taliban and anti-Shia groups such as the Lashkar-e-Jhangvi, Sipah-e-Sahaba-e-Pakistan, and Al-Qaeda. Because of its adherence to Deobandi principles and its ties with Al-Qaeda, this was coded as Sunni.

Sources:

https://en.wikipedia.org/wiki/Jaish-e-Mohammed

http://web.stanford.edu/group/mappingmilitants/cgi-bin/groups/view/95

Lashkar-e-Taiba

This terrorist organisation mainly operates in Punjab and received funding from Osama Bin Laden. The main aim of Lashkar-e-Taiba is to opposed Pakistan's ruling powers. The organisation rose in the late 1980s as a militant wing of Markaz-ud-Dawa-wal-Irshad, an Islamist organisation influenced by the Wahhābī sect of Sunni Islam. Because of its ties with Markaz-ud-Dawa-wal-Irshad and the support received by Bin Laden, this was coded as Sunni.

Sources:

https://en.wikipedia.org/wiki/Lashkar-e-Taiba

https://www.britannica.com/topic/Lashkar-e-Taiba

http://www.dopel.org/JuD.htmComposition.

The following organisations have been agglomerated to Lashkar-e-Taiba:

- Al-Mansoorian

- Harkatul Jihad-e-Islami

Majlis-e-Askari

This organisation is allegedly connected to the Muttahida Majlis-e-Amal political party, which has proved to uphold Wahhabi believes. This group has been classified as Sunni-majority for two reasons: first, the news has reported connections between Majlis-e-Askari and Pakistani Talibans; second, the organisation is supposedly supported by Muttahida Majlis-e-Amal, a Sunni party.

Sources:

https://tribune.com.pk/story/980401/cross-border-afghan-fire-kills-7-fc-troops/

http://test.outlookindia.com/newswire/story/seven-pak-soldiers-killed-in-cross-border
918293

https://en.wikipedia.org/wiki/Muttahida_Majlis-e-Amal

Mutahida Majlis-e-Amal

This terrorist organisation is a political alliance consisting of ultra–conservative, Islamist, religious, and far-right parties of Pakistan. Mutahida Majlis-e-Amal operates in compliance with principles belonging to Wahhabism, which is a current of Sunni Islamism. The political parties supporting this organisation (Jamiat Ulema-e-Pakistan and Sami ul Haq Group) are of Sunni-majority. Because of its ties with Wahhabism and the endorsement received by Sunni parties, this organisation was coded as Sunni.

Sources:

https://en.wikipedia.org/wiki/Muttahida_Majlis-e-Amal

https://en.wikipedia.org/wiki/Wahhabism

https://www.globalsecurity.org/military/world/pakistan/mma.htm

Muttahida Qami Movement

This terrorist organisation is the operative fringe of Muttahida Qami Movement, a Pakistani political party. The aforementioned party has been recognized as a force capable of mobilizing riots in Pakistan. Amnesty International has accused the movement of supporting violence and fascism. Muttahida Qami Movement has claimed not to side with any specific religion or sect basing its beliefs on secularism and economic development. Because of refusal of political categorization, I have not identified this terrorist organisation as Sunni.

Sources:

https://en.wikipedia.org/wiki/Muttahida_Qaumi_Movement

https://www.trackingterrorism.org/group/muttahida-qami-movement-mqm

https://www.theguardian.com/world/2007/jun/02/uk.pakistan

Composition. The following organisations have been agglomerated to Muttahida Qami Movement:

- Mohajir National Movement

Sindhu Desh Liberation Army

This terrorist organisation strives to impose Sindh's separatism. The Sindhu Desh Liberation Army has started operating in 2003, with the aim of granting to the Sindh region total autonomy. Official law enforcement agencies in Pakistan recognize the movement as a terrorist group. This movement is not classified as Sunni for two reasons: first, Sindhu Desh Liberation Army's operates in Sindh, which is a province without a clear religious majority; second, the movement is interested in promoting Sindh's independence and it is not concerned with establishing a religious supremacy in the region.

Source:

https://en.wikipedia.org/wiki/Sindhudesh_Liberation_Army

Composition. The following organisations have been agglomerated to Sindhu Desh Liberation Army:

- Sindh Liberation Front

Sipah-I-Mohammed

This movement was strong in various Shia communities in Pakistan, and in the majority Shia town of Thokar Niaz Beg ran a "virtual state within a state" in the 1990s. The organisation was born in 1993 with the aim of countering anti-Shia actions in Punjab led by Sipah-e-Sahaba or Lashkar-e-Jhangvi. Because the group's main aim is to promote safeguard of Shia Muslims from attacks planned by Sunni organisations, this was classified as non-Sunni.

Sources:

https://en.wikipedia.org/wiki/Sipah-e-Muhammad_Pakistan

http://dopel.org/SEM.htm

Sunni Muslims

This organisation is composed of various non-affiliated lone-wolves supporting Sunni Islamism. Because its actions were carried out in compliance with Sunni beliefs, we have categorized it as Sunni. The following organisations have been agglomerated to Sunni Muslims:

- Tawheedul Islam
- Tehrik-e-Tuhafaz (Pakistan)
- Brelvi Muslims
- Amr Bil Maroof Wa Nahi Anil Munkir
- Pakistan Muslim League (PML)

Tehrik-i-Taliban Pakistan

Tehrik-i-Taliban Pakistan (TTP), alternatively referred to as the Taliban, is a terrorist group organized as an umbrella organisation of various militant groups based in the northwestern Federally Administered Tribal Areas along the Afghan border in Pakistan. The TTP has close ties with the Afghan Talibans, which is a terrorist group promoting Sunni dominance. The TTP believes in the Pashtunwali, a non-written ethical code belonging to Deobandi Muslims, making the TTP a Sunni organisation.

Sources:

https://en.wikipedia.org/wiki/Tehrik-i-Taliban_Pakistan

http://www.start.umd.edu/baad/narratives/tehrik-i-taliban-pakistan-ttp#_edn15

https://ctc.usma.edu/a-profile-of-tehrik-i-taliban-pakistan/

Composition. The following organisations have been agglomerated to Tehrik-i-Taliban Pakistan:

- Afghan Guerrillas

- Al-Jihad

- Al-Nawaz

- Al-Qaida

- Ansar Wa Mohajir (Pakistan)

- Jamaat Tauhid Wal Jihad (Pakistan)

- Jamaat-ul-Ahrar - Lashkar-e-Islam (Pakistan)

- Lashkar-e-Omar

- Mujahideen Ansar

- Qari Kamran Group

- Tanzeem al-Islami al-Furqan

- Tehrik-e-Khilafat

- Tehrik-e-Nafaz-e-Shariat-e-Mohammadi

- Abdullah Azzam Brigades

- Jamaat Tauhid Wal Jihad (Pakistan)

Tribesmen

This organisation is composed of an unidentified mixture of tribesmen, which practice indigenous religions other than Islam. Tribesmen mainly operates in the Federally Administrated Tribal Areas of Pakistan. Because Tribesmen's actions are inspired by religions other than Islam, I have not categorized the organisation as Sunni-majority.

Composition. The following organisations have been agglomerated to Tribesmen:

- Mazari Tribesmen

- Ujjan Tribe

D.2 Description of Jihadi Message Boards

This appendix provides basic descriptions of the jihadist fora to create the Recruitment dataset. The message boards are hardly accessible and few characteristics for each message board are provided in the following paragraphs.

Ansar1

This is a jihadist message board administrated in English for which little information is currently provided. Ansar1 counts around 382 members, 11,244 different post threads and a total of 29,492 posts.

Gawaher

It is an English administrated forum of medium size. Gawaher is mainly dedicated to discussions on multifarious topics connected to Islam and Muslims. A considerable size of its member are outright supporters of radical Islamic groups. The platform counts 9,269 members and 372,499 posts pertaining to 53,235 different threads.

Islamic Awakening

This platform has been closed down in 2013. The majority of its members lived in the UK and threads were discussed in English. At its closure, the forum counted 3,964 members, who posted 201,287 messages in a total of 32,879 threads.

Islamic Network

This is a small forum created to discuss various topics related to Islam. The topics range from theology to contemporary events and all the threads are administrated in English. Out of the 2,082 active members, there appears to be a concerning chunk openly expressing support for jihadist movements. The site counts 91,874 posts and 13,995 threads.

Myiwc

This is a small forum for Muslim people counting 756 members. On this platform, members have posted a total of 25,016 messages, all in English language, in 6,310 different threads. The topics discussed on Myiwc range from every day Muslim diet to more contentious ones regarding religious wars.

Turn To Islam

This English platform has a total of 10,858 members. The platforms' main purpose is to correct common misconceptions regarding Islam; however radical supporters may occasionally participate to discussions. Turn To Islam counts a total of 335,338 messages and 41,654 threads.

Ummah

This English platform is used to discuss topics such as Islamic life style and social issues. Ummah counts a total of 21,013, 1,491,957 posts and 91,527 threads.

E Two Messages Graded as Recruitment

Message 1

In a conversation commenting the arrest of a member, the following appeared:

"*a*******m a***i g****1 if you need help im your brother and closer then you think. inshallah just ask and i will help you as best as i can inshallah, i must tell you i was with ******* a few days before he was arrested and he knew it was coming. he is doing ok now. bro there are a few brothers out there that are true to Allah and are very close to you.*"

Message 2

Another message with members discussing the joining of militants in Somalia

A***l K**i states: "*Somalia could actually be an ideal base for physical and weapons training... and from there one could join the brothers in the liberation of Mogadishu and from there move on to other Jihadi fronts*"

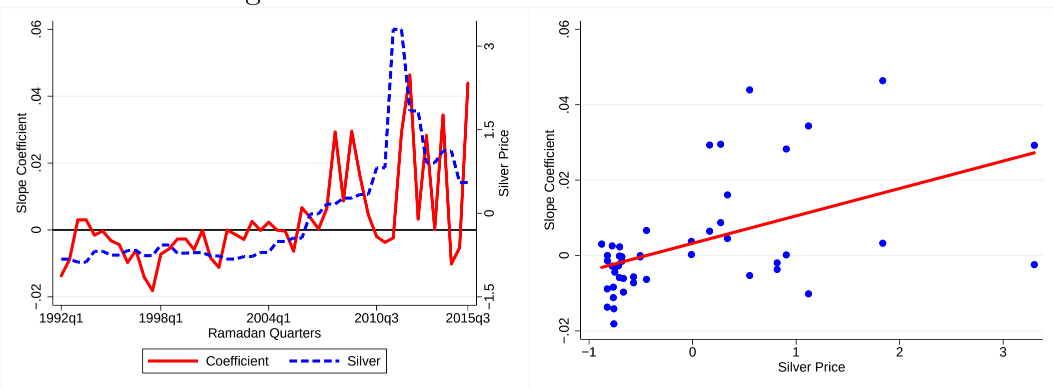
Other member: "*God help me for I am certain that this is the ideal alternative front to Afghanistan in producing terrorism and exporting it to the entire world*"

Others went on to discuss practical details, including how to get there.

Directed towards a militant Islamist website run by foreign jihadist in Somalia with helpful information.

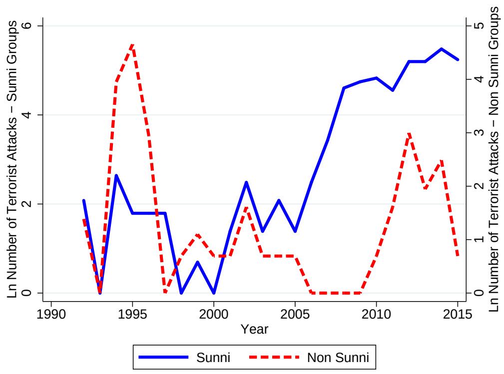
F Tables from the Section "Robustness Checks"

Figure 10: Terrorist Attacks and Silver Prices



Notes: The left panel of this picture shows the evolution of silver prices through the dashed blue line, and the θ_j coefficients from equation (9). These capture the differential probabilities of a terrorist attack in a Sunni-majority city in Ramadan quarters. The right panel shows a scatterplot between the θ_j coefficients from Equation (9) and the price of silver; the correlation between these two is 0.51 and is statistically significant at less than 1%.

Figure 11: Number of Terrorist Attacks for Sunni and Non-Sunni Groups



Notes: This picture shows the evolution in the natural logarithm of one plus the number of terrorist attacks claimed by Sunni and non-Sunni groups between 1992 and 2015. The solid blue line shows the attacks by Sunni groups, as described in Table 16 and reported on the left y-axis; the dashed red line reports the attacks by non-Sunni groups and is described by the right y-axis.

Table 17: Terrorist Attacks, Sunni Cities, Silver and City Seasonalities

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t$	0.00163	0.00237	-0.000833
	(0.00293)	(0.00405)	(0.00578)
$Sunni_c \times Ramadan_t$	0.00393**	0.00218	0.00256
	(0.00170)	(0.00160)	(0.00285)
$Sunni_c \times Silver_t \times$	0.00630***	0.00430**	0.00629
$Ramadan_t$	(0.00243)	(0.00211)	(0.00416)
City, Quarter-Year FE	Yes	Yes	Yes
City × Quarter FE	Yes	Yes	Yes
Obs.	148320	148320	148320
Adj. R sq.	0.170	0.264	0.213
Mean Dep. Var.	0.0314	0.0311	0.0428
S.D. Dep. Var.	0.175	0.198	0.333

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is city c in quarter-year t. City, quarter-year and city × quarter fixed effects are present in all columns, and standard errors are clustered at city level. The dependent variables are the probability of a terror attack in column (1), Terror Dummy; the natural logarithm of the number of terrorist attacks in column (2), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in column (3), Casualties $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 18: Terrorist Attacks, Sunni Cities, Silver and State Time-Varying Shocks

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t$	-0.00144	-0.000861	-0.00644
	(0.00324)	(0.00453)	(0.00667)
$Sunni_c \times Ramadan_t$	0.00337**	0.00197	0.00189
	(0.00169)	(0.00162)	(0.00273)
$Sunni_c \times Silver_t \times$	0.00627***	0.00413*	0.00647
$Ramadan_t$	(0.00236)	(0.00213)	(0.00409)
City, Quarter-Year FE	Yes	Yes	Yes
State × Quarter-Year FE	Yes	Yes	Yes
Obs.	148320	148320	148320
Adj. R sq.	0.191	0.287	0.233
Mean Dep. Var.	0.0314	0.0311	0.0428
S.D. Dep. Var.	0.175	0.198	0.333

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is city c in quarter-year t. City, quarter-year and state ×quarter-year fixed effects are present in all columns, and standard errors are clustered at the city level. The dependent variables are the probability of a terror attack in column (1), Terror Dummy; the natural logarithm of the number of terrorist attacks in column (2), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in column (3), Casualties $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 19: Terrorist Attacks, Sunni Cities and Commodities out of Ramadan

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)
$Sunni_c \times Silver_t$	-0.00579	-0.00322	-0.00565
	(0.00419)	(0.00406)	(0.00576)
$Sunni_c \times Gold_t$	-0.00219	-0.00207	-0.00214
	(0.00700)	(0.00755)	(0.00811)
$Sunni_c \times Copper_t$	0.00320	0.00310	0.00343
	(0.00300)	(0.00308)	(0.00318)
$Sunni_c \times Tin_t$	0.00753	0.00564	0.00456
	(0.00542)	(0.00515)	(0.00670)
City, Quarter-Year FE	Yes	Yes	Yes
Obs.	71070	71070	71070
Adj. R sq.	0.184	0.277	0.306

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is city c in quarter-year t. City and quarter-year fixed effects are present in all columns, and standard errors are clustered at the city level. The dependent variables are the probability of a terror attack in column (1), Terror Dummy; the natural logarithm of the number of terrorist attacks in column (2), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in column (3), Casualties $Ln(1+N)$. These are regressed over a sample that excludes all quarters of Ramadan and the following quarter to verify the lack of a differential effect of commodity prices on terror out of Ramadan. The terror attacks variable are regressed over interactions of the dummy, taking unit value in Sunni-majority cities, $Sunni_c$, with the mean quarterly price of silver, gold, copper and tin. To simplify the interpretation of the coefficients, all of these commodity prices are standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 20: Terrorist Attacks, Silver and Mines

Variables	(1) Terror Dummy	(2) Attacks Ln(1+N)	(3) Casualties Ln(1+N)	(4) Terror Dummy	(5) Attacks Ln(1+N)	(6) Casualties Ln(1+N)
	Panel A Cities within 50km from a mine			Panel B Cities beyond 50km from a mine		
$Sunni_c \times Silver_t$	-0.006	-0.008	-0.015	0.004	0.007	0.005
	(0.005)	(0.009)	(0.013)	(0.003)	(0.004)	(0.006)
$Sunni_c \times Ramadan_t$	0.003	0.002	0.002	0.003	0.001	0.000
	(0.002)	(0.002)	(0.004)	(0.001)	(0.001)	(0.003)
$Sunni_c \times Silver_t \times$	0.007	0.004	0.005	0.007***	0.004**	0.007*
$Ramadan_t$	(0.004)	(0.003)	(0.006)	(0.002)	(0.002)	(0.004)
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	47232	47232	47232	101088	101088	101088

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is city c in quarter-year t. City and quarter-year fixed effects are present in all columns, and standard errors are clustered at the city level. The dependent variables are the probability of a terror attack in column (1), Terror Dummy; the natural logarithm of the number of terrorist attacks in column (2), Attacks $Ln(1+N)$; and the natural logarithm of the number of terrorist-related casualties in column (3), Casualties $Ln(1+N)$. These are regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. Panel A presents the results for cities placed within a 50 km radius from a mine, while Panel B presents results for outside this radius. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 21: Organisations and Attacks—Excluding 2006–2009

Variables	(1)	(2)	(3)
	Probability of a Terrorist Attack		
$Sunni_c \times Silver_t$	-0.0162	-0.0162	
	(0.0117)	(0.0118)	
$Sunni_c \times Ramadan_t$	0.00155	0.00155	
	(0.00361)	(0.00359)	
$Sunni_c \times Silver_t \times Ramadan_t$	0.00434	0.00434	
	(0.00421)	(0.00419)	
$Sunni_o \times Silver_t$	0.0250		0.0250
	(0.0315)		(0.0315)
$Sunni_o \times Ramadan_t$	0.00441		0.00441
	(0.00476)		(0.00485)
$Sunni_o \times Silver_t \times Ramadan_t$	0.0182**		0.0182**
	(0.00810)		(0.00803)
City FE	Yes	Yes	Yes
organisation FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
City-Time FE			Yes
Organisation-Time FE		Yes	
Obs.	931,200	931,200	931,200
Adj. R sq.	0.0162	0.0386	0.0144
Mean Dep. Var.	0.0009	0.0009	0.0009
S.D. Dep. Var.	0.0311	0.0311	0.0311

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is organisation o in city c in quarter-year t. Organisation, city and quarter-year fixed effects are present in all columns. Column (2) also introduces organisation-time fixed effects, while column (3) adds city-time fixed effects. All quarter-years between 2006 and 2009 are not present in this sample due to the few attacks claimed by non-Sunni terrorist groups. Standard errors are two-way clustered at city and organisation. The dependent variable is the probability of a terror attack. This is regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; a dummy taking unit value for Sunni organisations, $Sunni_o$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 22: Organisations and Attacks—Religious Affiliation

Variables	(1)	(2)	(3)	(4)
	Probability of a Terrorist Attack			
	Panel A Sunni Group		Panel B Excluded	
$Sunni_c \times Silver_t$	-0.0147		-0.0177	
	(0.0106)		(0.0119)	
$Sunni_c \times Ramadan_t$	0.000234		-0.000224	
	(0.00323)		(0.00350)	
$Sunni_c \times Silver_t \times Ramadan_t$	0.00400		0.00448	
	(0.00393)		(0.00429)	
$Sunni_o \times Silver_t$	0.0141	0.0141	0.0184	0.0184
	(0.0301)	(0.0301)	(0.0333)	(0.0334)
$Sunni_o \times Ramadan_t$	0.00543	0.00543	0.00520	0.00520
	(0.00430)	(0.00425)	(0.00445)	(0.00437)
$Sunni_o \times Silver_t \times Ramadan_t$	0.0203*	0.0203*	0.0217*	0.0217*
	(0.0115)	(0.0115)	(0.0116)	(0.0116)
organisation FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
City-Time FE		Yes		Yes
Obs.	931200	931200	838080	838080
Adj. R sq.	0.0170	0.0147	0.0170	0.0150
Mean Dep. Var.	0.000968	0.000968	0.00104	0.00104
S.D. Dep. Var.	0.0311	0.0311	0.0322	0.0322

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is organisation o in city c in quarter-year t. Organisation, city-year and quarter-year fixed effects are present in all columns. Columns (2) and (4) add city-time fixed effects. Standard errors are two-way clustered at city and organisation. The dependent variable is the probability of a terror attack. The coding of two terrorist organisations that were reported as non-Sunni in Tables 6 and 7 are changed to Sunni in columns (1) and (2) and excluded from the sample in columns (3) and (4). The dependent variable is the probability of a terror attack. This is regressed over a dummy taking unit value in Sunni-majority cities, $Sunni_c$; a dummy taking unit value for Sunni organisations, $Sunni_o$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.

Table 23: Religiosity, Zakat and Ramadan - Google Trends

Variables	(1) Dua Hits	(2) Qibla Hits	(3) Hadith Hits	(4) Salat Hits)
$Sunni_d \times Silver_t$	-6.229	22.94	35.68	3.151
	(29.19)	(22.92)	(41.99)	(20.07)
$Sunni_d \times Ramadan_t$	35.56	2.027	33.91	46.82
	(37.70)	(32.20)	(34.61)	(31.85)
$Sunni_d \times Silver_t \times$	-38.49	-2.953	-34.10	-30.26
$Ramadan_t$	(42.12)	(36.88)	(47.27)	(35.65)
Division FE	Yes	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes
Obs.	80	80	80	80

Notes: This table presents ordinary least squares (OLS) estimates, where the unit of observation is division d in quarter-year t. Division and quarter-year fixed effects are present in all columns. Standard errors are two-way clustered at division. The dependent variables are index numbers provided by Google Trends on the following topics: 1) ”Dua” is a spontaneous prayer of invocation to get requests or supplications; 2) ”Qibla” is the direction of the pray; 3) ”Ḥadīth” is a story on the life of the Prophet and constitutes the ”Sunna” (the second source of law, after the ”Quran”); 4) ”Ṣalā” is the compulsory Islamic prayer to be recited five times daily. These variables are regressed over a dummy taking unit value in Sunni-majority divisions, $Sunni_d$; the price of silver at the announcement of the Zakat threshold, $Silver_t$; and a dummy taking unit value for the quarter in which Ramadan takes place and the following quarter, $Ramadan_t$. To simplify the interpretation of the coefficients, the price of silver is standardised; hence, I subtract the mean across all periods and divide by the standard deviation. The row Adj. R sq. shows the adjusted R^2 of these regressions, and the next two rows show the mean and standard deviation of the dependent variable, respectively. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively.