University of Freiburg
Department of International Economic Policy
Discussion Paper Series
Nr. 53

FDI and the Geography of Terror

Omer Majeed
Günther G. Schulze

December 2025

ISSN 1866-4113

University of Freiburg
Department of International Economic Policy
Discussion Paper Series

The Discussion Papers are edited by:
Department of International Economic Policy
Institute for Economic Research
University of Freiburg
D-79085 Freiburg, Germany
Platz der Alten Synagoge 1

Tel: +49 761 203 2342
Fax: +49 761 203 2414
Email: iep@vwl.uni-freiburg.de

Editor:
Prof. Dr. Günther G. Schulze

ISSN: *1866-4113*
Electronically published: 11.12.2025

FDI and the Geography of Terror *

Omer Majeed†
Australian National University

Günther G. Schulze‡
University of Freiburg

Abstract

This study uncovers a powerful, yet overlooked geographic dimension to terrorism's macroeconomic impact. Our findings reveal that terror's harm to FDI is profoundly shaped by attack location. Using Pakistan as a case study we show that assaults on economic and political centers cause far greater damage to FDI than attacks in peripheral areas. From 2001–2021, terrorism cost Pakistan $8.1 billion in lost FDI, eroding nearly 30% of its foreign capital stock. These results carry broad relevance, highlighting how localized violence can generate systemic, uneven macroeconomic consequences, which supports geographically calibrated policy responses to terror.

Key words: *terror, FDI, time series analysis, economic geography, core-periphery, Pakistan*
JEL Code: *F21, F52, D74*

1 Introduction

The modern, globalized world is increasingly marked by the recurrence of terrorist attacks, with terrorism destroying capital, disrupting markets, and undermining political stability and business confidence. As such, researchers and policymakers now widely recognize that terrorism imposes significant economic costs (Bandyopadhyay et al., 2014; Federal Bureau of Investigation (FBI), 2021; NATO, 2024). A large literature examines terrorism's economic impact (Meierricks, 2025). Yet a crucial question remains unanswered: do terrorist attacks impose the same economic costs everywhere,

*We are grateful to Renée Fry-McKibbin, Krisztina Kis-Katos, and Jamie Cross for very helpful comments and Gan Jin and Philip Pohl for excellent assistance. The usual disclaimer applies.

†Australian National University, Arndt-Cordon Department of Economics, Canberra, Email: omer.majeed@anu.edu.au

‡University of Freiburg, Institute of Economics, and CESifo, Email: Guenther.Schulze@vwl.uni-freiburg.de

or do costs vary significantly and systematically by geography? This gap is increasingly consequential: the number of terror incidents has surged in recent years (START, 2022), extending beyond traditional hotspots such as the Middle East, Pakistan, and Afghanistan to Africa, Asia, and even Europe and the United States. High-profile attacks in New York, Paris, Brussels, Nice, Boston, Berlin, and Israel illustrate how geography may condition the magnitude of economic fallout from terrorism.

This paper examines terrorism as a novel class of macroeconomic shocks to foreign direct investment (FDI). Our focus on FDI embeds terrorism into the economics of capital mobility and location risk, offering evidence on how within-country geography conditions the response of foreign capital to security shocks. While attacks both in a state's center and periphery cause losses, in this paper we show how and why attacks in the center have much greater impact on FDI, and how this heterogeneity affects its long run accumulation. To do so, we examine the impact of terrorism in Pakistan, a country that has experienced substantial attacks in both center and periphery and provides key monthly economic data to test core-periphery cost asymmetry.[1] While terrorism has been shown to impose significant costs, the literature assumes that the economic fallout of terrorism is location-invariant and aggregates attacks to a national level (e.g., Abadie and Gardeazabal (2008), Blomberg and Mody (2005), Enders and Sandler (1996), Kis-Katos et al. (2011), and Powers and Choi (2012)), with many studies focusing on FDI, which reacts sensitively and serves as a key channel of losses due to terrorism (Abadie & Gardeazabal, 2008; Blomberg et al., 2004; Eckstein & Tsiddon, 2004; Meierricks, 2025; Tavares, 2004). Our focus on FDI embeds terrorism into the economics of capital mobility and location risk, offering evidence on how within-country geography conditions the response of foreign capital to security shocks.

A key novelty of our work is that we link our framework to the broader literature on state capacity (Acemoglu, 2005; Dincecco & Katz, 2016; Robinson & Acemoglu, 2012) and agglomeration (Krugman, 1991) to argue why attacks on major cities are likely to be more costly. As such, our study fills an important gap by highlighting a significant asymmetry between costs produced by attacks in major cities and those in the periphery. Because FDI is central to technology spillovers and economic growth (Keller, 2004), assessing the impact of terrorism on FDI is important in its own right.

We hypothesize that the economic costs of terrorism vary by location, specifically arguing that attacks in major cities (the center) have much bigger impact than in the periphery. While this paper focuses on FDI, the framework could apply to any spatially determined economic costs of violence. To understand the heterogeneous costs of terrorism based on location, the paper explores several channels through which costs might diverge. Costs of terror attacks may correlate with location via proximity to foreign-owned firms, critical infrastructure, political institutions, or media and thereby impact perceptions, business confidence, and – finally – investment differentially. The paper suggests that if attack location influences perceptions of security, stability, and

[1] We provide further details as to why Pakistan provides a clear example to study heterogeneity of location.

future returns, then the geography of terror should fundamentally shape the economic impact of terrorism. The paper therefore introduces a novel framework, emphasizing a spatial lens on the costs of violence and shows how localized shocks can yield asymmetric and systemic consequences. A key implication is that countries limiting terrorism to peripheral regions can mitigate its economic costs, as seen in cases such as the Philippines, Spain, India, and Colombia, in contrast to situations where attacks are concentrated in core urban centers. Ultimately, whether central attacks impose more severe costs than peripheral ones is an empirical question that this paper tests.

Our contribution connects the costs-of-terror literature to established urban and political-economy mechanisms: nodes and backward/forward transportation linkages (Hirschman, 1958), increasing returns and agglomeration in urban cores (Krugman, 1991) and the importance of state institutions (Acemoglu, 2005; Dincecco & Katz, 2016; Robinson & Acemoglu, 2012), and their concentration in major cities. We show such disruptions in agglomerated hubs and political nodes are therefore likely to be differentially costlier to disruptions in the periphery, both through effects on transportation hubs and expectations channels and by signaling weaker public protection.

Empirically, we assess whether location shapes the costs of terrorism for FDI in Pakistan, distinguishing between major cities and the periphery, and further distinguishing between economic hubs and political centers within the major cities. Results show that attacks in central cities generate substantially larger adverse effects than equally severe incidents in peripheral regions, underscoring that aggregation at the national level obscures an important heterogeneity. The qualitative pattern of bigger impact in major cities remains robust across identification assumptions, specifications, and samples. The results show that from 2001 to 2021, terrorism led to a staggering $8.1 billion (in constant 2010 dollars) loss in FDI – equivalent to 30% of Pakistan's foreign capital stock as of June 2021. Our main terrorism variable is casualties, but when we instead use fatalities as the measure, the estimated impacts are larger, suggesting that our baseline estimate of an $8.1 billion reduction in foreign capital may represent a lower bound of the true effect. The paper also shows that for Pakistan, the aggregate impact likely remains muted and potentially misleading.

Because terrorism appears to respond endogenously to increases in FDI, the paper highlights the presence of reverse causality, making single-equation approaches inadequate and prone to bias (Enders, 2008; Enders & Sandler, 1996). For that reason, we adopt a Vector Auto Regression (VAR) methodology, a workhorse model in empirical macroeconomics (Brunnermeier et al., 2021; Enders, 2008; Sims, 1980), which allows us to examine the dynamic interplay between terrorism and FDI (Enders, 2008; Enders & Sandler, 1996, 2012; Patterson, 2000). By treating both FDI and terrorism as endogenous, and examining their dynamic interrelations, we can gain additional insights into the nature of the FDI-terror nexus.[2]

[2]This reverse causality issue frequently appears in the study of terrorism; for instance, political instability makes terror more likely (Kis-Katos et al., 2011), at the same time terror compromises political stability (Gassebner et al., 2008, 2011). Likewise, (ethnic and interpersonal) inequality may give rise to

We further strengthen identification by drawing on a quasi-difference-in-differences design within our VAR framework. Specifically, we disaggregate Pakistan's core urban centers into economic hubs (Karachi and Lahore) and political-security hubs (Islamabad and Rawalpindi) and contrast their responses to terror with those of the periphery. We run two separate VAR models to test for differential FDI responses. The first estimates the impact of terrorist attacks in Karachi and Lahore relative to all other regions, excluding Islamabad and Rawalpindi, the second the effect of attacks in Islamabad and Rawalpindi relative to all other regions, excluding Karachi and Lahore. This structure mimics the logic of a difference-in-differences design: it nets out nationwide shocks – such as macroeconomic fluctuations, policy shifts, or regime changes – that affect all regions simultaneously, while focusing on the relative effect of location-specific shocks. The results confirm the robustness of the core-periphery asymmetry and reveal that, among major cities, FDI is more sensitive to attacks on political centers than on business hubs – an important finding, as the channels (increased perceived political risks and enhanced costs of doing business) have not previously been disentangled.

A country study offers distinct advantages for analyzing the heterogeneity of terror. First, a potential omitted variable bias is much less of a problem than in cross-country analyses as unobserved variables such as legal framework, institutions, and conflict history are the same for all observations. Second, we analyze very similar types of terror. Kis-Katos et al. (2014) show that substantially different determinants govern different types of terror and that their attacks result in very different numbers of casualties. Consequently, different terror types may be suspected to have different impacts as well. Third and most importantly, the economic and political geography is so different across countries that a universal definition of core versus periphery seems impossible, making panel analyses problematic, if not infeasible.[3]

Further, Pakistan provides an ideal setting: it is one of the few countries that have suffered extensive terrorist attacks across both major urban centers and remote areas, creating meaningful variation in attack location. What makes Pakistan distinctive is that this breadth of exposure to terrorism is paired with high-frequency economic data; allowing us to capture short- and medium-run investment dynamics. Studying Pakistan is important for policy in its own policy context and for broader policy debates,

terrorism (Fleming et al., 2022; Krieger & Meierrieks, 2019) and terrorism may exacerbate this inequality (McGauvran et al., 2024). Our approach is consistent with Biglaiser et al. (2023), who also find that FDI increases terrorist activity in low-income host countries.

[3]For instance, the definition and the importance of a center would be very different for federal states such as India and the US as compared to unitary states such as Pakistan or France. Frey and Luechinger (2004) argue that political decentralization reduces vulnerability to terror, while Dreher and Fischer (2010) provide differentiated empirical evidence for this hypothesis. Following this logic, vulnerability of FDI inflows could be hypothesized to be different for centralized versus decentralized states; moreover, the importance of the center could be lower in decentralized states. However, also within the group of unitary states, the importance of a center or central locations may differ substantially. For instance, in Italy, the central city (Rome) may have much less importance than Paris does for France. A similar argument can be made for South Africa as compared to Egypt. Thus, an equally applicable definition of a center for all countries is impossible.

as it sits on several geopolitical and terrorism fault lines – for instance its proximity to Afghanistan and India. In terms of geopolitics, it is at the crossroads of influence between the West and China. Also, the fact that it faces such extreme terrorism pressure and is a nuclear state means that neither the West nor the East wants to see terrorists take hold in that country.

Our findings not only deepen understanding of how terrorism disrupts economic trajectories, but also introduce a new framework for assessing the costs of violence through a spatial lens. Our results yield major policy implications. First, countries that manage to confine terrorist attacks to the periphery can limit economic costs.[4] Second, given the bidirectionality between terror and FDI, governments need to anticipate retaliatory actions by terror organizations to increased FDI when designing policies to attract foreign capital. Security measures must constitute an integral part of such an economic policy. Third, as costs are disproportionately larger in the center, these security measures need to be disproportionately deployed in central locations. Terror organizations act strategically to put pressure on the government, which they can do by directly targeting economic prosperity.[5]

Related Literature: Terrorism can impose significant economic costs (e.g., Abadie and Gardeazabal (2003), Blomberg et al. (2004), Eckstein and Tsiddon (2004), and Tavares (2004) for a survey cf. Meierricks (2025)), particularly by reducing foreign direct investment (FDI) which reacts very sensitively to terror and is a major component of terrorism's indirect economic costs (Abadie & Gardeazabal, 2008). Terror attacks lower expected investment returns through the loss of employees, destruction of capital, and damaged infrastructure, which increase production costs and lower productivity. Additional expenses arise from enhanced security and risk compensation for workers. Counter-terrorism efforts further raise business costs and divert public resources from more productive uses (Brück, 2005; Gaibulloev & Sandler, 2008). Terrorism also heightens risk perception by undermining government stability and making policy responses unpredictable (Gassebner et al., 2008). Developing countries are especially vulnerable to these impacts (Blomberg et al., 2004; Tavares, 2004).

The impact of terror on FDI is an important research question in itself. While other determinants of FDI have been intensively studied, empirical evidence on terror's ef-

[4]Examples include: the Philippines, where Abu Sayyaf is mostly limited to Southern Islands; India, where violence from Maoists, separatists and other terrorists is mainly limited to peripheral regions; and Colombia, where activities by remnants of FARC and ELN are primarily concentrated in rural areas and along peripheral regions near the Venezuelan border.

[5]In the case of Pakistan, terrorists have particularly targeted foreign investments. Eight days after the terror attack on Karachi airport on June 8, 2014, Shahidullah Shahid, the main spokesmen of Tehreek-e-Taliban Pakistan issued the following statement: "We warn all foreign investors, airlines and multinational corporations that they should immediately suspend their ongoing matters with Pakistan and prepare to leave Pakistan, otherwise they will be responsible for their own loss." http://www.thenews.com.pk/article-150930-Taliban-threatens-to-burn-palaces-in-Islamabad,-Lahore ; 16 June 2014.

fect is scant and inconclusive.[6] This is surprising since declines in FDI are a major channel through which terror may harm an economy, reducing capital stock and limiting technology transfer and growth, especially so in a developing country (Borensztein et al., 1998; Keller, 2004; Makki & Somwaru, 2004).

Enders and Sandler (1996) find that terrorism reduced net FDI in Spain by 14% and in Greece by 12%, but had no effect in Portugal. Abadie and Gardeazabal (2008) show that a one standard deviation in terrorist risk lowers net FDI by 5% of GDP. Blomberg and Mody (2005) find that violence in general significantly reduces FDI, especially in developing countries, but that terrorist violence has no distinct effect in developing countries and a positive effect in developed countries. Powers and Choi (2012) show that terrorism reduces FDI in 123 developing countries (1980–2008), but only when attacks target business interests. Bandyopadhyay et al. (2014) use FGLS and GMM on 78 countries (1984–2008) and show that both transnational and domestic terror reduce FDI, with stronger effects from transnational attacks. In contrast, Arif et al. (2021) find no impact of terror on FDI. Osgood and Simonelli (2020) demonstrate that FDI responds less when firms possess market-specific assets. Schlesinger and Tomashevskiy (2024) find only countries with medium institutional effectiveness experience significant reductions in FDI. Ajide (2025) shows for 41 African countries (1980–2020) that terror significantly decreased FDI. None of these papers address the spatial heterogeneity of terror costs.

Despite its importance, terror in Pakistan has been largely neglected in the economics literature. Ismail and Amjad (2014) find that poor socioeconomic conditions, such as inflation, political repression, illiteracy, and poverty, are associated with higher terror incidence. Malik and Zaman (2013) show that population growth, inflation, poverty, and political instability Granger-cause terrorism in the long run. Mehmood (2014) finds that terror has cost Pakistan 1 ppt of real GDP per capita growth annually (1973–2010). Shahbaz et al. (2013) find a bidirectional relationship between terrorism and foreign capital flows (which informs our analysis of reverse causality between terror and FDI in Section 8). Abbas and Syed (2021) study the effect of Pakistan's foreign policy on sectarian terror. Notably, Gassebner et al. (2023) study in the Pakistani context how proliferation of terror groups through splits leads to increased violence. Overall, the effects of terror on Pakistan's economy and politics, and on FDI more broadly, remain under-researched.

Our analysis is also related to the urban economics literature that shows how violence depresses house prices in affected urban areas (Abadie & Dermisi, 2008; Arbel et al., 2010; Besley & Mueller, 2012; Elster et al., 2017; Mills, 2002). Our approach differs by examining how the macroeconomic effect of attacks diverge between central and remote locations, using an economic geography rather than city-focused approach on local real estate markets.

The paper proceeds as follows. Section 2 explains why attack location matters, Section 3 reviews terrorism in Pakistan, Section 4 describes the data, and Section 5 the

[6] For a recent survey cf. Islam and Beloucif (2024).

empirical approach. Section 6 presents results, Section 7 robustness checks, Section 8 Granger causality, Section 9 reverse causality and policy implications, and Section 10 concludes.

2 Theoretical Considerations on a Core-Periphery Divide

2.1 Reasons for a larger effect of central attacks

Multiple reasons suggest a differentially larger effect of attacks in the center than in the periphery, essentially because central cities host more critical infrastructure, more foreign firms, more important (government and business-related) institutions, and because the material damage will be larger and more consequential. Importantly, we also argue that attacks on these centers will heighten perceived risk and deteriorate expected returns more than peripheral attacks, especially because they more strongly undermine perceptions of economic and political stability. Below we detail the arguments.

Material and Behavioral Channels of Terror Impact

Material damage is expected to be larger in the centers (even for attacks with the same number of casualties) as centers have more valuable infrastructure, bigger and higher valued buildings, more central nodes in communication and transportation networks, and host more corporate headquarters, especially of foreign-owned firms. This damage increases the costs of doing business, in particular since foreign firms are more likely to trade internationally, which requires trade-related infrastructure. For instance, incapacitating a central airport through a terror attack will have larger repercussions on the economy than hitting a regional airport (even if the value of destroyed buildings and equipment were the same, which is unlikely). Moreover, the loss of life and physical capital is probably higher in central places, where population and building densities are higher, which tends to magnify the damage of a given attack.

Yet, the actual material damage is often small compared to the economic costs of behavioral changes brought about by altered risk perceptions among individuals (Basuchoudhary & Schulze, 2025). It is the change in potential and actual investors' risk perception that sees FDI undone or redirected to other countries (Abadie & Gardeazabal, 2008).

These behavioral changes brought about by updated risk assessments in the aftermath of terror attacks are present in many dimensions of economic behavior, such as declining consumer sentiment and consumption expenditures (Brodeur, 2018), tourism (Klotzbücher & Schulze, 2025), air travel (Mitra et al., 2018), and real estate prices (Abadie & Dermisi, 2008; Mills, 2002), and have political fallout in terms of decreased government stability (Gassebner et al., 2011) and changed voting behavior (e.g., Berrebi and Klor (2008) and Montalvo (2025)). Foreign investors may be more rational and less

likely to overreact than the average consumer or voter, yet may still react significantly to terror attacks, e.g. by considering alternative host countries (Abadie & Gardeazabal, 2008; Bandyopadhyay et al., 2014). Thus, FDI will predominantly decrease not because the activity itself is discontinued, but because it will be relocated to other relatively more attractive locations. One indicator of a deteriorated risk assessment is changes in stock market returns after terror attacks. Ample empirical evidence of this exists, though results vary between economies, and industries, and between single attacks versus prolonged campaigns (e.g., Abadie and Gardeazabal (2008), Chesney et al. (2011), Goel et al. (2017), Jin et al. (2024), and Nikkinen and Vähämaa (2010)). Alam (2013) and Aslam and Kang (2015) provide some evidence of the negative effect of terror on stock market returns in the Karachi stock exchange. However, none consider the attack location.

Importantly, a large literature shows that state capacity – concentrated in central institutions – is pivotal for growth and investor confidence (Acemoglu, 2005; Cutler & Glaeser, 2024; Duranton & Puga, 2013). Attacks on political and security nodes (e.g., Islamabad/Rawalpindi) shift perceptions about the state's ability to protect property and deliver services, amplifying nationwide risk perceptions. As such, we expect attacks in central cities hosting main government institutions to generate stronger negative perceptions.

We control for the severity of attacks in terms of casualties by analyzing the response to similar shocks (i.e., those with similar numbers of casualties) in center and periphery, thereby capturing possible effects of higher population density and better medical services in the center. We cannot control for material damage inflicted by an attack.

Channels Amplifying the Economic Impact of Central Attacks

For attacks in the center to be more detrimental, they must lead to a larger deterioration in the risk assessment of (potential) foreign investors than attacks of equal severity in the hinterland. Several reasons suggest attacks in the center may receive more attention and cause more concern for foreign investors than hinterland attacks causing similar destruction.

First, if FDI is predominantly located in the center, investors may care more about attacks there directly affect them, which peripheral attacks do not. Not only could their assets be regarded as potential targets after an attack in the center, additional security measures may be necessary, employees may demand risk compensation, and expat staff may want to relocate, all of which would reduce expected profits. Table A2 in the supplementary material file provides evidence from the World Bank Enterprise Survey showing foreign-owned firms are concentrated in Lahore and Karachi. Moreover, much critical infrastructure – communication and transport nodes, banks, corporate headquarters, stock exchange – is located in the center. Attacking these sites may disrupt business activities and supply chains significantly more than peripheral attacks of

similar severity.

Second, central cities are high-value targets and, as such, are better protected. They house critical political and military functions, critical infrastructure and are home to most political, military and corporate decision-makers. If a terror organization succeeds in staging an attack in the political or economic heart of the country, impacting state capacity, then confidence in the effectiveness of security forces to protect the public and business sector against terror and other forms of violence is much more severely undermined than by attacks in the hinterland.[7] Attacks on the center cast doubt on the political and economic stability of the country and influence the risk assessments and business confidence of potential investors (Busse & Hefeker, 2007; Yasuda & Kotabe, 2021).

Third, agglomeration economics implies that shocks to the core are disproportionately damaging. In Krugman, 1991's core-periphery model, increasing returns and market access pull activity into central cities. Meta-evidence shows systematically positive agglomeration elasticities – productivity rises with city size/density (Melo et al., 2009) – while knowledge spillovers are spatially concentrated, with urban proximity enabling faster learning and innovation (Breschi & Lissoni, 2009). These forces make major cities the locus of dense supply chains, specialized services, and deep talent pools that both underpin productivity and attract FDI. By weakening the core's engines – scale, linkages, learning – hub shocks raise perceived risk, so like-for-like attacks cut FDI more in cities than in the periphery.

Fourth, media have a larger presence in the centers than in the periphery, as central political and corporate decision-makers are located in the centers, and more newsworthy events occur there. This means terror attacks in the center will generate more extensive media coverage, regardless of their relative menace to the country's political and economic stability (see above). Media reports are crucial for spreading information and fear (Akay et al., 2020; Becker & Rubinstein, 2011). Media reporting on terror has significant effects on stock market returns (Jin et al., 2024; Melnick & Eldor, 2010), suggesting risk assessments shift in line with media coverage of attacks. Moreover, larger media coverage of terror attacks encourages more terror in the future (Jetter, 2017), which rational investors may anticipate.

Relatedly, foreign embassies and consulates are concentrated in major political and commercial centers and foreign firms' local headquarters are often co-located in these hubs. Attacks proximate to these diplomatic and corporate clusters receive rapid, high-credibility dissemination through official advisories, including travel and investment advisories, country reports, and investor briefings, often escalated directly to potential investors back home and parent-company headquarters.

[7] For many countries, the political and the economic centers share the same location (e.g., France, the UK, Indonesia). In others, the economic centers are more spread out and not as clearly identifiable (e.g., the US, Germany, Canada). In Pakistan, Lahore and Karachi are the economic powerhouses, Islamabad the seat of the government and Rawalpindi hosts the military and security forces headquarters. This allows us to estimate whether attacks in the two types of centers have similar effects on FDI (see below).

Fifth, if it is easier to attack in the periphery, especially if terror organizations have bases there (e.g., in Northwest Pakistan's Federally Administered Tribal Areas (FATA)), attacks may be more frequent and additional attacks not carry as much new information. Thus, risk assessments may not update significantly following attacks and FDI not be further deterred. People may also learn that peripheral attacks are not as detrimental to economic development as previously thought (habituation effect, cf. Boumans et al. (2017)).[8] In addition, firms in the center may have higher liquidity, facilitating the outflow of capital. Unfortunately, the data do not allow us to investigate this.

Multiple reasons suggest that terror attacks in major cities have more far-reaching impacts on economic stability, governance, public perceptions, and security costs, making them far more consequential than attacks in peripheral regions. However, other arguments suggest attacks in the periphery might be the more detrimental.

2.2 Reasons for a larger effect of attacks in the periphery

First, the center may have better institutions (e.g., faster security response, better damage control, and more advanced healthcare facilities) that would mitigate the negative effects of terror more effectively than in the periphery. The costs in terms of lives lost and property destroyed may be lower. Likewise, attacks in the center would conceivably be less detrimental because institutions are stronger, and the local society is more resilient.

Second, the state deploys its resources strategically to protect high-value targets, and terrorists may anticipate the geographically distinct response capabilities of the state (Berman & Gavious, 2007), even if knowledge of the state's defense locations is imperfect (Li et al. (2021), cf. also Hunt and Zhuang (2024)). This strategic interaction may lead to fewer and less severe attacks at better-protected central locations where attacks involve higher risks for the terrorists.[9]

Third, natural resource exploitation facilities, such as mines or large plantations, may constitute valuable targets due to their high visibility. Often, resources are extracted with the help of foreign investors, which may make them even more attractive targets for terrorist groups. Attacks on foreign-owned natural resource-based firms in the hinterland may thus have a strong negative impact on FDI.

Terrorists choose locations by trading off symbolism/visibility (pulling attacks toward capitals and dense cities) against their operational vulnerability (pushing attacks toward less-protected peripheries). Although systematic evidence is limited (Marineau et al., 2020), case studies for Israel and Spain support this logic (Berrebi & Lakdawalla, 2007; LaFree et al., 2012; Perry et al., 2013). Cross-country work links attack risk to mountainous terrain, large and dense populations, poor economic conditions, ethnic

[8] Boumans et al. (2017) show that people who have been more exposed to terror assess the detrimental effects of terror as less severe compared to people who have experienced only very little terror.

[9] Indeed, we show that attacks in the center are less frequent.

heterogeneity, and – in autocracies – proximity to the capital (Nemeth et al., 2014). Transnational attacks are more likely where targets are accessible, lightly secured, symbolic, and capable of large material damage – especially near capitals (Marineau et al., 2020). Recent evidence points to a shift toward high-impact, low-security sites (Marchment and Gill (2022); cf. Santifort et al. (2013)). In Pakistan, this calculus yields clustering in major cities and in the northwest (Khyber Pakhtunkhwa (KP), and FATA), where law enforcement is weaker (Imran et al., 2023).

The arguments above are not mutually exclusive; ultimately, the relative effects of terror attacks in the center and those in the periphery is an empirical issue. This is what we test in this paper.

3 Terror in Pakistan

Pakistan, like most countries in the region, endured some terrorism prior to September 11, 2001. After 9/11, under military ruler Gen. Pervez Musharraf, Pakistan joined the U.S.-led War on Terror against the Taliban and Al Qaeda. In response, terrorist organizations began targeting Pakistan directly, with violence escalating over time. Since many of these groups had been allied with Pakistan during the Afghan war against the Soviet Union, the shift was gradual.

Musharraf's support for the War on Terror eroded domestic political capital (Wilkinson, 2008). In 2007, the Red Mosque in Islamabad was controlled by radicals, who launched attacks and abductions. Musharraf responded with a military operation in July 2007, killing the leader Abdul Rashid Ghazi. The crackdown sparked a wave of suicide bombings (Figure A2 in the supplementary materials). Violence briefly subsided in 2008, but elections later that year ended Musharraf's rule.

Between 2008 and 2014, terrorist groups consolidated safe havens in KP and the FATA, particularly Waziristan, using them as bases for attacks on the Pakistani state (Demkiv, 2009; Nawaz, 2009; The Express Tribune, 2011). Many expanded into urban areas, both to camouflage within civilian populations and to strike strategic targets (Iqbal, 2014). The government and military were initially reluctant to launch full-scale operations, and peace talks under Nawaz Sharif's government (2008–2013) were widely criticized as appeasement (BBC, 2014; Dawn, 2014). Emboldened, militants escalated violence, driving casualties upward (Figure A2). The lack of political will to deny safe havens in KP and FATA was a key factor behind this surge (BBC, 2014; The Express Tribune, 2014a).

In mid-2014, under Gen. Raheel Sharif, the military launched Operation Zarb-e-Azb, a comprehensive campaign in North Waziristan and FATA, backed by nationwide counterterrorism sweeps (Bokhari, 2014; Boone, 2014; Hussain & Khan, 2014). The military retook major towns, dismantled camps, and killed hundreds of militants (Sindhu 2014). Terror-related casualties fell sharply (Saleem, 2014; The Express Tribune, 2014b; Yousaf, 2014). More recently, U.S. officials acknowledged Pakistan's operations as ef-

fective counterterrorism measures (Dawn, 2025).

Terrorism in Pakistan has been fueled by overlapping fault lines – sectarian divisions (Sunni-Shia, radical vs. mainstream), ethnic grievances (notably in Balochistan), and regional rivalries (Paliwal, 2017). These dynamics were further complicated by Pakistan's accusations that India supported terrorist organizations to destabilize the country (Haider, 2014). Groups operate at local, transborder (Afghanistan, India), and global (Al Qaeda) levels. An overview of terror organizations operating in Pakistan is given in the supplementary materials (Section A.2).

4 Data

For our time series analysis of terror and FDI, we use monthly data from July 2001 to June 2021, the period for which data on terror and FDI are simultaneously available, and that saw the most violent terrorist attacks in Pakistan.

Our choice of variables is guided by channels through which FDI is affected by terror, and by the availability of data. We use net foreign direct investment (NFDI), terror variables, and real interest rate disparity (between Pakistan and the US) in our base regressions and the real effective exchange rate (REER) in an extension. The real exchange rate affects the return to investments and thus FDI. Interest rate differentials reflect the opportunity cost of investing in Pakistan versus other countries and hence may be a determinant of NFDI flows. These variables are the only relevant macroeconomic variables available monthly. Given the lag structure of our VAR system, the lagged dependent variables compensate largely for any omitted variable (J. Wooldridge, 2020).[10] We also include an institutional variable – regime type dummies – in our analysis. The government in Pakistan changed from a pro-growth military government to a democratic government without the pro-growth orientation of its predecessor. During the military government of 1999 to 2007, the average annual growth rate was 5.03 per cent. Under the subsequent civilian governments it has averaged around 3.57 per cent (Bank, 2024). Regime type dummies may capture the influence of red tape, corruption, political risk and more general economic policy stances that may affect NFDI. Furthermore, a dummy for which party was in power after the military government is included to distinguish the governing coalition of the Pakistan People's Party (PPP) and the Pakistan Muslim League (Nawaz) (PMLN) (March 2008 to August 2018 from the Pakistan Tehreek-e-Insaf (PTI) government which followed.) We also include a dummy variable to capture global recessions linked to the Dot Com bubble burst, the global financial crises and the Covid19-pandemic. These three incidents reflect the main economic slumps over our sample period. Thus, we extend Enders and

[10]Omitted variables cannot be entirely ruled out even if lagged dependent variables are introduced (Lütkepohl, 1982). However, some determinants of direct investment used in studies at the annual level do not exist at the monthly or quarterly level for Pakistan. Including the real exchange rate, the only other relevant variable available at monthly frequency, does not change our results in any meaningful way.

Sandler (1996)'s earlier bivariate analysis (for different countries), which includes only FDI and an aggregate variable for terror attacks.

4.1 Terror

We use the *Global Terrorism Database* (GTD) published by the National Consortium for the Study of Terrorism and Responses to Terrorism (LaFree & Dugan, 2007; START, 2022). We aggregate terror data to monthly figures and created the variable CASUALTIES to represent the number killed plus the number wounded in terror attacks in a given month in Pakistan. We prefer casualties over incidents or fatalities for the following reasons.

Incidents treat all attacks equally, regardless of severity. Yet attacks range from protests, assassinations and armed assaults to large-scale bombings, with casualties from zero to hundreds. Foreign investors likely differentiate between attacks of varying severity, with smaller ones perhaps below their perception threshold. Hence, a terror measure should capture intensity, not just frequency, of attacks. In a core-periphery context, the number of incidents may bias estimates: if larger attacks are harder to stage in the center due to stronger security, the higher share of small attacks there would overstate the relative severity of attacks in the center.

Casualties per month measure the severity of attacks in a given month and avoids the bias described above. Fatalities provide another measure of the severity of attacks. We think that in the center-periphery context, casualties (dead and wounded) are a better measure than fatalities (only dead). An attack of the same strength will lead to more fatalities in the periphery on average because medical facilities are limited in remote areas. Thus, casualties better capture the severity of attacks. We use fatalities as alternative terror measure in our robustness tests (Section 7).

We disaggregate terror data into casualties incurred in the center and in the periphery. The center consists of four major cities Karachi, Lahore, Islamabad, and Rawalpindi. Karachi and Lahore are the main economic and financial hubs; Islamabad is the seat of the government and the political center, Rawalpindi hosts the military high command and is the military center. The periphery is the remainder of the country.

Furthermore, we disaggregate attacks into attacks on businesses and on other targets to analyze whether terrorism has a heterogeneous effect on NFDI based on geography and target type, to control for confounding factors. If businesses suffered relatively more attacks in the center and attacks on businesses affected NFDI more strongly than attacks on other targets, a possible center-periphery pattern could in part be driven by this difference in target types rather than centrality.[11] Table 1 provides an overview of the distribution of terror casualties between center and periphery.

[11] We considered further disaggregation, for instance into major cities, other urban areas, remote areas; but the data do not permit this. A stronger regional and target type disaggregation would lead to many zero observations, causing multicollinearity problems and imprecise estimates.

Table 1: Terror casualties by region and target

Target Type	Major cities				Periphery				Overall			
	mean	std dev	casualties	Incidents	mean	std dev	casualties	Incidents	mean	std dev	casualties	Incidents
All	50.52	84.53	12124	1546	194.1	188.78	46585	6561	244.62	233.67	58709	8107
Business	7.45	24.72	1788	194	23.29	34.56	5590	690	30.74	45.12	7378	884

Source: Global Terrorism Database, own calculations, center regions include Karachi, Lahore, Islamabad and Rawalpindi, periphery: all the rest, casualties refers to the sum of fatalities and injuries, mean casualties refer to the average casualties per month.

Figure A1 in the Supplementary Materials shows the geographic distribution of terror casualties in Pakistan for our period of observation 2001-2021. Hotspots of terror are in the center locations, notably in Karachi and Lahore, but also in the periphery in Quetta and Peshawar; due to the sheer size of the periphery, more than three times as many attacks occur in the periphery.

4.2 Foreign direct investment

We use monthly net foreign direct investment (NFDI) flows from the State Bank of Pakistan (SBP). The US producer price index is used to convert nominal NFDI into real values with 2010 as the base year. We use NFDI instead of inflow of FDI because disaggregated data for inflow and outflow of direct investment is only available from June 2012 onwards. Moreover, Net FDI figures also take account of terror-induced capital outflow. Time series of NFDI and REER appear in Figure A§ in the Supplementary Materials. NFDI increased significantly during the military government of President Musharraf and saw a sustained decline under the democratic governments post-February 2008. REER declined under both governments, but more rapidly under the civilian governments.

Systematic information on the geographic location of foreign investment in Pakistan is unavailable.[12] The only available information stems from the World Bank Enterprise surveys conducted in 2007, 2013, and 2022. Only the 2007 survey gives a detailed geographic breakdown (presented in the supplementary material, Table A2, panel A). The 2013 and 2022 surveys only reveal which of the four provinces or the federal capital territory the enterprise was located in and where the interview was conducted (see panel B). We define the binary variable foreign to be one if foreign ownership is positive. This information indicates that foreign investment is concentrated in the economic centers of Karachi and Lahore.

[12]This materialized despite requesting data from several government agencies, including the State Bank of Pakistan, and using secondary data searches including the CEIC data base.

4.3 Other control variables

We include the real effective exchange rate in our analysis as it affects returns to FDI. We calculate the Pakistani bilateral real exchange rates (RER) according to (1), where NER is an index of the nominal exchange rate and PPI is producer price index. Subscripts p and j stand for Pakistan and partner economy respectively; t indicates the time period.

$$RER_{pjt} = \frac{NER_{pjt} \times PPI_{jt}}{PPI_{pt}} \tag{1}$$

The Pakistani real effective exchange rate at time t is then calculated as weighted geometric mean of bilateral real exchange rates as follows:

$$REER_{pt} = \prod_{j} (RER_{pjt})^{g_j} \quad \text{with} \sum_{j} g_j = 1 \tag{2}$$

We include all partner countries that accounted for more than 5 per cent of NFDI over the sample period, except for UAE and Hongkong for which monthly price indexes were not available. The included partner economies are United States (US), United Kingdom (UK), Euro area economies, China, and Switzerland.[13] Weights g_j are based on the shares of NFDI for each country for the entire sample period. All indexes have 2010 as base year.

Nominal exchange rate data were taken from the SBP, while price indexes for the US, UK, Euro-Area, China, Switzerland, and Pakistan come from the Bureau of Labor Statistics (US), Office of National Statistics (UK), Eurostat, National Bureau of Statistics (China), Swiss Federal Statistical Office, and SBP respectively. The Economist Intelligence Unit (EIU) database was used to extract these series.

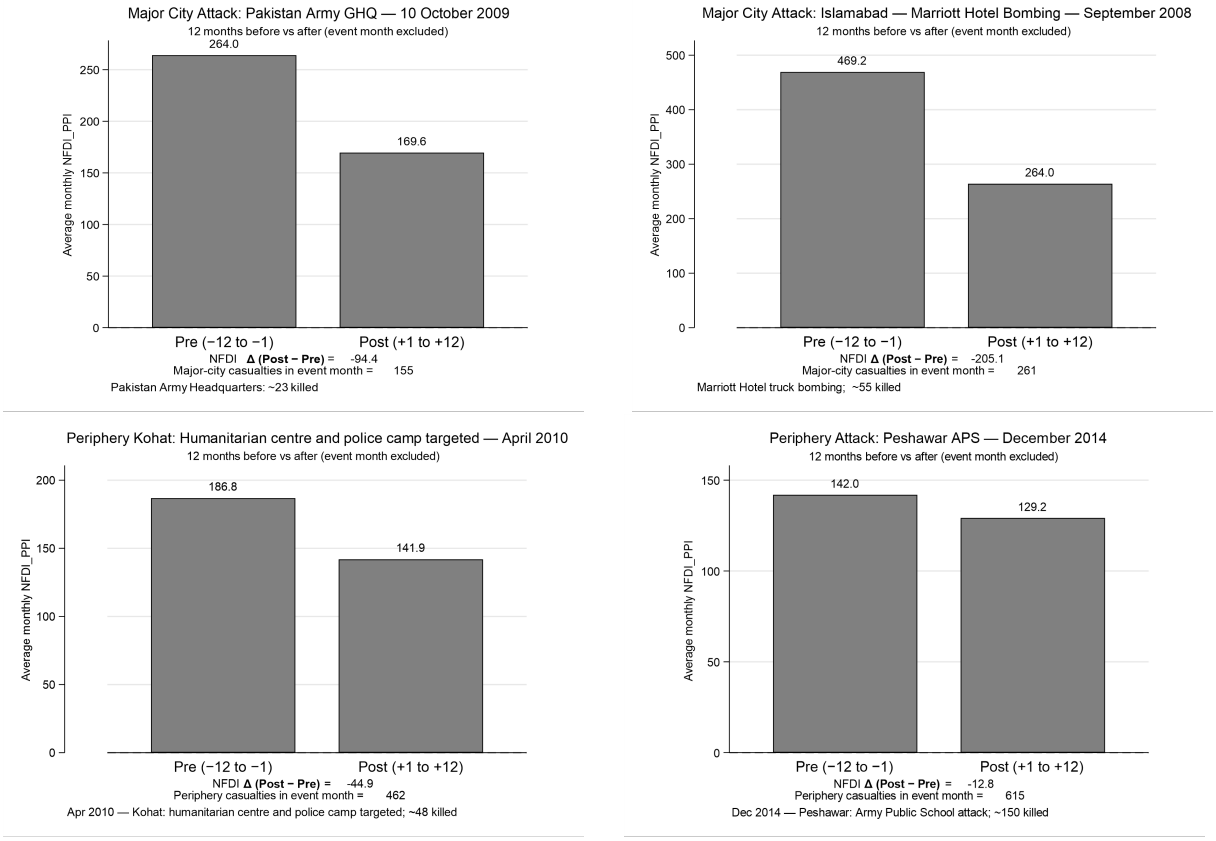
Real interest rates disparity (RIRD) between the US and Pakistan was included to capture a further determinant of FDI. Data on interest rates come from the Federal Reserve System (US) and SBP (we used the US federal funds effective rate and the Pakistan policy rate). To convert nominal interest rate disparities to real ones, we apply the respective countries' consumer price indexes (CPI). The US Federal Reserve System and EIU data base were again used to extract these series.

4.4 Descriptive Evidence

Figure 1 plots NFDI 12 months before and after selected high-casualty, high-profile terrorist events in major cities and the periphery. These figures provide preliminary

[13] UAE accounts for around 10 per cent of NFDI over the sample period. As it did not have regular monthly consumer or producer price indexes, the bilateral real exchange rate for Pakistan and UAE could not be constructed. While Japan accounts for less than 5 per cent of NFDI, given its importance as a donor and trading partner of Pakistan, Japan was included in the RER index construction in a robustness test. Results were insensitive to that inclusion.

Figure 1: Case evidence



evidence that terrorist violence may be associated with changes in foreign investment flows. For these cases we observe declines in NFDI following large-scale attacks, more pronounced for attacks in the major cities. Interestingly, the attack on the Army Public School (a prominent attack) in the periphery appears to have had little impact on NFDI, despite its symbolic significance as an assault on the military and number of children killed. This perhaps suggests that because the target was not directly linked to economic or decision-making centers (like the army headquarters attack), the investment response was more muted.

While suggestive, these plots should be interpreted with some caution. By construction, they are simple pre-post averages that do not adjust for confounding factors. As is evident from Figures A2 and A3, the NFDI and terrorism series itself display strong persistence, structural breaks, and external shocks that could account for part of the observed changes.

To move from a descriptive to an inference approach that accounts for these confounding factors, we need to model a bidirectional adjustment dynamic. First, persistence and history in both terrorism and NFDI suggest the need for a lag structure,

which simultaneously overcomes omitted variables biases by including lagged dependent variables (Enders, 2008; J. Wooldridge, 2020; J. M. Wooldridge, 2010). Second, we must control for terror activity in both major cities and the periphery to avoid spurious correlations. Third, regime changes and global shocks, such as the 2008 global financial crisis, can independently shift the investment trend. Fourth, other macroeconomic variables may act as confounders.

5 Empirical Approach

To analyze the effects of terrorism in major cities versus the periphery, we conduct a time-series analysis of Pakistan. We jointly model the evolution of all variables of interest to fully capture feedback effects using a VAR approach, which has routinely been used to examine complex relationships with feedback loops (e.g., Brunnermeier et al. (2021), Enders (2008), Fry-Mckibbin et al. (2025), Kim et al. (2025), and Sims (1980). This allows us to examine both the impact of terrorism on FDI and of FDI on terrorism (Enders, 2008).

VARs are the appropriate methodology to address the key challenge to our analysis of reverse causality between FDI and terrorism. Rather than ignoring feedback loops by using single equation frameworks, we use a system of equations and trace out IRFs to explicitly account for this joint dynamic, treating the variables of interest as endogenous and examining their joint evolution through simultaneous equations (Enders, 2008; Enders & Sandler, 1996; Hamilton, 2020; Kim et al., 2025; Lütkepohl, 2007). Moreover, as discussed below, our identification strategy based on Cholesky decomposition is robust to alternative recursive orderings; the resulting IRFs are qualitatively unchanged. In the reduced form, VARs include lagged dependent variables, and lags of other variables, important because conditioning today's outcomes on their own history – and on that of other variables in the system – helps to mitigate omitted variable bias (J. Wooldridge, 2020). Our quasi-DID VAR design (see below), contrasting business hubs and political hubs with the periphery, further strengthens the robustness of the methodology. Building on the VAR approach by Enders and Sandler (1996), we differentiate between terror attacks in the center and periphery and show it is an important distinction.

Benchmark VAR Specification

As we expect heterogeneity in the impact of terror, we split the terror variable into casualties from attacks in the central cities and the periphery. Our VAR system treats four variables as endogenous:

$$X_t = \{CC_T, P_T, D.RID_T, NFDI_T\} \tag{3}$$

where CC_T, P_T, stand for terror casualties in the central cities and the periphery, respectively. $D.RID$ is differenced real interest rates disparity between the US and Pakistan. $NFDI$ is net foreign direct investment flows. All variables are discussed in detail in the data section.

Our preferred VAR model can be written as follows:

$$B(L)X_t = \upsilon + \alpha + \varepsilon_t \tag{4}$$

where $B(L)$ is a pth order matrix polynomial in the lag operator, L, $B(L) = B_0 - B_1L - B_2L^2 - \ldots - B_pL^p$, B_0 is a non-singular matrix that summarizes the contemporaneous relationships between the variables and υ is a vector of intercepts. The $n \times 1$ vector ε_t contains the structural shocks.

α is a vector of dummy variables capturing seasonal effects and key historical events. Following Enders and Sandler (1992), we include monthly seasonal dummies, S_i, since the data are at monthly frequency. In addition, α accounts for major structural breaks and crises: (i) a regime-change dummy, D_R , which equals 1 prior to August 2008 (the military dictatorship period with relatively higher growth and investment) and 0 afterwards (the return of exiled democratic leaders marked a period of governance challenges and a sharp fall in NFDI), coinciding with the structural break discussed in Section 4; (ii) a post-2013 dummy, $D_{Post_{2013}}$, equal to 1 from December 2013 onward to capture the structural break and the downward shift in NFDI to a persistently lower base; and (iii) a crisis dummy, D_C , synchronized with Federal Reserve Bank of St. Louis dates, taking the value 1 in July–November 2001, January 2008–June 2009, and March–April 2020, to reflect Dot Com bubble, Global Financial Crises and COVID-19, all of which are likely to have impacted global flows of FDI.

$$\alpha = \sum_{1}^{11} a_{2i}S_i + a_3D_{C_t} + a_4D_{R_t} + a_5D_{Post_{2013}} \tag{5}$$

The reduced form representation of the model is given by:

$$A(L)X_t = c + \alpha + u_t \tag{6}$$

where $A(L) = B_0^{-1}B(L) = I - A_1L - A_2L^2 - \ldots - A_pL^p$ and c is a vector of intercepts. The reduced form errors are related to the structural errors via $u_t = B_0^{-1}\varepsilon_t$.

We start by examining the impact of aggregate terrorism on NFDI using a three-variable VAR that captures total casualties at the national level, and show that this gives muted and possibly misleading results. Identification, lag length and variable selection are discussed below.

The impacts of shocks on FDI is traced out by examining how FDI reacts to these shocks, while accounting for endogenous terrorist activity, via the impulse response functions (IRFs). These IRFs, consistent with Sims (1980), rely on the moving-average representation of a VAR, which allows us to trace the time path of shocks and show how terrorist incidents shape the dynamic adjustment of FDI.

Identification and robustness of Cholesky decomposition. Our identification approach relies on recursive structure using standard Cholesky decomposition to examine IRFs (Enders, 2008; Kim et al., 2025). We explicitly test multiple alternative orderings. The center-periphery asymmetry persists across all of them, confirming that results are not driven by identification choices. This is discussed below.

Our preferred identification assumption is that terrorism does not contemporaneously react to any of the economic variables, including NFDI, similar to Enders (2010). This assumption is based on the consideration that terrorists may require some time to logistically organize themselves, or even realize that foreign investment has increased, and is similar to Enders and Sandler (1996). In contrast, the economic variables of the system can react contemporaneously to terrorism, as terror attacks are visible on impact, picked up by media, and can create an instant psychological effect. Terrorist attacks may immediately impact expectations of investors about the future stability of the country. Moreover, we assume that NFDI reacts to economic variables like interest rate differentials contemporaneously rather than the other way around. As such, the Cholesky decomposition used to identify structural shocks follows the order of the variables in equation 5.1.

Our results remain robust when we reverse the identification assumption, allowing FDI to affect terrorism contemporaneously while responding to it with a lag. Re-estimating the VAR with alternative orderings – placing NFDI before terrorism or switching major city and periphery attacks – yields consistent findings: city attacks exert a stronger negative impact on NFDI. Thus, results are not driven by identification and remain robust to checks on stability, variable selection, and lag lengths.

Quasi Difference-in-Difference Extension. Since difference-in-differences (DID) approaches also address endogeneity and mitigate omitted variable bias, we complement our VAR analysis with a quasi-DID design. In our setting, this involves contrasting shocks in the political-security core (Islamabad and Rawalpindi) against shocks in the periphery, and separately comparing the economic hubs (Karachi and Lahore) with the periphery. This approach mirrors the DID intuition of differencing out common national shocks – macroeconomic fluctuations, structural breaks, or regime changes – while focusing on within-country variation in attack location. Doing so provides a quasi-experimental setting that strengthens identification beyond the VAR.

The quasi-DID analysis offers several benefits. First, DID-style comparisons are widely recognized as a transparent tool to address omitted variable bias, since they help isolate treatment-specific effects by netting out time trends common to all regions. Second, in our case they provide complementary evidence that the center-periphery asymmetry in FDI responses is not an artifact of model specification. As the results show in Section 6.3, in both contrasts – economic hubs versus periphery and political hubs versus periphery – the core-periphery wedge remains statistically significant and economically meaningful, underscoring the robustness of our main hypothesis. Third, the results highlight attacks on political-security hubs as more consequential than those on business hubs: attacks in Islamabad and Rawalpindi exert larger negative effects

on FDI than those in Karachi and Lahore, despite the latter being the main economic centers with higher foreign investment exposure.

Taken together, the quasi-DID evidence reinforces our baseline VAR results by showing the center-periphery divide is not driven by omitted variable biases. Rather, it reflects a consistent pattern: attacks on central political or economic nodes of the country generate disproportionately larger economic costs than equally severe attacks in peripheral regions.

Variable section, lag selection, Toda-Yamamoto robustness. We complement the baseline VAR with a broad suite of checks. We discipline variable choice using Granger selection and, in robustness, expand the control set, vary lag structures (including variable-specific designs and extended horizons), and probe alternative recursive orderings. We also implement Toda and Yamamoto (1995) augmentation to account for unit roots. Across these perturbations, the impulse-response profiles remain stable and the core city-periphery asymmetry persists. Complete results and implementation details appear in the Supplementary Materials.

6 Results

6.1 The Loss of FDI from Terror

In this section, for completeness, we report muted and potentially misleading aggregate terror-FDI estimates. Accordingly, our preferred results are the core-periphery contrasts, which isolate location-specific effects. We start by analyzing time series properties of the variables using unit root tests.

Unit root tests: We use the augmented Dicky-Fuller test for all our series to test for unit roots (J. Wooldridge, 2020) using eq. (7). Our null hypothesis is that H_0: $\theta = 0$ and H_a: $\theta < 0$, where y_t is the series being tested, and lags of Δy_{t-i} are included to clean up serial correlation.

$$\Delta y_t = \alpha + \theta y_{t-1} + \sum_{1}^{n} \gamma_i \Delta y_{t-i} + e_t \tag{7}$$

Results are summarized in Table A3 in the *Supplementary Materials*. All terrorism-related variables test stationary. Figure A2 in the supplementary materials shows an upward trend for NFDI until the middle of 2008, and a decline afterwards, suggesting a structural break in the data. This break is accounted for by splitting data into two samples, pre- and post-February 2008, for the unit root test.

This date coincides with the change from a military to civilian government, and is approximately when NFDI began to decline. Table A3 shows that NFDI is integrated of order 1 ($I(1)$) for the whole sample, but once we take the structural break into account, it appears stationary in both subsamples.

For robustness, we also apply the Phillips and Perron (1988) unit root test to all variables, including NFDI. The Phillips-Perron test has greater power than the Dickey-Fuller test and accounts for serial correlation by using Newey-West standard errors. Additionally, we conduct the Zivot and Andrews (2002) unit root test, which explicitly accounts for up to one structural break in the series. The results indicate a minimum t-statistic of -5.816 at March 2005 (obs. 45), which exceeds the 1% critical value threshold of -5.34, confirming stationarity. Since the Zivot-Andrews test accommodates structural breaks, there is no need to split the sample. Both the Phillips-Perron and Zivot-Andrews tests confirm that NFDI is stationary, reinforcing the split samples result of the augmented Dicky-Fuller test.

The periphery terrorism series exhibits clear structural shifts and is therefore divided into three periods: 2001–2007, 2007–2013, and 2013–2021. These phases reflect distinct changes in the level and volatility of terrorist activity: a relatively low and stable baseline in the early period, a sharp and sustained escalation in attacks between 2007 and 2013, and a gradual decline in frequency and intensity from 2013 onward. The post-2013 decline in terrorism aligns with major counterterrorism efforts, notably Pakistan's Operation Zarb-e-Azb, launched in June 2014, which significantly reduced militant activity in peripheral regions. Unit root tests indicate stationarity within each segment, with the ADF test failing to reject non-stationarity only during the highly volatile middle period. Additionally, the more robust Phillips-Perron test confirms stationarity across all three phases. Taken together, these findings suggest that, once structural breaks and policy interventions are accounted for, periphery can be treated as integrated of order zero, $I(0)$.

Table A3 summarizes the unit root properties of the main variables. The terrorism variable for major cities (MC) is consistently stationary across all tests. Total casualties (ALL) is stationary under ADF and PP tests. Exchange rate (RER) and real interest rate disparity (IRD) appear non-stationary in levels ($I(1)$), but both are stationary upon first-differencing. This is consistent with economic expectations for macro-financial series. However, Dell'Erba and Sola, 2013, Lopez and Reyes, 2009, Cerrato et al., 2013 argue that real interest rate disparity cannot be $I(1)$. As such, robustness checks treating real interest rate difference as $I(0)$ reveal no qualitative change in our results. Noting also that ER was ruled out as a main variable based on Granger causality, and is only included in robustness tests.

Importantly, as discussed in the Empirical Approach section, we implement Toda and Yamamoto (1995) methodology to account for any or several variables that may be $I(1)$ and have not been accounted for. Our overall results remain robust.

Aggregate impacts: Our results show that aggregate measures of terrorism yield muted and potentially misleading effects on NFDI. In the next section we show that disaggregating by the core-periphery split reveals that attacks in major cities have larger and differently timed impacts than those in the periphery, a finding that proves robust across multiple sensitivity tests.

Because attacks in the central cities and in the periphery impact NFDI with different

lags, the aggregate effects of all attacks as a weighted average of two distinct dynamic processes may turn out muted or insignificant while the two different processes are not. In particular, for the lagged periods in which attacks in central cities affect NFDI, terrorism coefficients in the periphery are mostly insignificant (and vice versa). Based on our preferred equations, casualties from terrorism in major cities affect NFDI at the second, seventh, and twelfth lags while terror casualties in the periphery are effective at the seventh lag. In other words, if we analyze aggregate impacts we are constraining the impact of terrorism in the central cities to be the same as that of terrorism in the periphery, which we show to be an unjustified restriction. Hence, analyzing terrorism disaggregated by geography gives a more accurate impact of terrorism on NFDI.

By analyzing the moving average representation of a VAR, we can trace out the dynamic responses of the variables in the VAR system (Becketti, 2013; Enders, 2010; Lütkepohl, 2007) and calculate IRFs (results available upon request).

IRFs measure the effect of an exogenous shock of a covariate on itself or on another covariate (Becketti, 2013; Lütkepohl, 2007). Following the common practice in literature, we normalize these shocks to one standard deviation of the respective variable. Figure A4 in the Supplementary Material file displays the impacts of aggregated terrorist casualties on NFDI. Terror attacks have a tangible and statistically significant (at the 5 percent level) negative impact on NFDI in Pakistan. After a standardized attack, NFDI decreases by a total of around $16.3 million in 2010 US dollar terms over a period of 7 months, though we see a recovery in month 11. The positive response of NFDI observed in period 11 is most likely noise as it is not robust to other specifications, but we present it for transparency. When we turn to our preferred estimation, disaggregating terrorism into major cities and the periphery, the impact of terror on NFDI is more pronounced.

To analyze to what extent the variance of the NDFI is attributable to its own shocks and to what extent caused by terror attacks, we calculate the variance decomposition for various months ahead. If NFDI were independent of terror it should account for all its own variance. However, Table A4 demonstrates that after 12 months, the shocks in NFDI only account for 82.2 percent, with 8.49 percent accounted for by terrorism. After two years, terrorism accounted for 7.83 percent of forecast error variance.

The results above portray the average effect of terror attacks, i.e. they restrict all attacks in central and peripheral locations to have the same impact on FDI. As argued above, a differentiated, more accurate view takes the location of the attack into consideration. Therefore, we turn to the geographical dimension of terrorism.

6.2 Center versus Periphery

Attacks in the economic centers are hypothesized to affect FDI directly and strongly as this is where most FDI is located. Attacks on the political-military center signal weaker state capacity and expose the vulnerability of political institutions and the military as the guarantor of security and stability, prompting foreign investors to reprice country

risk (cf. Section 2). All other locations are aggregated into the periphery.[14]

We again use IRFs derived from standard VAR analysis to show the impact of terrorism on NFDI in the major cities and periphery (see eq. 3 and 4). We analyze the effect of a shock in terror casualties on NFDI – where a shock is defined as an increase in casualties by one standard deviation in the center and in the periphery, respectively. These standard deviations are 84.5 for the center and 188.8 for the periphery. To make the reactions to terror casualties comparable between center and periphery, we standardize both exogenous shocks to the size of a standard deviation of the casualties in the center.

Using the same methodology, we find terror in major cities has a higher economic cost than terror in the periphery. Figure 2 (panel A and B) shows the impact on NFDI of attacks in major cities and in the periphery. A standardized attack in a major city decreases NFDI by around $48.2 million 2010 US dollars over 15 months. A shock in terrorism leads to a reduction in NFDI in the second, seventh and twelfth months after the attack. In contrast, the same shock in the periphery has a statistically insignificant impact on NFDI. However, an attack in the periphery, based on its standard deviation of about 188.8 casualties, produces significant negative impacts (Figure 2, panel C), reducing NFDI by around $23 million 2010 US dollars over 15 months. In other words, attacks in the periphery have to be much larger in order to similarly affect NFDI. In several months attacks in the periphery cause significantly more casualties than attacks in the major cities, and as a result have more impact on NFDI.

Following Enders and Sandler (1996), we calculate the accumulated effect of terrorism on foreign capital in Pakistan. Equation (8) determines the law of motion for foreign capital in Pakistan, where K is foreign capital and $dep_t = \rho K_{t-1}$ is the depreciation at time t. We use a 5 percent annual depreciation rate ρ (Enders & Sandler, 1996).

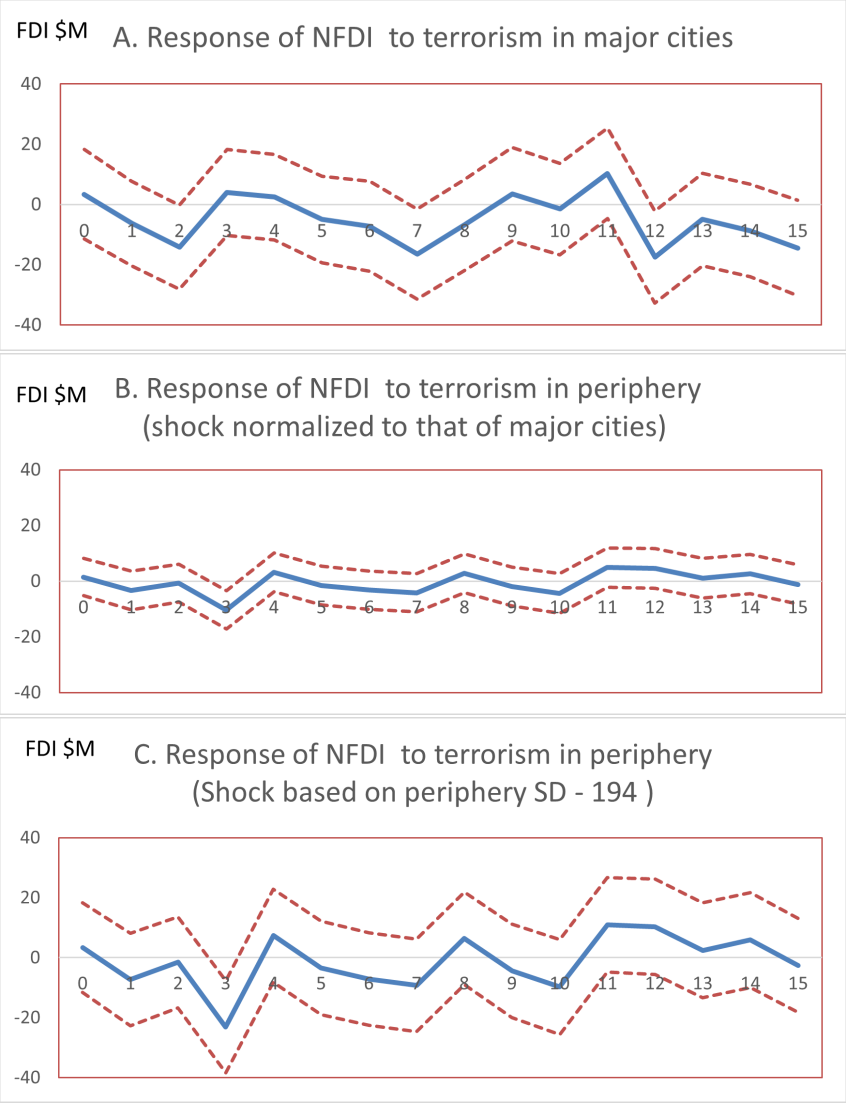
$$K_t = K_{t-1} + NFDI_t - dep_t \tag{8}$$

To estimate the total impact of terrorism on NFDI, we construct a counterfactual NFDI. We use the results from the VAR analysis to construct what NFDI for each period would have been with no terrorism in Pakistan. We call this counterfactual net foreign investment $N\ddot{F}DI$, and calculate it using the impulses responses based on equation (9) and shown in Figure 2. Using the disaggregated VAR system of (3 and 4) is likely to give a more accurate impact of terrorism on NFDI than the aggregated VAR system.

Our point estimates of the IRFs show that terrorism in major cities decreases NFDI

[14]This may over-simplify as degrees of remoteness vary: Faisalabad and Hyderabad may be substantially more central than Balochistan or the tribal areas. We distinguish only between center and periphery for two reasons. First, given the lag structure of our analysis, a larger disaggregation would give less powerful test results, as degrees of freedom decline substantially. Second, FDI locates largely in economic powerhouses and not middle centers. Our goal is to investigate difference in the effect of central versus peripheral attacks. Finding such a difference would suggest more differences in the effects of attacks depending on the degree of remoteness.

Figure 2: IRFs for terror in center and periphery



Source: Authors' calculations

by \$14.2M, \$16.5M, and \$17.5M in periods 2, 7, and 12 following the attack, while NFDI decreases by \$23M in period 3 after a standard attack in the periphery. Specifically, we use equation (9) to construct $N\ddot{F}DI$ - the net FDI flows that would have taken place had there been no terrorism. d and e represent these reductions in NFDI due to terror attacks. d takes the values of \$14.2M, \$16.5M, and \$17.5M in periods 2, 7 and 12 following an attack in the major cities, while e takes the value \$23M in period 3 after a standard attack in the periphery. Our IRFs are scaled to a one-standard-deviation shock of each series. To map IRFs to actual monthly casualties, we convert casualties

into "s.d.-equivalents": $\omega_t = \frac{casualties_{center_t}}{SD(casualties_{center})}$ and $\Theta_t = \frac{casualties_{periphery_t}}{SD(casualties_{periphery})}$.

In other words, the weights are a fraction of the normalized shocks.

$$\ddot{NFDI}_t = NFDI + \sum \omega_{t-m} d_{t-m} + \sum \Theta_{t-n} e_{t-n} \quad \text{where } m = 2, 7, 12 \text{ and } n = 3 \quad (9)$$

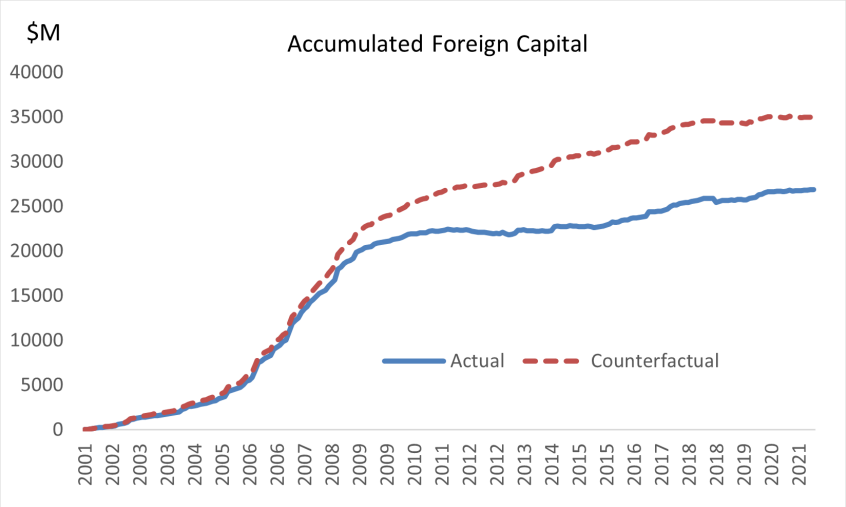
The accumulated impact of terrorism has had a major impact on foreign capital in Pakistan. Over the entire sample, terrorism in Pakistan caused foreign capital stock to be about $8.1 billion US dollars lower than it might have been in the absence of terror (in constant 2010 values). This is about 30 percent of the actual foreign capital stock in Pakistan as of June 2021. For robustness, we re-estimate effects using fatalities instead of casualties as our measure of terrorism. The estimated impacts are even larger with this specification, suggesting that our baseline estimate of an $8 billion reduction in foreign capital may represent a lower bound of the true effect.

Figure 3 shows the actual and counterfactual accumulated foreign capital in Pakistan. It reveals several interesting features. First, terrorism has had a major accumulated impact on foreign capital. The dotted line depicts counterfactual foreign capital stock that would have materialized had there been no terrorism and the solid line depicts the actual foreign capital stock in Pakistan. The divergence between counterfactual and actual capital stock increases substantially from 2008 onwards. Second, foreign capital stock increased fastest between 2001 and 2008, stagnated between 2008 and 2013, and then increased only moderately until 2020. Third, Figure 3 also shows that if there had been no terrorism in Pakistan, foreign capital stock would have continued to grow. Thus, terror attacks continue to pose a severe setback for capital accumulation and thus for economic development in Pakistan.

As seen before, for the same number of casualties, attacks in major cities have a much larger impact on NFDI. Table A5 illustrates this. Attacks in the major cities only constitute around 21 percent of all terrorism-related casualties in Pakistan, but are responsible for around 45 percent of the reduction in NFDI caused by terrorism. In contrast, attacks in the periphery are responsible for around 79 percent of casualties, but account for only around 55 percent of the reduction in NFDI.

Using fatalities instead of casualties as a terror measure, the impulse-response estimates (IRFs) show that terrorism in major cities decreases NFDI by about $16.2M, $16.5M, $16M, $20.2M and $16.8M in periods 1, 2, 7, 12 and 15 following an attack. For the periphery, the IRFs indicate that a standard attack reduces NFDI by around $18.5M, $16M, and $22.4M in periods 3, 6, and 7, respectively. In this specification, the impact of terrorism on NFDI is even larger and again statistically significant: terrorism in Pakistan sent foreign capital stock about $17.7 billion US dollars lower than it would have been in the absence of terror (in constant 2010 values). The counterfactual shows that without terrorism, FDI stock may have been 65 per cent higher.

Figure 3: Actual and Hypothetical Foreign Capital in the Absence of Terror



6.3 Business centers vs. political and security centers

As attacks in central cities deter more FDI than similar attacks in peripheral areas, an important asymmetry emerges. Two mechanisms could explain this. The first is mechanical: central hubs host more foreign firms, so the same attack destroys a larger volume of capital. The second is perceptual: attacks on the center send a stronger signal, undermining confidence in government stability and capacity, supply chains, and the overall investment climate. Distinction between these channels is crucial, yet absent in the literature. Our data provide leverage by separating Pakistan's political center, where little FDI is located, from its economic center, which hosts a substantial share. If attacks on the political center prove as detrimental to FDI as those on the economic center, it would reveal that the dominant force behind this asymmetry is the signal channel: central attacks reverberate internationally, deterring investment far beyond their immediate location.

We refine our definition of core cities into two distinct categories: economic hubs (Karachi and Lahore) and political-security centers (Islamabad and Rawalpindi). Islamabad hosts Pakistan's key political institutions (the parliament, judiciary, and executive) and the bulk of foreign embassies. Rawalpindi, its twin city, houses the General Headquarters of the military and is the operational nerve center of Pakistan's security apparatus.

We run two separate VAR models to test for differential FDI responses. The first estimates the impact of terrorist attacks in Karachi and Lahore relative to all other regions, excluding Islamabad and Rawalpindi. The second assesses the effect of attacks in Islamabad and Rawalpindi relative to all other regions, excluding Karachi

and Lahore. By mimicking a difference-in-differences design (controlling for common macroeconomic shocks, policy shifts, and broader trends that affect both the core and periphery), it allows us to test if the core-periphery asymmetry persists when isolating the economic from political-military core.

Results yield two key findings. First, in both models, the core-periphery wedge remains statistically significant and economically meaningful, underscoring the robustness of our core hypothesis: terrorist attacks in central locations disproportionately reduce FDI. Second, terrorism in Islamabad and Rawalpindi causes a larger adverse effect compared to Karachi and Lahore, despite Islamabad and Rawalpindi having substantially lower populations and FDI than Karachi and Lahore. Three plausible mechanisms may underlie this pattern (alluded to in the framework section): (i) attacks near national institutions may erode perceptions of state capacity and political stability; (ii) the proximity of embassies and international media centers may amplify international concern, potentially affecting travel warnings and investment sentiment; and (iii) the symbolism of attacks targeting government or military infrastructure may trigger sharper negative updates in investor expectations, leading to deeper FDI contractions (see Section 2).

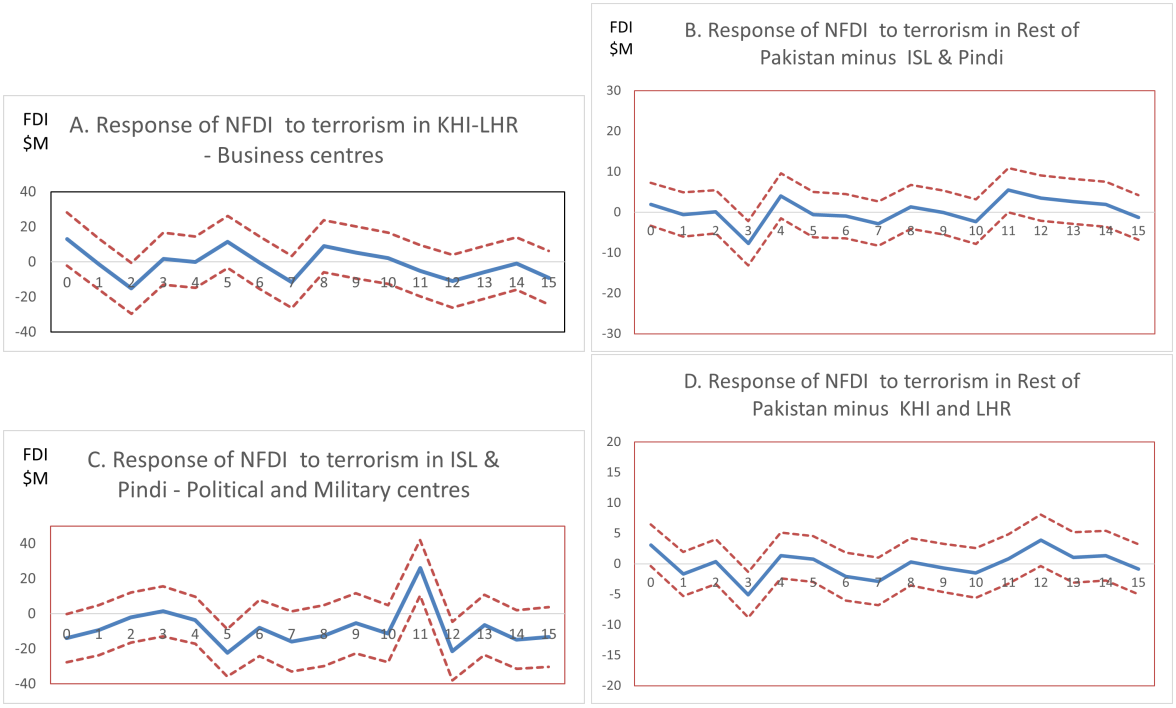
This additional analysis not only corroborates our core-periphery framework but also reveals important heterogeneity within core regions, highlighting that the political and security geography of terrorism matters as much as its economic geography.

Moreover, we can rule out the possibility that the stronger impact of attacks in central cities is merely due to their higher concentration of FDI. Our findings show that attacks in the political center have an equally large or greater, negative effect on overall FDI. This suggests such attacks convey a broader signal to investors, beyond the direct threat to firms located in the affected city. This supports our earlier claim that the channel through which attacks reduce FDI is more likely the re-evaluation of risk than the direct cost of physical damage.

7 Further Robustness Checks

Our findings are robust to a wide range of tests, detailed in the supplementary materials. Results remain unchanged when we broaden the definition of central cities to include Faisalabad and Gujranwala, disaggregate attacks by business versus non-business targets (motivated by Powers and Choi (2012) who suggested that only attacks on business would deter FDI), or substitute fatalities for casualties as our measure of terrorism intensity. Our results also hold across alternative econometric specifications, including varying lag lengths based on Hsiao (1981) criteria, imposing a uniform lag length, or extending lags well beyond the optimal length, and under the Toda and Yamamoto (1995) procedure designed to address possible non-stationarity. Likewise, results are stable to alternative ordering of the Cholesky decomposition, including reversing the baseline ordering so that economic conditions contemporaneously

Figure 4: Business Centers vs Political and Military Centers



Notes: Shock in Panel B is normalized to that of KHI and LHR and shock in in Panel D is normalized to Islamabad and Rawalpindi. (Karachi and Lahore are excluded.) Shocks in Panels A and C are similar. Plus, the dynamics in periphery are not large, as such, we have reduced the y axis range to show dynamics.

affect terrorism, and switching the ordering between central and peripheral attacks. Finally, results are robust to reintroducing the real exchange rate in both differenced and stationary forms. In all cases, the impulse responses remain qualitatively similar, with terrorist attacks in major cities consistently producing significantly larger negative effects on FDI than attacks in the periphery. We also discuss if terror per capita (suggested by Jetter and Stadelmann, 2019) is a better measure for terror in our context. These results strengthen the confidence that the documented asymmetry is not an artifact of modeling choices or identification assumptions. These results are discussed in the Supplementary Materials file (Appendix C and figures presented in D).

8 Granger Causality

Before implementing impulse response functions from the VAR framework, we undertook Granger causality tests to analyze the dynamic relationship between terrorism and FDI. These tests assess whether past values of one variable significantly predict future values of another. The results are given in the Supplementary Material, Section

E.

Key Findings from Granger Causality Tests: The Granger causality Wald test results confirm a predictive relationship between terrorism and FDI, while reinforcing the hypothesis that urban terrorism has a more substantial impact on investment. First, urban terrorism significantly Granger-causes FDI ($\chi^2 = 98.885, p = 0.000$), indicating that past terrorist activity in major cities strongly predicts future reductions in foreign investment. Conversely, FDI also Granger-causes urban terrorism ($\chi^2 = 46.027, p = 0.000$), suggesting that fluctuations in investment inflows may influence the frequency or intensity of urban terrorist attacks. This is discussed below for its important policy implications. A similar predictive relationship exists between peripheral terrorism and FDI, though the effect is weaker. Peripheral terrorism Granger-causes FDI ($\chi^2 = 43.275, p = 0.001$), confirming that attacks in remote areas also deter investment, but to a lesser extent than urban terrorism. In turn, FDI also Granger-causes peripheral terrorism ($\chi^2 = 49.597, p = 0.000$), suggesting that economic conditions play a role in shaping terrorist activity outside major cities. These results also confirms our earlier claim, that a single equation framework would be inappropriate and we need to use a VAR based system that treats FDI and terrorism variables as endogenous. The higher χ^2 values for urban terrorism compared to peripheral terrorism indicate that attacks in economic and political hubs exert a stronger deterrent effect on investment decisions. These results reinforce the core-periphery hypothesis by demonstrating that terrorist activity in urban centers is more economically damaging than in peripheral areas.

VAR ordering as a result of Granger Causality: As a result of the Granger causality tests and to ensure the robustness of our findings, we assess whether the results hold under different VAR orderings. Specifically, we estimate three alternative specifications: one where both urban terrorism and peripheral attacks are placed before FDI, another where they are placed after FDI, and a third where peripheral attacks are ordered before urban terrorism. Across all these specifications, the results remain qualitatively consistent, reinforcing the robustness of the bidirectional relationships between terrorism and FDI. These findings further strengthen the conclusion that urban terrorism has a more substantial impact on FDI than peripheral attacks, independent of how the variables are ordered in the VAR framework.

9 Terrorists react to increased foreign investment

The impulse response function in Figure A5 shows that increases in FDI are followed by a significant rise in terrorist attacks, particularly around the second and fifth months in the aggregate (Panel A). This suggests a reactionary pattern by terrorist groups, potentially aimed at deterring foreign investment and disrupting economic recovery. These dynamics support the view that terrorists may seek to undermine economic confidence, either by targeting symbols of progress or by dissuading further investment inflows. The timing and intensity of these responses likely highlight the strategic intent

behind such attacks.

Further, when we disaggregate these results by core-periphery, we see that terrorists attack both core and periphery, though the attacks in the periphery are more immediate, within the first two months (Panel C), while attacks in the core are typically four to five months after the increase in FDI (Panel B). This pattern may reflect that organizing a terror attack in a major city requires significantly more preparation.

10 Conclusion

Our analysis was motivated by a simple but important question: do terrorist attacks have different impacts depending on where they are staged? We hypothesized that attacks in the center are more detrimental to FDI than those in the periphery because they attract greater international attention, heighten perceived country risk by signaling weaker political/economic stability and state capacity, receive amplified media coverage and embassy briefings to investors, and disrupt critical transportation and business nodes. Using Pakistan as a case study, we find precisely this pattern. Compared with shocks to business centers, attacks on political and security institutions carry greater credibility costs, leading investors to reprice risk more sharply and reduce FDI further.

While the literature has ignored this geographic heterogeneity of terror, we link to the agglomeration and state capacity literature. Our analysis suggests the spatial dimension of terror must be accounted for when analyzing the consequences of terror. The impact of terror on FDI depends on the centrality of the attack location. While this paper focuses on FDI, its framework could apply to any spatially determined economic or political costs of violence, such as overall growth, political fallout, stock market repercussions, or international trade. Results may vary systematically across countries depending on the relative importance of their political and economic centers. This calls for empirical analyses in the contexts of other countries, which in turn might provide insight into why more decentralized countries are less vulnerable to terror attacks, as shown by Dreher and Fischer (2010).

We test the hypothesis that terrorism has heterogeneous impacts depending on location, applying a VAR approach, the workhorse of empirical macroeconomics. Our paper is the first to show that the economic costs of terrorism depend significantly on geographic location. These results remain robust to different samples, specifications, and various alternative definitions. Our quasi DID VAR, differentiating political hubs and business hubs within the central cities, corroborates our findings. The paper finds very sizeable effects: terror attacks have reduced FDI by 8.1bn US dollars, around 30 percent of actual foreign capital stock, which is our lower bound estimate. This terror-induced reduction in net FDI thus imposes substantial costs on Pakistani society, highlighting the alarming capacity of terrorism to disrupt investment and deter development (FDI is also an important vehicle for technology transfer).

We also find that periods of FDI growth are often followed by spikes in terrorist attacks. This suggests terrorists react strategically to rising investment. Their attacks appear timed to deter future FDI and disrupt economic momentum. Thus, state capacity and security are inputs to growth: countries confronting terrorism should sequence recovery with visible enhancements in protection, and that periods of FDI growth are often followed strong signals to investors.

Taken together, our findings not only deepen understanding of how terrorism disrupts economic trajectories, but also introduce a new framework for assessing the costs of violence through a spatial lens that highlights how localized shocks can produce systemic and uneven consequences. This approach places geography at the center of the economic analysis of (in)security.

Our findings have direct policy implications as they suggest a spatially differentiated counterterrorism approach, focusing on central cities and employing fewer resources in the periphery. Relatedly, effective policies designed to attract foreign investment need to consider a terrorist backlash in the aftermath of increased FDI. Of course, optimal counterterrorism policies will still need to protect lives in the periphery.

Future work could continue to explore how location-specific vulnerabilities interact with investment behavior and institutional resilience. It could also analyze how the center-periphery divide in responses to terror is shaped by the economic geography of a country and which factors determine the magnitude of the center-periphery divide.

References

Abadie, A., & Dermisi, S. (2008). Is Terrorism Eroding Agglomeration Economies in Central Business Districts? Lessons from the Office Real Estate Market in Downtown Chicago. *Journal of Urban Economics*, *64*(2), 451–463.

Abadie, A., & Gardeazabal, J. (2003). The Economic Costs of Conflict: A Case Study of the Basque Country. *American Economic Review*, *93*(1), 113–132.

Abadie, A., & Gardeazabal, J. (2008). Terrorism and the World Economy. *European Economic Review*, *52*(1), 1–27.

Abbas, S. A., & Syed, S. H. (2021). Sectarian terrorism in Pakistan: Causes, impact and remedies. *Journal of Policy Modeling*, *43*, 350–361.

Acemoglu, D. (2005). Politics and Economics in Weak and Strong States. *Journal of Monetary Economics*, *52*(7), 1199–1226.

Ajide, K. B. (2025). Do Terrorist Attacks Deter Foreign Investors from Entering African Markets? *International Economic Journal*, *39*(3), 531–567.

Akay, A., Bargain, O., & Elsayed, A. (2020). Global terror, well-being and political attitudes. *European Economic Review*, *123*, 103394.

Alam, A. (2013). Terrorism and stock market development: Causality evidence from Pakistan. *Journal of Financial Crime*, *20*(1), 116–128.

Arbel, Y., Ben-Shahar, D., Gabriel, S., & Tobol, Y. (2010). The local cost of terror: Effects of the second Palestinian Intifada on Jerusalem house prices. *Regional Science and Urban Economics*, *40*(6), 415–426.

Arif, I., Rawat, A., & Khan, L. (2021). Does terrorism hamper FDI inflows? A pre and post 9/11 analysis. *Journal of Economic Studies*, *48*(5), 968–980.

Aslam, F., & Kang, H. G. (2015). How different terrorist attacks affect stock markets. *Defence and Peace Economics*, *26*(6), 634–648.

Bandyopadhyay, S., Sandler, T., & Younas, J. (2014). Foreign direct investment, aid, and terrorism. *Oxford Economic Papers*, *66*(1), 25–50.

Bank, W. (2024). World development indicators [accessed 2024].

Basuchoudhary, A., & Schulze, G. (2025). The Economic Approach to the Analysis of Terrorism [forthcoming, chapter 1]. In A. Basuchoudhary & G. Schulze (Eds.), *Cambridge Handbook on the Economics of Terrorism*. Cambridge University Press.

BBC. (2014). Pakistan's Nawaz Sharif seeks Taliban talks despite attacks. http://www.bbc.com/news/world-asia-25943669

Becker, G., & Rubinstein, Y. (2011). *Fear and the response to terrorism: An economic analysis* (Centre for Economic Performance (CEP) Working Paper No. 1079). London School of Economics and Political Science.

Becketti, S. (2013). *Introduction to time series using stata*. Stata Press books.

Berman, O., & Gavious, A. (2007). Location of terror response facilities: A game between state and terrorist. *European Journal of Operational Research*, *177*(2), 1113–1133.

Berrebi, C., & Klor, E. F. (2008). Are voters sensitive to terrorism? Direct evidence from the Israeli electorate. *American Political Science Review*, *102*(3), 279–301.

Berrebi, C., & Lakdawalla, D. (2007). How does terrorism risk vary across space and time? An analysis based on the Israeli experience. *Defence and Peace Economics*, *18*(2), 113–131.

Besley, T., & Mueller, H. (2012). Estimating the peace dividend: The impact of violence on house prices in Northern Ireland. *American Economic Review*, *102*(2), 810–833.

Biglaiser, G., Hunter, L. Y., & McGauvran, R. J. (2023). The Double-Edged Sword of Foreign Direct Investment on Domestic Terrorism. *Journal of Conflict Resolution*, *67*(9), 1647–1674.

Blomberg, S. B., Hess, G., & Orphanides, A. (2004). The macroeconomic consequences of terrorism. *Journal of Monetary Economics*, *51*, 1007–1032.

Blomberg, S. B., & Mody, A. (2005). *How severely does violence deter international investment?* (Working paper series No. 2005-01). Claremont Institute for Economic Policy Studies. http://www.econstor.eu/bitstream/10419/31451/1/505127970.pdf

Bokhari, F. (2014). Pakistan pounds taliban strongholds. Retrieved March 13, 2021, from https://www.irishtimes.com/news/world/asia-pacific/pakistan-pounds-taliban-strongholds-1.1833289

Boone, J. (2014). Pakistan begins long-awaited offensive to root out militants from border region. *The Guardian*.

Borensztein, E. J., De Gregorio, J., & Lee, J.-W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, *45*(1), 115–135.

Boumans, D., Garnitz, J., & Schulze, G. (2017). Who Has Terror Angst? Perceptions of the Effects of Terror on the World Economy. *Applied Economics Letters*, *25*(1), 29–33.

Breschi, S., & Lissoni, F. (2009). Mobility of skilled workers and co-invention networks: An anatomy of localized knowledge flows. *Journal of Economic Geography*, *9*(4), 439–468.

Brodeur, A. (2018). The effect of terrorism on employment and consumer sentiment: Evidence from successful and failed terror attacks. *American Economic Journal: Applied Economics*, *10*(4), 246–282.

Brück, T. (2005). An economic analysis of security policies. *Defence and Peace Economics*, *16*(5), 375–389.

Brunnermeier, M., Palia, D., Sastry, K. A., & Sims, C. A. (2021). Feedbacks: Financial Markets and Economic Activity. *American Economic Review*, *111*(6), 1845–79.

Busse, M., & Hefeker, C. (2007). Political risk, institutions and foreign direct investment. *European Journal of Political Economy*, *23*(2), 397–415.

Chesney, M., Reshetar, G., & Karaman, M. (2011). The impact of terrorism on financial markets: An empirical study. *Journal of Banking and Finance*, *35*(2), 253–267.

Cutler, D. M., & Glaeser, E. (2024). The mysteries of cities and economic growth. *IMF Finance Development*. https://www.imf.org/en/publications/fandd/issues/2024/12/point-of-view-the-mysteries-of-cities-and-economic-growth-david-cutler

Dawn. (2014). Kayani was reluctant to launch N Waziristan operation. http://www.dawn.com/news/1116115

Dawn. (2025). US acknowledges Pakistan's efforts in counter-terrorism: Pentagon. https://www.dawn.com/news/1916524

Demkiv, A. (2009). Pakistan's FATA, Transnational Terrorism and the Global Development Model [Winter/Spring]. *Journal of Global Change and Governance*, *2*(1), 2.

Dincecco, M., & Katz, G. (2016). State capacity and long-run economic performance. *The Economic Journal*, *126*(590), 189–218.

Dreher, A., & Fischer, J. (2010). Government Decentralization as a Disincentive for Transnational Terror? an Empirical Analysis. *International Economic Review*, *51*(4), 981–1002.

Duranton, G., & Puga, D. (2013). The growth of cities.

Eckstein, Z., & Tsiddon, D. (2004). Macroeconomic consequences of terror: Theory and the case of Israel. *Journal of Monetary Economics*, *51*, 971–1002.

Elster, Y., Zussman, A., & Zussman, N. (2017). Rockets: The housing market effects of a credible terrorist threat. *Journal of Urban Economics*, *99*, 136–147.

Enders, W. (2008). *Applied econometric time series*. John Wiley & Sons.

Enders, W. (2010). *Applied Econometric Time Series* (3rd ed.). John Wiley & Sons.
Enders, W., & Sandler, T. (1996). Terrorism and foreign direct investment in Spain and Greece. *Kyklos*, *49*, 331–352.
Enders, W., & Sandler, T. (2012). *The Political Economy of Terrorism* (2nd ed.). Cambridge University Press.
Federal Bureau of Investigation (FBI). (2021). *Strategic report: Countering domestic terrorism*. https://www.fbi.gov/file-repository/counterterrorism/fbi-dhs-domestic-terrorism-strategic-report.pdf
Fleming, C. M., Manning, M., Pham, H. T., & Vorsina, M. (2022). Ethnic economic inequality and fatalities from terrorism. *Journal of Interpersonal Violence*, *37*(11-12), 9089–9114.
Frey, B., & Luechinger, S. (2004). Decentralization as a Disincentive for Terror. *European Journal of Political Economy*, *20*(2), 509–515.
Fry-Mckibbin, R., Greenwood-Nimmo, M., Kima, R., & Volkov, V. (2025). A three-sector structural var model for Australia. *Journal of Economic Dynamics and Control*, *170*, 105029.
Gaibulloev, K., & Sandler, T. (2008). Growth consequences of terrorism in Western Europe. *Kyklos*, *61*(3), 411–424.
Gassebner, M., Jong-A-Pin, R., & Mierau, J. (2011). Terrorism and cabinet duration. *International Economic Review*, *52*(4), 1253–1270.
Gassebner, M., Jong-A-Pin, R., & Mierau, J. O. (2008). Terrorism and electoral accountability: One strike, you're out! *Economics Letters*, *100*(1), 126–129.
Gassebner, M., Schaudt, P., & Wong, M. H. L. (2023). Armed groups: Competition and political violence. *Journal of Development Economics*, *162*, 103052.
Goel, S., Cagleb, S., & Shawky, H. (2017). How vulnerable are international financial markets to terrorism? An empirical study based on terrorist incidents worldwide. *Journal of Financial Stability*, *33*, 120–132.
Haider, M. (2014). RAW involved in terrorist activities across Pakistan: Foreign secretary. *Dawn*. http://www.dawn.com/news/1181908
Hamilton, J. (2020). *Time series analysis*. Princeton University Press.
Hirschman, A. O. (1958). *The strategy of economic development*. Yale University Press.
Hsiao, C. (1981). Autoregressive modeling and money-income causality detection. *Journal of Monetary Economics*, *7*(1), 85–106.
Hunt, K., & Zhuang, J. (2024). A review of attacker-defender games: Current state and paths forward. *European Journal of Operational Research*, *313*(2), 401–417.
Hussain, S., & Khan, H. N. (2014). Pakistan military says 105 killed in airstrikes on Taliban and other militants' hideouts. *The Washington Post*. https://www.washingtonpost.com/world/pakistan-dozens-killed-in-strikes-on-militants/2014/06/15/f8a06d48-f45e-11e3-bf76-447a5df6411f_story.html
Imran, S., Amin, M., Tahir, M. N., Imran, M., Karim, S., & Usman, T. (2023). Geographical spread analysis of terrorist attacks in Pakistan. *GeoJournal*, *88*, 4585–4601.

Iqbal, A. (2014). Militants hiding in Pakistani cities: CIA's ex-chief. *Dawn*. Retrieved March 14, 2021, from http://www.dawn.com/news/1125844

Islam, M., & Beloucif, A. (2024). Determinants of Foreign Direct Investment: A Systematic Review of the Empirical Studies. *Foreign Trade Review*, *59*(2), 309–337.

Ismail, A., & Amjad, S. (2014). Determinants of Terrorism in Pakistan: An Empirical Investigation. *Economic Modelling*, *37*, 320–331.

Jetter, M. (2017). The effect of media attention on terrorism. *Journal of Public Economics*, *153*, 32–48.

Jetter, M., & Stadelmann, D. (2019). Terror per capita. *Southern Economic Journal*, *86*(1), 286–304.

Jin, G., Karim, M. R., & Schulze, G. G. (2024). *The Stock Market Effects of Islamist versus Non-Islamist Terror* (CESifo Working Paper No. 10960). Center for Economic Studies and ifo Institute (CESifo). Munich.

Keller, W. (2004). International technology diffusion. *Journal of Economic Literature*, *42*(3), 752–782.

Kim, H. S., Matthes, C., & Phan, T. (2025). Severe weather and the macroeconomy. *American Economic Journal: Macroeconomics*, *17*(2), 315–341.

Kis-Katos, K., Liebert, H., & Schulze, G. (2011). On the Origin of Domestic and International Terror. *European Journal of Political Economy*, *27*, 17–36.

Kis-Katos, K., Liebert, H., & Schulze, G. (2014). On the Heterogeneity of Terror. *European Economic Review*, *68*, 116–136.

Klotzbücher, V., & Schulze, G. (2025). Tourism. In A. Basuchoudhary & G. Schulze (Eds.), *Handbook on the Economics of Terrorism*. Cambridge University Press.

Krieger, T., & Meierrieks, D. (2019). Income inequality, redistribution and domestic terrorism. *World Development*, *116*, 125–136.

Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, *99*(3), 483–499.

LaFree, G., & Dugan, L. (2007). Introducing the global terrorism database. *Terrorism and Political Violence*, *19*(2), 181–204.

LaFree, G., Dugan, L., Xie, M., & Singh, P. (2012). Spatial and temporal patterns of terrorist attacks by ETA 1970 to 2007. *Journal of Quantitative Criminology*, *28*(1), 7–29.

Li, Q., Li, M., Gan, J., & Guo, C. (2021). A game-theoretic approach for the location of terror response facilities with both disruption risk and hidden information. *International Transactions in Operational Research*, *28*(4), 1864–1889.

Lütkepohl, H. (1982). Non-causality due to omitted variables. *Journal of Econometrics*, *19*(2-3), 367–378.

Lütkepohl, H. (2007). *New introduction to multiple time series analysis*. Springer.

Makki, S., & Somwaru, A. (2004). Impact of Foreign Direct Investment and Trade on Economic Growth: Evidence From Developing Countries. *American Journal of Agricultural Economics*, *86*(3), 795–801.

Malik, Z., & Zaman, K. (2013). Macroeconomic consequences of terrorism in Pakistan. *Journal of Policy Modeling*, *35*(6), 1103–1123.

Marchment, Z., & Gill, P. (2022). Spatial decision making of terrorist target selection: Introducing the TRACK framework. *Studies in Conflict & Terrorism*, *45*(10), 862–880.

Marineau, J., Pascoe, H., Braithwaite, A., Findley, M., & Young, J. (2020). The local geography of transnational terrorism. *Conflict Management and Peace Science*, *37*(3), 350–381.

McGauvran, R. J., Biglaiser, G., Hunter, L. Y., & Lee, H. (2024). The Effect of Terrorism on Income Inequality. *International Studies Quarterly*, *68*(2), sqae043.

Mehmood, S. (2014). Terrorism and the macroeconomy: Evidence from Pakistan. *Defence and Peace Economics*, *25*(5), 509–534.

Meierricks, D. (2025). Macroeconomic Consequences of and Economic Resilience to Terrorism. In A. Basuchoudhary & G. Schulze (Eds.), *Handbook on the Economics of Terrorism*. Cambridge University Press.

Melnick, R., & Eldor, R. (2010). Small investment and large returns: Terrorism, Media and the Economy. *European Economic Review*, *54*(8), 963–973.

Melo, P. C., Graham, D. J., & Noland, R. B. (2009). A meta-analysis of estimates of urban agglomeration economies. *Regional Science and Urban Economics*, *39*(3), 332–342.

Mills, E. S. (2002). Terrorism and US real estate. *Journal of Urban Economics*, *51*, 198–204.

Mitra, D., Pham, C., & Bandyopadhyay, S. (2018). Terrorism and international air travel: A gravity approach. *World Economy*, *41*, 2852–2882.

Montalvo, J. (2025). Terrorism, Voting Behavior, and Political Attitudes. In A. Basuchoudhary & G. Schulze (Eds.), *Handbook on the Economics of Terrorism*. Cambridge University Press.

NATO. (2024). Countering terrorism. *North Atlantic Treaty Organization*. https://www.nato.int/cps/en/natohq/official_texts_228154.htm

Nawaz, S. (2009). FATA – A most dangerous place. *Center for Strategic and International Studies*, 15.

Nemeth, S. C. N., Mauslein, J. A., & Stapley, C. (2014). The primacy of the local: Identifying terrorist hot spots using geographic information systems. *The Journal of Politics*, *76*(2), 304–317. https://doi.org/10.1017/S0022381614000058

Nikkinen, J., & Vähämaa, S. (2010). Terrorism and stock market sentiment. *Financial Review*, *45*(2), 263–275.

Osgood, I., & Simonelli, C. (2020). Nowhere to Go: FDI, Terror, and Market-specific Assets. *Journal of Conflict Resolution*, *64*(9), 1584–1611.

Paliwal, A. (2017). *My enemy's enemy: India in Afghanistan from the Soviet invasion to the US withdrawal*. Oxford University Press.

Patterson, K. D. (2000). An introduction to applied econometrics: A time series approach. *(No Title)*.

Perry, W., Berrebi, C., Brown, R. A., Hollywood, J., & Jaycocks, A. (2013). Predicting suicide attacks: Integrating spatial, temporal, and social features of terrorist attack targets. *Rand Corporation*.

Phillips, P., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, *75*, 335–346.

Powers, M., & Choi, S.-W. (2012). Does transnational terrorism reduce foreign direct investment? Business-related versus non-business-related terrorism. *Journal of Peace Research*, *49*(3), 407–422.

Robinson, J. A., & Acemoglu, D. (2012). *Why nations fail: The origins of power, prosperity and poverty*. Profile.

Saleem, F. (2014). India disappointed by Zarb-e-Azb's success. *The News*.

Santifort, C., Sandler, T., & Brandt, P. T. (2013). Terrorist attack and target diversity: Changepoints and their drivers. *Journal of Peace Research*, *50*(1), 75–90.

Schlesinger, J. R., & Tomashevskiy, A. (2024). Terror, Political Risk, and Effect on Foreign Direct Investment. *Terrorism and Political Violence*, *36*(2), 145–165. https://doi.org/10.1080/09546553.2022.2122816

Shahbaz, M., Shabbir, M. S., Malik, M. N., & Wolters, M. E. (2013). An analysis of a causal relationship between economic growth and terrorism in Pakistan. *Economic Modelling*, *35*, 21–29.

Sims, C. A. (1980). Macroeconomics and Reality. *Econometrica*, *48*(1), 1–48.

START. (2022). Global Terrorism Database. http://www.start.umd.edu/gtd/

Tavares, J. (2004). The open society assesses its enemies: Shocks, disasters and terrorist attacks. *Journal of Monetary Economics*, *51*, 1039–1070.

The Express Tribune. (2011). Al Qaeda safe havens in FATA still pose threat: US [1. July 2011]. http://tribune.com.pk/story/200204/al-qaeda-safe-havens-in-fata-still-pose-threat-us/

The Express Tribune. (2014a). Kayani was reluctant to launch Waziristan operation three years ago [30. June 2014]. https://tribune.com.pk/story/729162/kayani-was-reluctant-to-launch-n-waziristan-operation-three-years-ago

The Express Tribune. (2014b). Operation updates: Air strikes kill 17 suspected militants in North Waziristan [2. December 2014]. https://tribune.com.pk/story/800607/air-strikes-kill-17-suspected-militants-in-north-waziristan

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, *66*(1–2), 225–250. https://doi.org/10.1016/0304-4076(94)01616-8

Wilkinson, I. (2008). Pakistan analysis: How President Pervez Musharraf fell from favour [18. August 2008]. *The Telegraph*.

Wooldridge, J. (2020). *Introductory Econometrics: A Modern Approach* (7th ed.). Cengage Learning.

Wooldridge, J. M. (2010). *Econometric Analysis of Cross-Section and Panel Data* (2nd ed.). MIT Press.

Yasuda, N., & Kotabe, M. (2021). Political risks and foreign direct investments by multinational corporations: A reference point approach. *Global Strategy Journal*, *11*(2), 156–184.

Yousaf, K. (2014). Operation Zarb-e-Azb: Military brass vows not to allow terrorists to regroup. *The Express Tribune*.

Zivot, E., & Andrews, D. W. K. (2002). Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis. *Journal of Business & Economic Statistics*, *20*(1), 25–44.

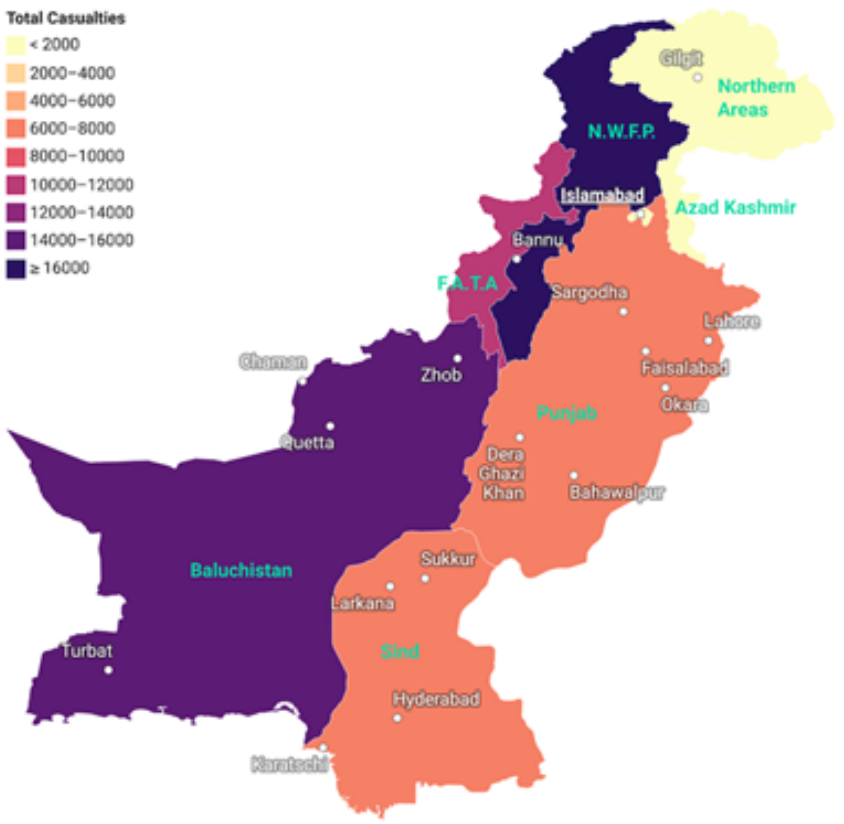
Supplementary Material to Majeed and Schulze, FDI and the Geography of Terror

Table of Contents – Supplementary Material

A Data and Descriptive Evidence

A.1 Geographical breakdown of terror attacks

Figure A1: Spatial distribution of terror casualties

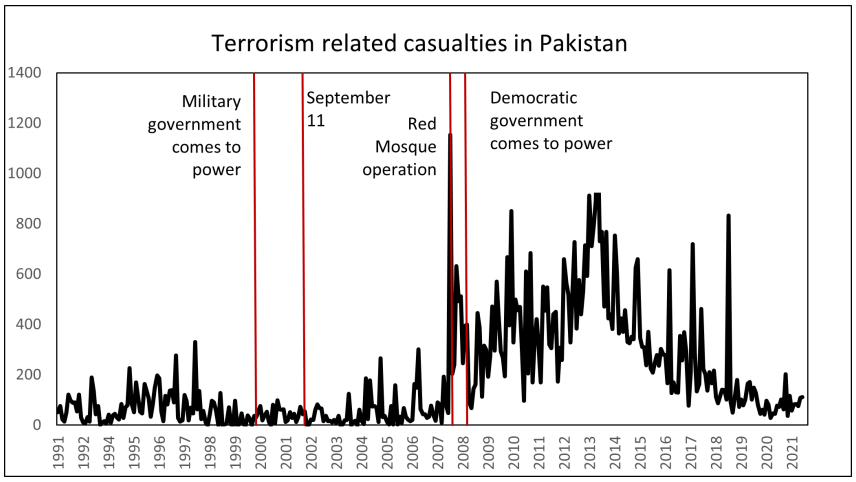


Source: Global Terrorism Database, own calculations; casualty figures refer to the sum of terror casualties per province for the period 2001-2021. The lines delineate the four provinces Baluchistan, Sind, Punjab, and the Northwest Frontier Province Khyber Pakhtunkhwa as well as the Federally Administered Tribal Areas (FATA), the Northern Areas, Azad Kashmir, and the Federal Capital Territory. Selected major cities are indicated by name.

A.2 Terror casualties and fatalities: national trends and important groups

Terror casualties over time

Figure A2: Terror Casualties in Pakistan



Source: Global Terrorism Database; casualties include killed and injured people.

Important terror groups

Terrorism in Pakistan has been fueled by religious divides (Sunnis against Shias, radical interpretation of Islam against mainstream), ethnic divides, and political extremism (especially with respect to Balochistan) and regional rivalry.[1] Terror groups' activities are local, many transborder (Afghanistan-Pakistan and Kashmir, Pakistan-India) and global (Al Quaeda). While there are several terrorist organizations with various agendas in Pakistan, seven prominent ones stand out. Table A1 below gives the casualties caused by these terrorist organizations.

Table A1: Terror casualties by terrorist organization 2001 July to June 2021

Organization	Casualties
Taliban and affiliates*	16,467
Balochistan Liberation Army and affiliates	3,614
Laser-e-Jhangvi	3,548
Khorasan Chapter of the Islamic State	2,056
Al Qaeda	703
Jundallah (Pakistan)	667
Lashkar-e-Islam (Pakistan)	523

*All factions of Taliban including Tahreik-i-Taliban, Punjabi Taliban, Taliban.
Source: Global Terrorism Database. Casualties refer to casualties (fatalities and injuries) on Pakistani soil.

[1]Paliwal, A. (2017). My enemy's enemy: India in Afghanistan from the Soviet invasion to the US withdrawal. Oxford University Press.

A.3 Provincial and city-level distribution of FDI (World Bank Enterprise Survey)

Table A2: Panel A: World Bank Enterprise Survey 2007, location of sampled firms

	Total sample		Firms with foreign ownership	
Region/City	Freq.	Percent	Freq.	Percent
Karachi	289	21.62	19	55.88
Lahore	200	14.96	5	14.71
Sheikhupura	42	3.14	-	-
Sialkot	114	8.53	1	2.94
Faisalabad	165	12.34	3	8.82
Gujranwala	133	9.95	-	-
Wazirabad	41	3.07	-	-
Islamabad/Rawalpindi	87	6.51	2	5.88
Sukkur	39	2.92	-	-
Hyderabad	45	3.37	1	2.94
Quetta	73	5.46	1	2.94
Peshawar	102	7.63	-	-
Hub	7	0.52	2	5.88
Total	1,337	100	34	100

Panel B: World Bank Enterprise Survey 2013 and 2022, location of interview

	Main Business City		
	Yes	No	Total
domestic	2,206 88.56%	285 11.44%	2,491 100%
foreign	44 78.57%	12 21.43%	56 100%
Total	2,250 88.34%	297 11.66%	2,547 100%

Source: World Bank Enterprise Survey Pakistan 2007 (panel A) and 2013 and 2022 combined (panel B)

A.4 Unit root tests and stationarity checks

Table A3 summarizes the various unit root tests described in the paper.

Table A3: Unit Root Tests for Key Variables

Variable	Sample	ADF p-value	ADF Stat	ADF Stationary?	PP p-value	PP Stat	PP Stationary?	ZA Stat (Break Date)	ZA Stationary?
NFDI	Full sample	0.0863	-2.633	No	0.0000	-10.149	Yes	-5.816 (2005m3)	Yes
NFDI	Pre-2008	0.0000	-6.564	Yes	0.0004	-4.305	Yes		
NFDI	Post-2008	0.0000	-6.321	Yes	0.0000	-9.036	Yes		
MC	Full sample	0.0000	-5.643	Yes	0.0000	-13.200	Yes	-8.243 (2007m7)	Yes
All	Full sample	0.0025	-4.359	Yes	0.0000	-7.042	Yes	-4.400 (2007m7)	No
Periphery	Full sample	0.6181	-1.969	No	0.0000	-6.503	Yes	-4.053 (2015m1)	No
Periphery	2001–2007	0.0016	-4.477	Yes	0.0000	-7.693	Yes		
Periphery	2007–2013	0.1209	-3.041	No	0.0000	-5.249	Yes		
Periphery	2013–2021	0.0000	-5.837	Yes	0.0000	-5.727	Yes		
RER_GM	Full sample	0.3356	-2.485	No	0.4510	-1.662	No	-4.378 (2010m1)	No
Δ RER_GM	First difference	0.0000	-13.425	Yes	0.0000	-13.410	Yes		
Real IRD	Full sample	0.2253	-2.149	No	0.0226	-3.157	Yes	-4.505 (2009m3)	No
Δ Real IRD	First difference	0.0000	-7.034	Yes	0.0000	-15.693	Yes		

A.5 Variance decomposition and share analysis

Table A4: Variance decomposition of NFDI

Months ahead	Terror	NFDI
1	0.00	97.0
3	2.30	91.9
6	4.23	88.7
9	7.14	84.4
12	8.49	82.2
15	8.03	80.8
18	7.94	80.9
24	7.83	80.3

Source: own calculations

Table A5: Attacks and their effects on FDI in the center and the periphery

	Proportion of total casualties	Proportion of reduction in NFDI (based on casualties)	Proportion of total fatalities	Proportion of reduction in NFDI (based on fatalities)
Major cities	0.21	0.45	0.18	0.45
Periphery	0.79	0.55	0.82	0.55

Source: own calculations

B Methodological Details

B.1 Variable Selection

To determine which macroeconomic controls to include in the system, we follow the approach developed by Hsiao (1981), using bilateral Granger causality tests on all relevant monthly economic variables available used in the literature (Enders and Sandler 1996) to assess their predictive relevance for NFDI. The Hsiao (1981) methodology provides a disciplined framework for model specification in high-lag VARs and helps to avoid overfitting and ensures parsimony. In particular, we estimate bivariate VARs

between NFDI and each of the potential controls – including terrorism in central cities, terrorism in the periphery, real interest rate disparity, and the real exchange rate (RER). The results indicate a strong Granger causality between NFDI and both terrorism variables and real interest rate disparity. However, RER does not significantly Granger-cause NFDI at conventional levels and is therefore excluded from the benchmark specification. Nonetheless, in Section 7 of the paper, and Section C.4 of the supplementary material, we report on the robustness of our findings by including RER. Full Granger causality results are available upon request.

B.2 Lag selection

To determine the optimal lag length for our VAR system, we apply several standard selection criteria. The Likelihood Ratio (LR) test and the Akaike Information Criterion (AIC) consistently favor 18 lags for most specifications, while the Schwarz Information Criterion (SIC) selects substantially shorter lag lengths – typically one or two. Given that FDI may respond to terrorist shocks with longer delays and that we are working with monthly data, our preferred methodology adopts 18 lags as our benchmark specification. This choice allows us to capture extended dynamics while staying within feasible estimation limits, as models with more than 18 lags would impose significant degrees of freedom constraints.[2]

To further refine this approach, we follow Hsiao's (1981) methodology for variable-specific lag selection by doing tests on individual variables. We conduct individual regressions for each endogenous variable and evaluate alternative lag structures using both AIC and SIC. The AIC supports 18 lags for NFDI_PPI, for terrorism variables, and for interest rate differential.[3] While for individual variables SIC chooses 18 lags for all variables, except terrorism in periphery where it selects 15 lags and 12 lags for the differenced real interest rate disparity. Based on these results, we estimate a restricted VAR that retains 18 lags for the system but imposes constraints to reduce lag lengths for periphery to 15 and for d_real_interestrate_dif1 to 12. The impulse response functions from this restricted system are reported in Section 7 of the paper and show that the core-periphery asymmetry remains robust.

As a robustness check, we estimate an unrestricted 15-lag VAR—the most conservative lag length suggested by AIC or SIC under variable-specific selection – and find our key results unchanged. Across uniform 15-lag, the 18-lag benchmark, and variable-specific restricted VARs, the findings remain qualitatively robust.

[2]The VAR method based on one lag length shows no dynamics. Moreover, relying solely on SIC's minimal lag length (e.g., one lag) would likely miss important temporal effects and fail to capture the full dynamic adjustment of FDI to terrorism shocks.

[3]The SIC chooses a smaller lag length when done on the whole VAR system and longer lag lengths when using the SIC criteria on individual variables.

B.3 Toda-Yamamoto Robustness and Extended Lag Length Check

As an additional robustness check, we implement the Toda and Yamamoto (1995) procedure. This method estimates a VAR in levels, augmenting the lag length by the suspected maximum order of integration (d), which we set to one, as our variables are at most I(1) – as discussed in the unit root test section of the paper. After selecting the optimal lag length p (18 lags, based on the earlier discussion), we estimate an augmented VAR with ($p + d$) lags – i.e., a total of 19 lags. This approach ensures valid statistical inference without requiring pre-tests for unit roots or cointegration. Importantly, Wald tests are applied only to the first p lags, while the additional lag serves to account for possible non-stationarity. This allows us to test for Granger causality in a system that may include integrated or cointegrated processes. The results reaffirm our baseline findings: Terrorist attacks in major cities exert a significantly larger negative impact on NFDI than attacks in peripheral areas.

To further test stability, we re-estimate the VAR with 24 lags – well beyond the AIC/SIC optimum and the Toda-Yamamoto adjustment – and find our core results unchanged: Major city attacks still exert a significantly larger negative impact on NFDI than periphery attacks. This extreme specification allows us to test whether the inclusion of a substantially larger number of lags alters the estimated relationships. Results for these are further discussed in the robustness section.

C Additional Robustness Checks

In this section, we investigate whether the center-periphery pattern is an artifact of our definition of the center and periphery divide or the specification of our econometric model, or whether confounding factors have created our results. If the latter were true, causality could not be clearly identified. Moreover, we analyze whether our results are robust to alternative definitions of terrorist attacks.

C.1 Alternative delineations of center vs. periphery

We extend the definition of the center by additionally including the next two cities with the highest level of FDI based on the World Bank Enterprise Survey 2007, Faisalabad and Gujranwala. Together, these cities accounted for 65.4 percent of FDI in Pakistan in 2007, according to the World Enterprise Survey (Table A2). The standard deviation of terrorist attacks in major cities in this case is 84.92, and for the periphery it is 188.05. Figure A6 shows the results for this alternative definition of the center-periphery divide. Our result remains unaltered with the impact of terror on FDI being significant in the major cities compared to terror attacks in the periphery. Based on this definition, a standardized attack in a major city decreases NFDI by around $32.9 million 2010 US dollars over 15 months: An equally sized attack in the center impacts around $10.2 million of FDI in 2010 US dollars.

C.2 Attacks on businesses vs. other targets

Powers and Choi (2012) make the point that terror significantly deters FDI, but that this effect is entirely driven by terror attacks on businesses whereas attacks on non-business targets have no significant effect on FDI. If that were true in the Pakistani context, our results might have been driven by a confounding effect. As the share of business targets may be higher in the center, because proportionally more businesses locate there (see Section 4.2 and Table A2), the larger effect of attacks in the center on FDI may not have been caused by the centrality of the location, but rather by the different target composition. In order to analyze such a possibility, we differentiate terror attacks targeting businesses from those targeting non-business assets and disaggregate them into central and peripheral attacks, i.e., we disaggregate terrorist attacks into four categories. We modify our VAR system accordingly: As the VAR system has 18 lags, but only a limited number of observations, we cannot put all four categories in our VAR system at the same time. Instead, we run the VAR system separately for each category, controlling for the terror outside of the category. Equation (A1) describes the matrix of control variables.

$$Z_2 = T_{T_{k,m}}, Rest_T P, D.ER, NFDI \tag{A1}$$

where T_T is terror causalities by target type and geography and the subscripts k=business, non-business and m=major cities, periphery. $Rest_T$ denotes the balance of all other terrorist casualties that are not captured by the respective $T_{T_{k,m}}$. To evaluate the impact of terrorism attacking businesses in major cities and in the periphery, the VAR system changes to reflect the above, and the FDI equation from the VAR system becomes:

$$\begin{aligned} NFDI_t = \mu_1 + \sum_1^p b_{1i} Terror_{businesses,centralcities,t-i} + \sum_1^p b_{2i} Rest_{T_{businesses,centralcities,t-i}} \\ + \sum_1^p b_{3i} D.ER_{t-i} + \sum_1^p b_{4i} NFDI_{t-i} + b_5 D_{C_t} + b_6 D_{R_t} + \sum_1^1 1 b_{9i} S_i + \varepsilon_{2t} \end{aligned} \tag{A2}$$

$$\begin{aligned} NFDI_t = \mu_1 + \sum_1^p c_{1i} Terror_{businesses,periphery,t-i} + \sum_1^p c_{2i} Rest_{T_{businesses,periphery,t-i}} \\ + \sum_1^p c_{3i} D.ER_{t-i} + \sum_1^p c_{4i} NFDI_{t-i} + c_5 D_{C_t} + c_6 D_{R_t} + \sum_1^1 1 c_{9i} S_i + \varepsilon_{3t} \end{aligned} \tag{A3}$$

Like in Section 6.2 of the paper, we have to make the IRFs for business targets in major cities and in the periphery comparable. We normalize the shock to the standard deviation of terror casualties from terror attacks against businesses in the central cities and compare the IRFs described in (A1) and (A2) . The standard deviation of terrorist

attacks on businesses in major cities in this case is 24.72, and for the periphery it is 34.56.

A standardized terror attack on businesses in major cities has a substantially larger impact than the same attack on businesses in the periphery (Figure A2 in the appendix). In the major cities it decreases NFDI by around $32.2 million 2010 US dollars. In contrast, the same attack on businesses in the periphery has a largely insignificant impact on NFDI.

Therefore, we can exclude that the observed center-periphery pattern in the effectiveness of terror on NFDI is only an artifact of the different target type composition (business vs. non-business). The terror on businesses displays a similar center-periphery divide in its effect on NFDI as the overall terror.

C.3 Alternative terror measure

In this section, we analyze whether our results depend on the terror variable used. Instead of casualties (per month in the center or the periphery), we use fatalities as alternative measure for the intensity of terror. Shocks are normalized to a one standard deviation of fatalities in major cities, i.e. to 24.83 people killed. Our results remain robust, with terror attacks in the major cities causing a much higher damage to NFDI than a comparable attack in the periphery. Figure A8 shows these results.

C.4 Alternative econometric specifications

We conduct a number of additional robustness checks on the econometric specification: We vary lag lengths of the VAR, we change the order of the Cholesky decomposition, we run the regression with a parsimonious specification only including terror variables and FDI, and we re-run the regression while treating the? interest rate differential as I(0). Furthermore, we discuss a potentially differential impact of domestic versus transnational terror.

Different lag lengths - Hsiao-based lag selection: Following the procedure recommended by Hsiao (1981), we estimate a restricted VAR model using variable-specific lag lengths, selected individually for each variable based on the lowest AIC and BIC values. Hsiao's (1981) approach accounts for the fact that different variables may exhibit different dynamic responses – some adjusting quickly, others more gradually. Based on this procedure, the lag structure retained was as follows: 1–18 lags for major city and NFDI_PPI, 1–15 lags for periphery, and 1–12 lags for differenced interest rates.

Imposing a uniform lag length can lead to overfitting or the exclusion of meaningful lagged effects, potentially distorting the underlying relationships. Our results remain qualitatively robust: casualties from terrorist attacks in major cities have a significantly greater negative impact on NFDI than those in the periphery. The corresponding IRFs are reported in Figure A9.

Alternative lag length: As an additional robustness check, we also estimate a VAR model with a uniform lag length of 15, chosen based on the minimum optimal lag across the major city and periphery terrorism variables and NFDI. The results are consistent with those from the variable-specific specification, reinforcing our central finding: Tterrorist attacks in major cities have a significantly more damaging effect on NFDI than attacks in the periphery. The corresponding IRFs are reported in Figure A10.

Toda-Yamamoto robustness check: Given that our optimal lag length is 18, we also estimate a VAR model using 19 lags, following the Toda and Yamamoto (1995) procedure. This method intentionally overfits the VAR by one lag to ensure valid inference in the presence of possible nonstationarity or cointegration. In this regression we treat all variables as I(0). The additional lag does not affect the estimated impulse responses, which remain qualitatively robust: Terrorist attacks in major cities continue to have a significantly stronger negative effect on NFDI than attacks in the periphery. The corresponding IRFs are presented in Figure A11.

To further test the robustness of our results, we re-estimate the VAR model using an extended lag length of 24 – well beyond the optimal lag length and the Toda-Yamamoto adjustment. This allows us to assess whether incorporating a substantially larger number of lags alters the underlying dynamics. The findings remain qualitatively robust: Casualties from terrorist attacks in major cities continue to have a significantly greater negative impact on NFDI compared to those in the periphery. The corresponding impulse response functions (IRFs) are presented in Figure A12.

Ordering of Cholesky decomposition: To test the robustness of our results to alternative identification assumptions, we estimate several alternative orderings of the VAR system. Specifically, we reverse the baseline Cholesky ordering by placing economic variables, including NFDI, before the terrorism variables, thereby allowing economic conditions to contemporaneously affect terrorist activity. We also estimate a model where the ordering between major city and periphery terrorism variables is switched. Across all these specifications, the impulse response functions remain qualitatively similar: Terrorist attacks in major cities consistently produce stronger negative impacts on NFDI than attacks in the periphery. These findings confirm that our results are not driven by the chosen variable ordering. Full results are available upon request.

Extended Specification Robustness Check: Although the Granger causality tests suggested dropping the real exchange rate (RER) from the VAR system, we reintroduce this variable to assess whether our results are robust to its inclusion. Given concerns that the RER may be integrated of order one (I(1)), we include it in first-differenced form. This allows us to test whether our core findings – particularly the center-periphery asymmetry in the impact of terrorism on FDI – are sensitive to the inclusion of RER. The results remain qualitatively robust: The core-periphery pattern is unaffected, and the impulse response functions continue to show that terrorism in major cities has a significantly larger negative impact on FDI than attacks in peripheral areas.

As an additional robustness check, we also treat RER as stationary (I(0)) and find that our results remain consistent. This strengthens confidence that the exclusion of RER in the baseline specification does not drive our main findings. Full results from these alternative specifications are available upon request.

C.5 Domestic vs. transnational terrorism

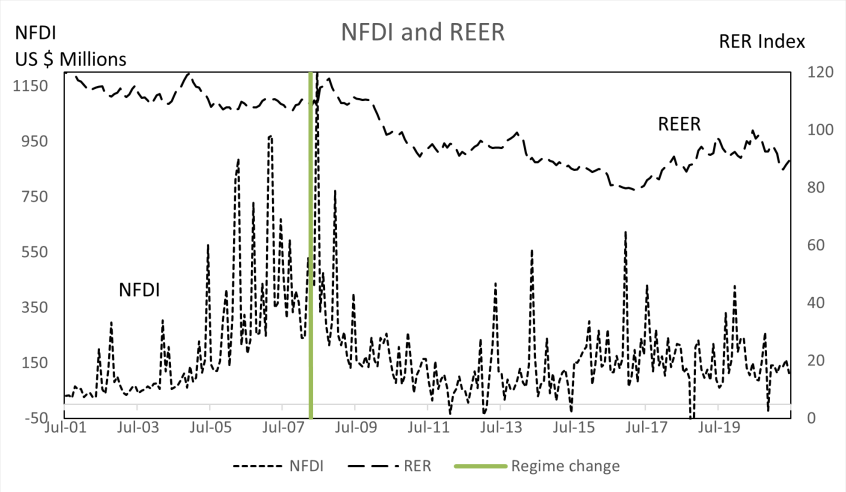
Bandyopadhyay et al. (2014) show for a sample of 78 developing countries that at the margin transnational terror is much more harmful to FDI than domestic terror. If transnational terror attacks were more frequently carried out in the center than domestic terror attacks and transnational terror was more harmful, our finding that central attacks are more harmful to FDI could be the result of a higher share of transnational terror attacks in the center.

Transnational terror is defined as terror in which either the perpetrator, the victim or the damaged asset, or the location is not of the same nationality. As all terror attacks analyzed occur in Pakistan, either victim or perpetrator need to be non-Pakistani for a transnational terror attack to occur. In our context the nationality of the perpetrator is in most cases hard to define, and such a definition would not make much sense. Most attacks are carried out by Taliban who live on both sides of the Pakistan-Afghan border and do not consider this border to limit their space or their freedom of movement (Rashid 2010). It is very hard to define whether it is by definition an act of domestic or transnational terrorism; what is more important, the distinction is essentially pointless. Transnational terror acts that are not caused by the Taliban are too few to estimate a VAR system on. Thus, in the Pakistani-Afghan context, the distinction between transnational and domestic terrorism makes little sense and is therefore not investigated further.[4]

[4]Jetter and Stadelmann (2019) argue that for cross-country panel studies – where population sizes vary considerably and the individual-level risk is of primary concern – per capita terrorism is a more appropriate measure for predicting future attacks. Yet, their approach may not be transferrable to our context. First, our findings indicate (Section 6.3) that visibility and symbolic salience matter more than population scale: Terror in political centers such as Islamabad and Rawalpindi, despite their smaller populations, generate a disproportionately larger economic response in FDI compared to the much larger business hubs of Karachi and Lahore. This bears witness of large spill-over effects. Attacks in the political center strongly affect FDI located predominantly elsewhere. Yet, if we have large spill-over effects within a country, it is unclear what the relevant regional population size should be. Moreover, severe concerns have been voiced regarding the accuracy of the population figures, especially with respect to the Karachi population (e.g., https://www.dawn.com/news/1354508, Khan and Ahmed 2022). This suggests that while per capita measures may be useful for predicting future attacks across countries (accounting for substantial differences in their population sizes), they may be less informative for assessing the economic impact within countries, where the strategic and symbolic value of a location can outweigh its population share.

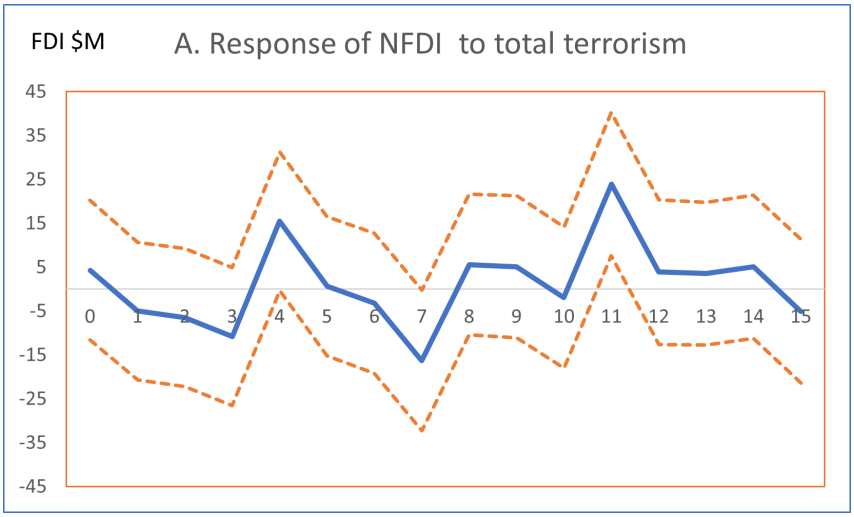
D Figures and Tables

Figure A3: Net foreign direct investment and the real effective exchange rate



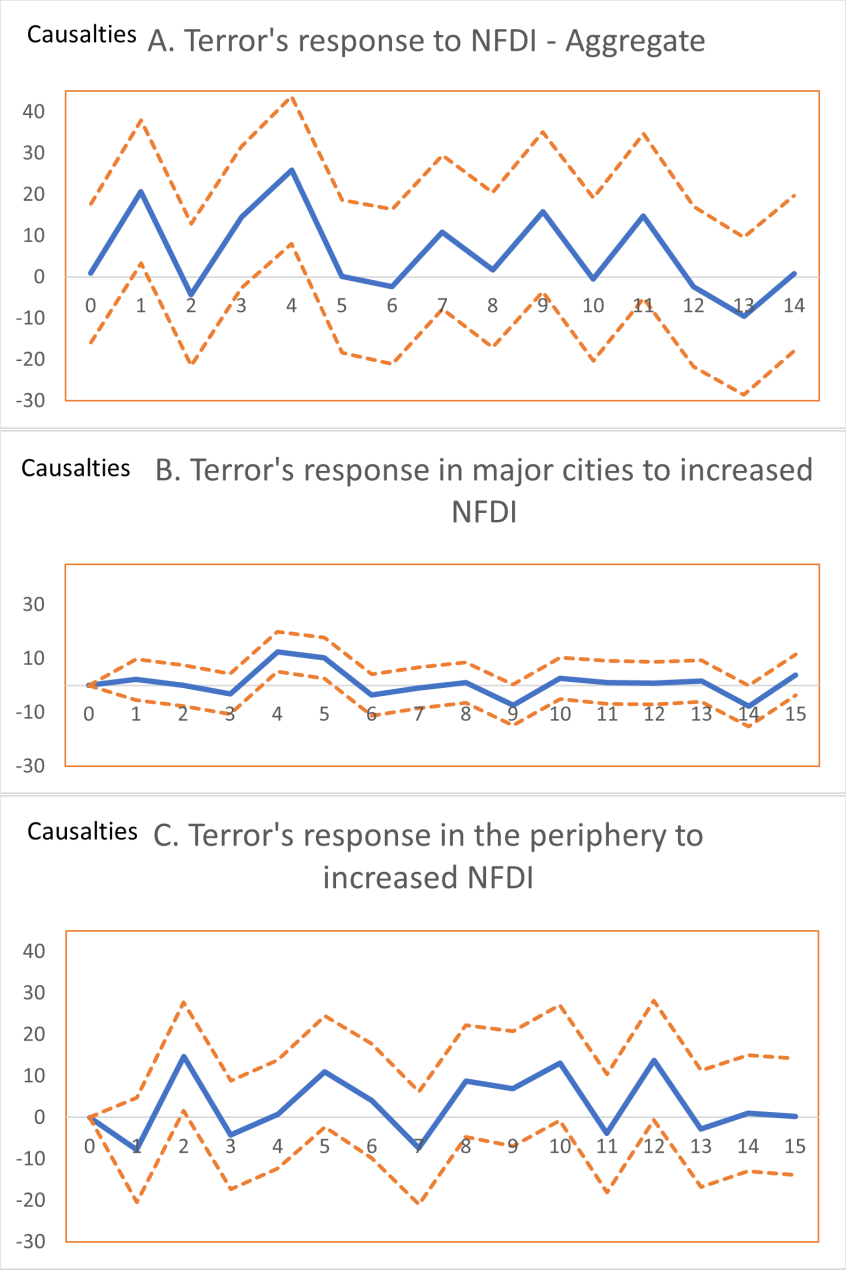
Source: NFDI own calculations using data from SBP and BLS. RER was constructed by the authors as described in the text.

Figure A4: Response of NFDI to total terrorism



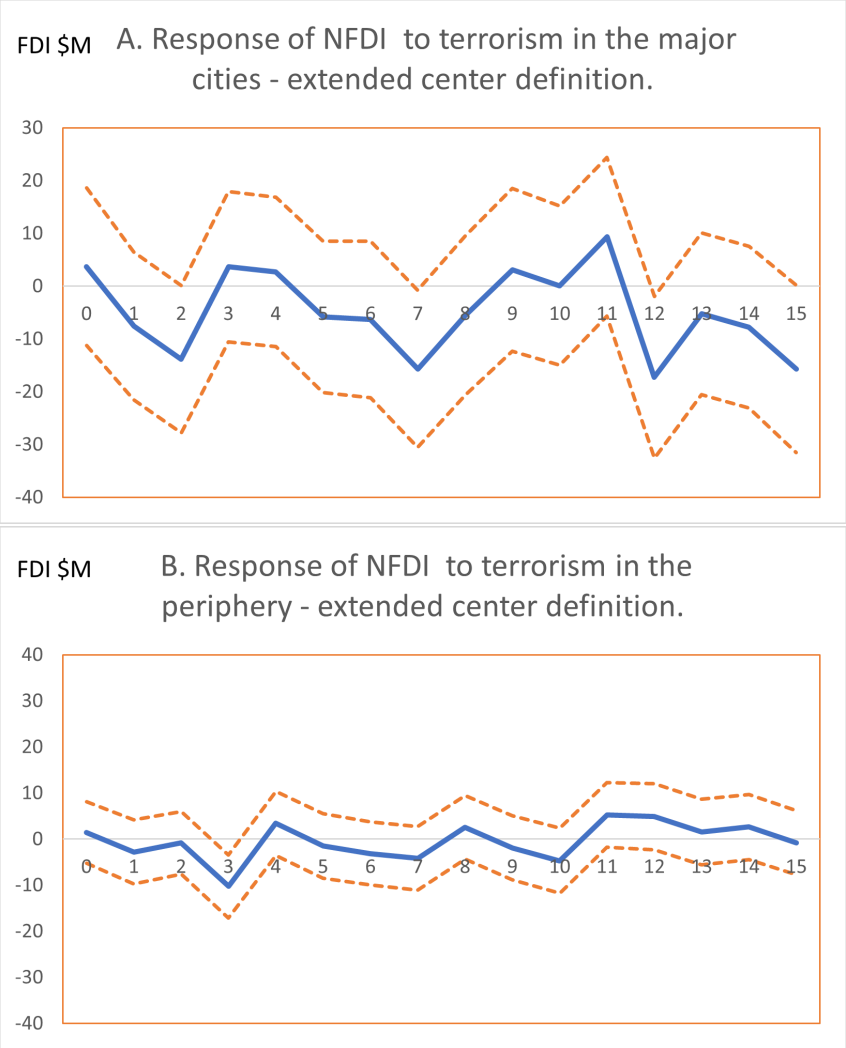
Source: own calculations

Figure A5: Response of aggregate terrorism to FDI



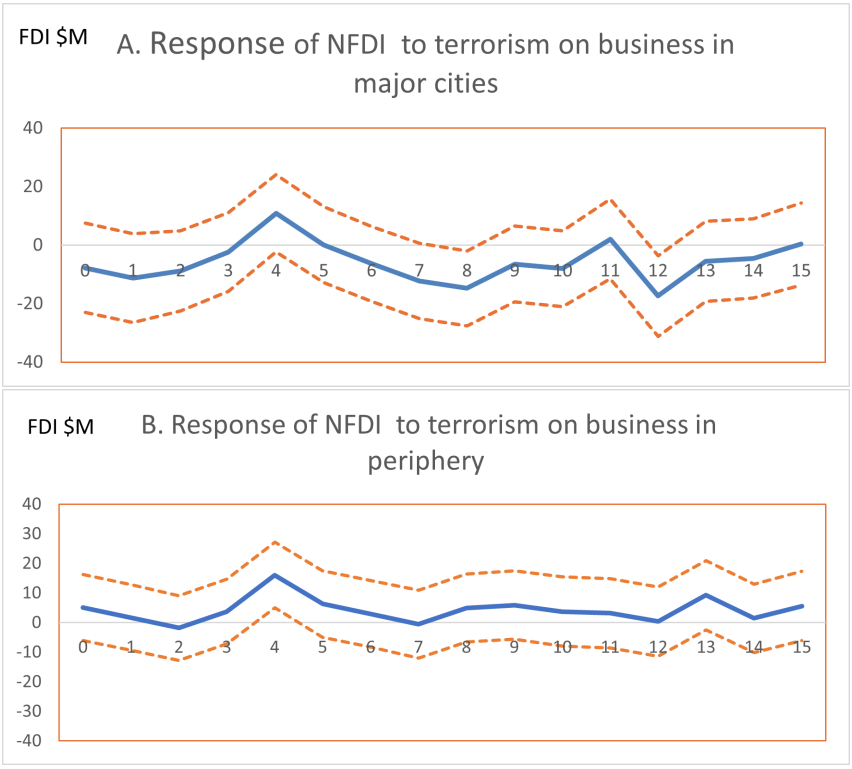
Source: own calculations

Figure A6: Extended center definition



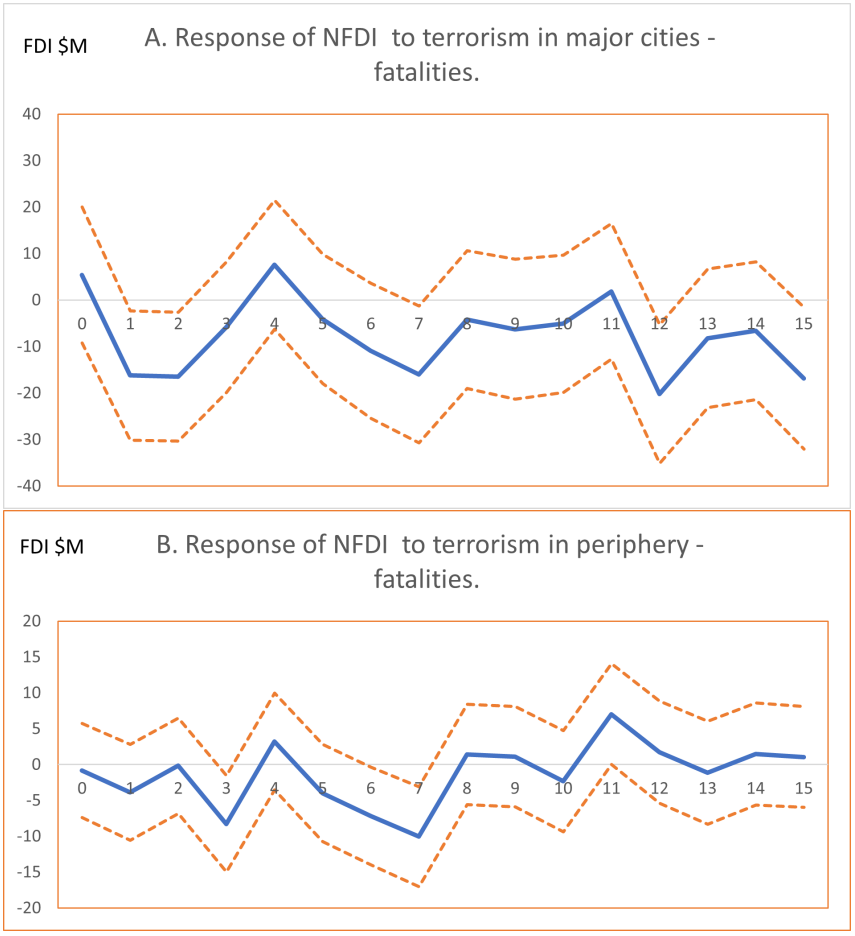
Note: Shock is normalized to that of major cities.

Figure A7: The effect of terror targeting businesses on FDI, center-periphery divide



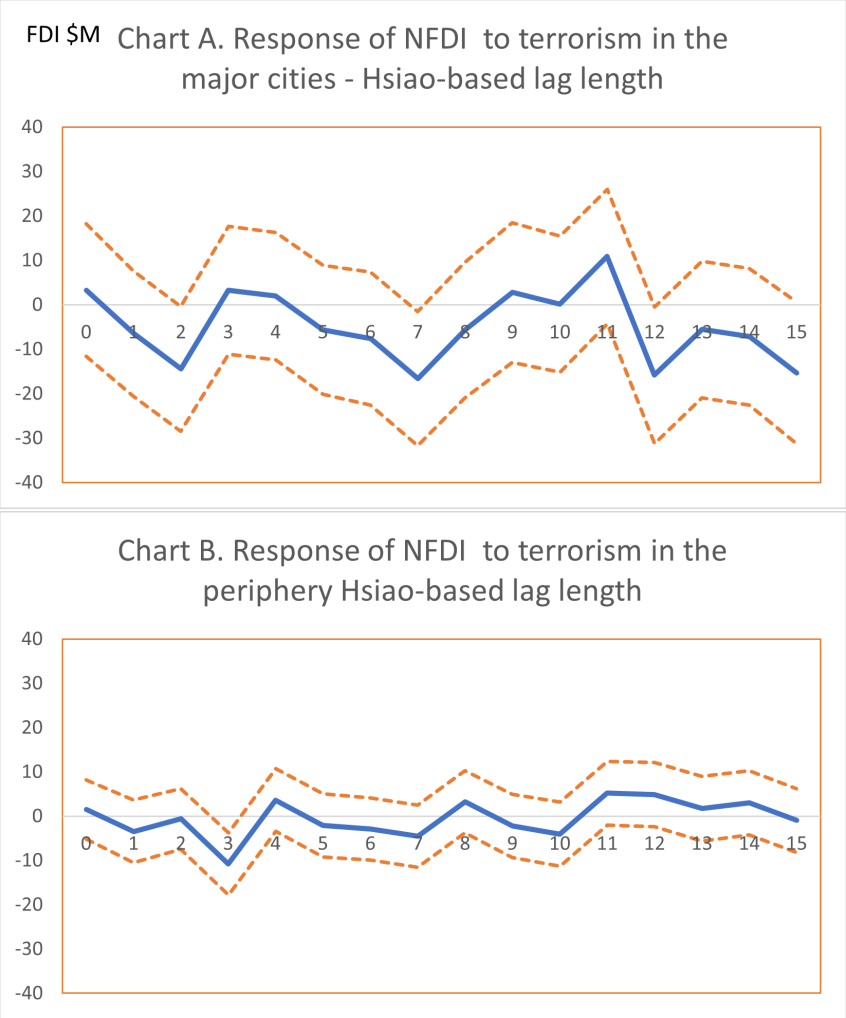
Note: Shock is normalized to that of major cities.

Figure A8: Impact of terror on NFDI, alternative terror variable fatalities



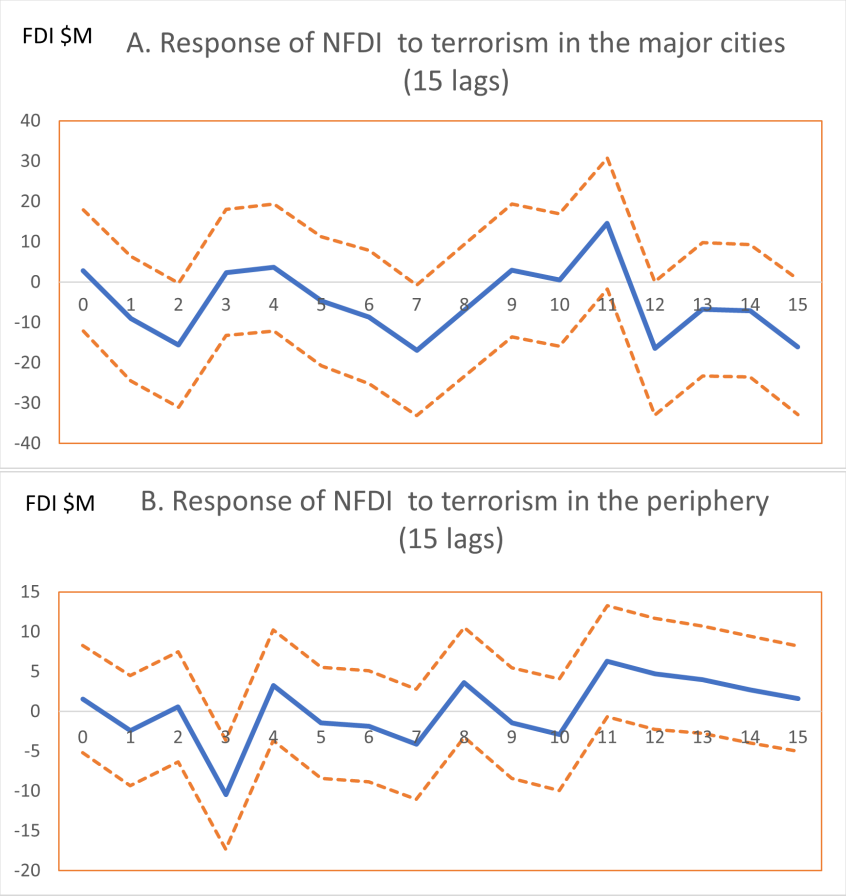
Note: Shock is normalized to that of major cities.

Figure A9: Center-periphery divide with IRFs – Hsiao-based lag length



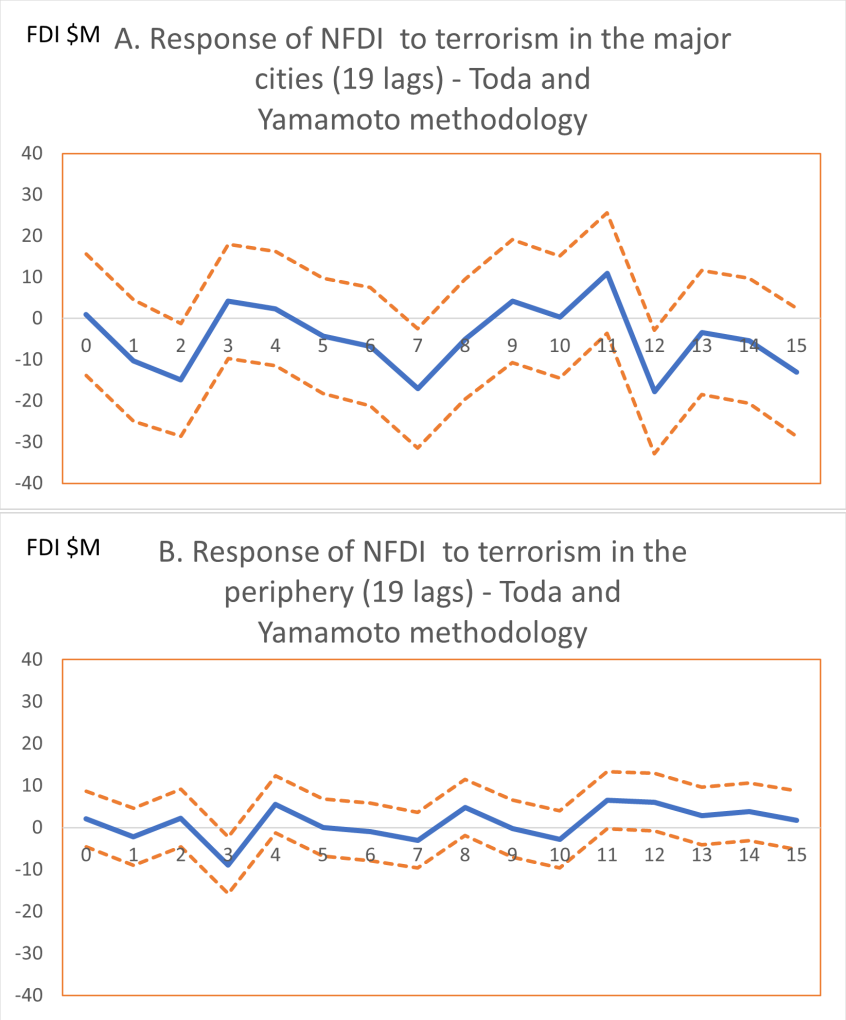
Note: Shock is normalized to that of major cities.

Figure A10: Center-periphery divide with IRFs estimated with 15 lags



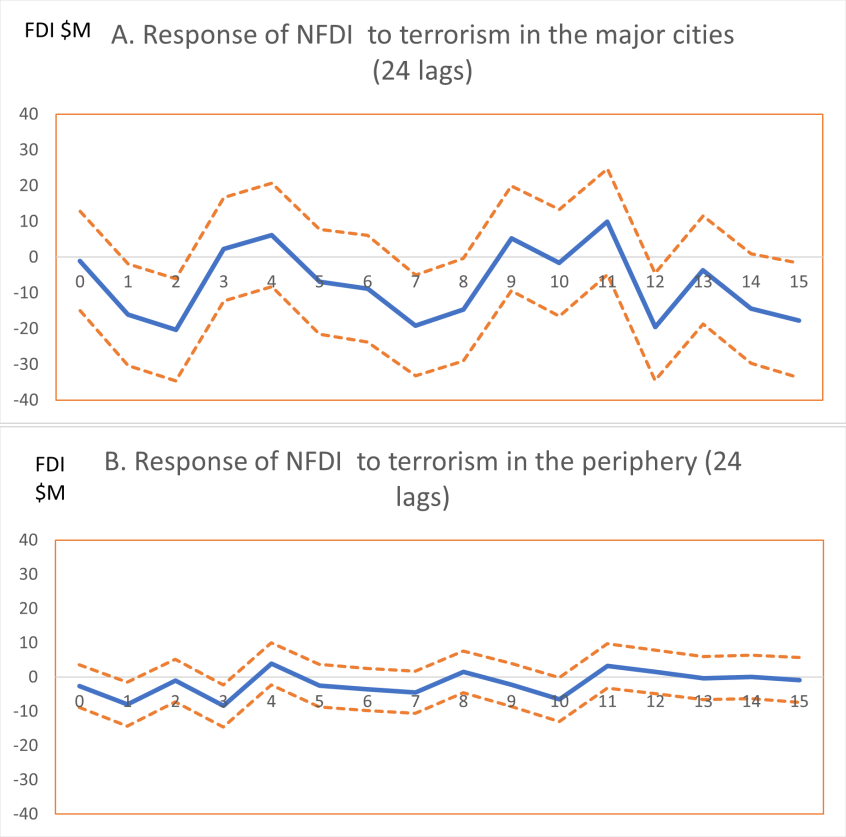
Note: Shock is normalized to that of major cities.

Figure A11: Center-periphery divide with IRFs – Toda and Yamamoto methodology 19 lags



Note: Shock is normalized to that of major cities.

Figure A12: Center-periphery divide – IRFs estimated with 24 lags



Note: Shock is normalized to that of major cities.

E Granger Causality and Statistical Tests

Table A6: Granger Causality Wald Test Results

Equation	Excluded Variable	Chi-Square	Degrees of Freedom	p-value
Urban Terrorism (mc1)	Peripheral Terrorism	45.804	18	0.0
Urban Terrorism (mc1)	Exchange Rate	24.114	18	0.153
Urban Terrorism (mc1)	Real Interest Rate	28.596	18	0.054
Urban Terrorism (mc1)	FDI	96.885	18	0.0
Urban Terrorism (mc1)	All	222.52	72	0.0
Peripheral Terrorism (periphery1)	Urban Terrorism	26.621	18	0.099
Peripheral Terrorism (periphery1)	Exchange Rate	12.244	18	0.834
Peripheral Terrorism (periphery1)	Real Interest Rate	52.34	18	0.0
Peripheral Terrorism (periphery1)	FDI	43.275	18	0.001
Peripheral Terrorism (periphery1)	All	124.2	72	0.0
Exchange Rate (D_rer_gm)	Urban Terrorism	61.379	18	0.0
Exchange Rate (D_rer_gm)	Peripheral Terrorism	38.899	18	0.003
Exchange Rate (D_rer_gm)	Real Interest Rate	41.411	18	0.001
Exchange Rate (D_rer_gm)	FDI	26.612	18	0.083
Exchange Rate (D_rer_gm)	All	164.63	72	0.0
Real Interest Rate (D_real_interest $\sim$ 1)	Urban Terrorism	60.172	18	0.0
Real Interest Rate (D_real_interest $\sim$ 1)	Peripheral Terrorism	39.274	18	0.003
Real Interest Rate (D_real_interest $\sim$ 1)	Exchange Rate	18.547	18	0.418
Real Interest Rate (D_real_interest $\sim$ 1)	FDI	31.078	18	0.028
Real Interest Rate (D_real_interest $\sim$ 1)	All	206.86	72	0.0
FDI (NFDI_PP)	Urban Terrorism	46.627	18	0.0
FDI (NFDI_PP)	Peripheral Terrorism	49.537	18	0.0
FDI (NFDI_PP)	Exchange Rate	39.986	18	0.003
FDI (NFDI_PP)	Real Interest Rate	23.504	18	0.172
FDI (NFDI_PP)	All	132.57	72	0.0