Frontier Rule and Conflict*

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Abstract

Colonial powers often governed the frontier regions of their colonies differently from non-frontier regions, employing a system of "frontier rule" that restricted access to formal institutions of conflict management and disproportionately empowered local elites. We examine whether frontier rule provides a more fragile basis for maintaining social order in the face of shocks. Using the arbitrarily defined historical border between frontier and non-frontier regions in northwestern Pakistan and 10km-by-10km grid-level conflict data in a spatial regression discontinuity design, we find that areas historically under frontier rule experienced significantly higher violence against the state after 9/11. We argue that 9/11 represented a shock to grievances against the state which, in the absence of formal avenues of conflict management, escalated into sovereignty-contesting violence. A key strategy employed by insurgents in this escalation was the systematic assassination of tribal elites, which undermined the cornerstone of frontier rule's social order.

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"To speak of frontier governmentality in the modern world, then, is to speak of a long history of violence." (Benjamin Hopkins, *Ruling the Savage Periphery: Frontier Governance and the Making of the Modern State*, 2020: 194)

1 Introduction

The great imperial powers ruled their frontier territories differently from the rest of their colonial domains, creating a 'rule of difference' that was manifested in distinct administrative, legal, and institutional practices. Described as 'frontier governmentality', these practices 'constituted a discrete form of rule unique to frontier spaces' (Hopkins, 2020, p. 17).[1] In these regions, described by historians as 'liminal spaces' or 'edges of empires', the state had a relatively thin presence, and social order was almost entirely predicated on elite intermediation. Frontier residents were thus treated as 'imperial objects' who remained susceptible to arbitrary state action, which contrasted sharply with non-frontier regions where colonial subjects had access to a full panoply of state institutions. The upshot was that frontier communities were 'encapsulated' in their own local traditions and 'enclosed', in institutional terms, from the rest of the colony. Originally introduced in the late nineteenth and earlier twentieth centuries, frontier governance quickly became 'an administrative archetype, widely replicated the world over' (Hopkins, 2020, p. 3-4). In his magnum opus, *Ruling the Savage Periphery*, Hopkins (2020, p. 6) alludes to the 'near simultaneous construction of a system of frontier administration on a cosmopolitan canvas'. Prominent historical illustrations include the colonial application of exceptional frontier rule in North-West Frontier of British India, Kenya's northern frontier with Somaliland, India's North-East, and Iraq's Basra Vilayet, among others.

Frontier governmentality persisted well beyond the end of colonial rule and served as a powerful, yet understudied, institutional legacy. Recent work by historians and political scientists shows that the 'highly uneven territorialisation of power' (Naseemullah, 2022, p. xi) through which the frontier was created as a 'spatial, political, and administrative category' (p. 384) left a profound historical legacy for explaining conflict against the state (Kolsky, 2015; Hopkins, 2020; Tripodi, 2020).[2] While there is a vibrant interdisciplinary literature on frontier governance, its role in fueling conflict is largely overlooked in mainstream economics. This is surprising given the higher prevalence of violent conflict in frontiers and borderlands (OECD/SWAC, 2022). This paper takes a first empirical stab at this important issue by investigating the causal impact of frontier rule on conflict against the state, and highlighting *when* and *how* this impact unfolds. Our main argument is that, while frontier rule can ensure social order for extended periods of time, it is more susceptible to violence in the face of disruptive shocks.

The lower resilience of frontier rule in the face of shocks stems from three inter-related features of frontier rule: lower trust in the state, fewer avenues for conflict management, and disproportionately greater reliance on elite intermediation. First, given that state authority was imperfectly penetrated in frontier regions, local populations had, at best,

[1] Such institutional heterogeneity is rooted in different colonial motivations. In regions where colonizers faced serious external threats, the ability to extract resources was limited, and the relative costs of extending state authority were high they tended to delegate greater authority to local elites and established more exceptional institutional arrangements (Naseemullah, 2022).

[2] As Naseemullah (2022, p. 17) argues, the 'spatial framework of governance diversity, with roots in colonial rule and post-colonial politics, represents the key to understanding the politics of conflict'.

only a tenuous and indirect link with the state, thereby shaping state–society relationships in profound ways. Second, frontier residents did not have recourse to institutions of conflict management (e.g., courts, electoral politics) that were typically available to other colonial subjects.[3] Instead, traditional modes of dispute resolution supervised by local elites (chiefs and tribal elders) were officially sanctioned and adopted by the imperial administration. Third, frontier rule represented a highly personalized form of rule that empowered the 'man on the spot' (Hopkins, 2020, p. 23). While colonial authorities routinely used local leaders and chiefs as 'mediators' and 'conduits', frontier governmentality constituted a specific 'sub-category' of indirect rule that delegated even greater power to local elites, sharing with them the state's power over coercion and social control (Mamdani, 1999; Naseemullah, 2022).

Alongside these features, the 'fluid and unstable character' of frontier rule and its 'constant' dependence on 'processes of negotiation between different parties' make it especially prone to violence in the face of shocks (Cuvelier et al., 2014, p. 346). Under such conditions, when elites face the threat of elimination the social order begins to unravel, triggering 'sovereignty-contesting' forms of violence. Such violence is more likely to:

> [...] arise and persist when there are fewer institutionalized resources that might draw different groups into competition over them, and the relative absence of interpenetration between society and the state that would institutionalize this competition. Instead, groups violently reject the legitimacy of the state and its ability to organize relations (Naseemullah, 2022, p. 20-21).

To examine the impact of frontier governmentality on conflict we study a setting in British India's North-West Frontier, long considered as an archetypical case of exceptional frontier rule. Here, the British imperial administration devised radically different institutional arrangements for governing the frontier areas as opposed to settled regions. While colonial subjects in settled regions had access to a full array of institutions, including courts, police, civil bureaucracy, and electoral institutions, frontier residents were enclosed in a state of institutional 'exception' where the routine institutions of conflict management were absent. As Sir Olaf Caroe, a colonial-era governor of the frontier province, noted: 'the line of administration stopped like a tide almost at the first contour' of frontier territories (Caroe, 1958, 239). Pursuing what was essentially a 'laissez faire policy of administration', this 'markedly different' colonial rule had a 'defining effect' on state–society relationship, laying the basis for legal and political marginalization in frontier regions (Hopkins, 2015, p. 380). Frontier residents existed on the 'margins of the state, excluded from the national body politics and defined by an era of colonial governance with limited rights and access to judicial systems' (Siddiqui, 2018). This exceptional rule had a 'lasting post-colonial afterlife' as it remained in operation from 1901 to 2018 when Pakistan's frontier areas were officially merged with neighbouring settled districts (Hopkins, 2015, p. 385).

While frontier rule (henceforth, FR) was a ubiquitous feature of colonial governance in late 19th and early 20th centuries, establishing its causal effects on conflict is empirically challenging because, in many contexts, the frontier rule border was determined either by sharp geographic changes or precise scientific surveys. However, Pakistan's North-West Frontier offers a rare setting where the exact placement of the border was based on neither

[3] We are partly motivated here by Rodrik (1999) who demonstrated the importance of formal 'institutions of conflict management' in stabilizing economic growth in the face of external shocks.

geographic factors nor scientific mapping. As detailed in section 2.1 and Online Appendix B, the process of mapping the FR border in British India was notoriously imprecise, often shaped by random and arbitrary considerations. We exploit this arbitrarily defined border, which resulted in a sharp institutional discontinuity between FR and non-FR areas that has persisted since 1901, to investigate the causal impact of frontier rule on conflict. Using a spatial regression discontinuity (SRD) design and fine-grained data on conflict incidents at a 10km-by-10km grid cell level from 1970 to 2018, we compare observations on both sides of the border to test whether historical exposure to frontier rule predicts contemporary conflict. Our results show that, on average, areas that fell just inside the FR border witnessed significantly higher conflict against the state than areas just outside the FR border. Concretely, individuals within FR areas had a 57% higher exposure to conflict incidents against the state than their non-FR counterparts.

We recognize potential threats to our identification strategy, including the possibility of discontinuities in key environmental, historical, and social characteristics in closely situated spatial units that are omitted from our analysis. These could be potentially correlated with the emergence of FR and could have influenced the post-FR trajectory of conflict. Reassuringly, we do not find any statistically significant discontinuity across a wide array of geographic and climatic factors, including ruggedness, slope, topography, precipitation, temperature, and wheat suitability. We also demonstrate that historical factors, such as pre-colonial conflict and population density, also vary smoothly across the FR border. Finally, we show that social structure (religion and ethnicity) and migration patterns are finely balanced across the FR border. The observed balance in these various characteristics is consistent with the idiosyncratic manner through which the historical border of frontier rule was determined (further details on this are furnished in section 2.1 and Online Appendix B).

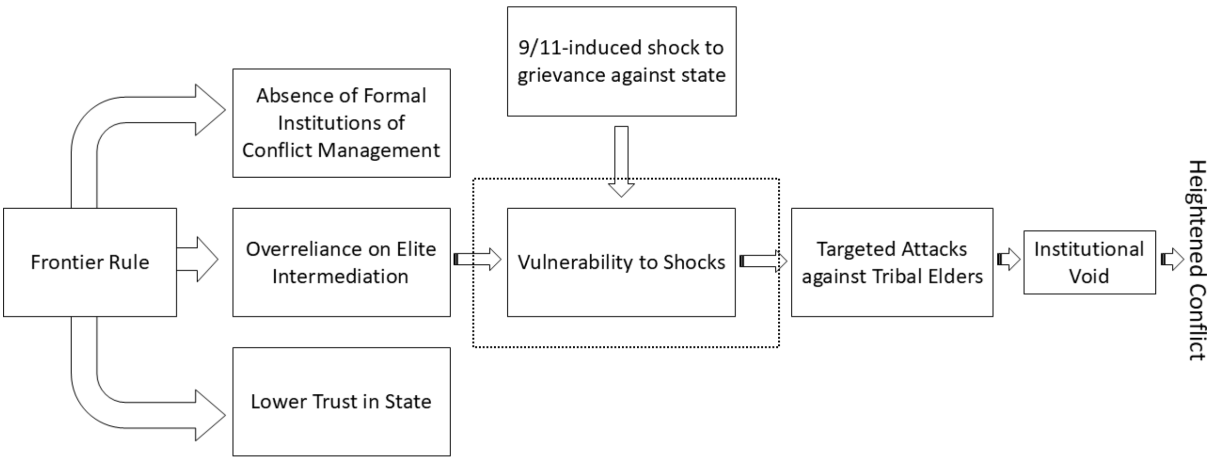
Our findings emanate from a relatively stringent identification strategy that restricts the sample to grid cells within a 50-km buffer zone of the FR border and controls for 20-km border segment fixed effects. This effectively means that we compare observations within a 50-km buffer zone along the FR border within the same 20-km border segment. Our results hold up to a battery of robustness checks, which we report in the Online Appendix. These include: changing the size of the buffer zone (40 km and 60 km instead of 50 km); altering the size of the border segments (18 km and 15 km instead of 20 km); excluding observations very close to the border; addressing issues with log-like transformations of zero-valued outcomes, as proposed by Chen and Roth (2024)[4]; using an alternative database on conflict; using alternative functional forms for the running variable; choosing other manually chosen bandwidths; applying a different kernel weighting strategy for observations close to the FR border; and shifting the original FR border south-westward (i.e., further inland) as a placebo exercise.

To explore the substantive meaning of our findings, we probe the temporal dimension and show that the effect of frontier rule on conflict was only activated after the invasion of Afghanistan by the United States (US) in 2001. Prior to 2001 there were no systematic differences in conflict against the state between FR and non-FR regions. However, FR regions witnessed a sharper spike in conflict shortly after 2001 relative to geographically proximate non-FR regions. We argue that the year 2001 represented a universal exogenous

[4]This robustness check is conducted because the outcome variable we use in our SRD analysis is of the functional form ln(1+x), where x can take zero values.

shock to the Pakistani population's grievance against the state for its decision to support the US-led 'war on terror' in the aftermath of 9/11. This rise in anti-state sentiment was particularly pronounced in FR areas where, in addition to the state's support for the war on terror, the Pakistani military increased its presence under US pressure for the purposes of patrolling the Pak-Afghan border and 'dominating the space' (Nawaz, 2011, p. 8). In our causal explanation, this led to a discontinuous rise in sovereignty-contesting forms of violence in FR areas where formal institutions of conflict management were absent, there was an over-reliance on elites for dispute resolution, and trust in the state was historically low. Using a nationally representative household survey we furnish concrete evidence on all three dimensions. Finally, we document the unraveling of social order through the systematic targeting of tribal leaders in FR regions, which was a key component of the local insurgents' strategy in perpetrating violence against the state. Accordingly, moving across the border from non-FR to FR areas, we find a discontinuous rise in attacks against tribal elders. In a context where local social order primarily hinged on elite intermediation, elimination of these elites represented an important strategy adopted by non-state actors, which created an institutional vacuum and exposed the FR areas to greater violence against the state. Figure 1 provides a brief sketch of our argument and the mechanisms at work.

Figure 1: The transmission mechanism from frontier rule to conflict



Notes: Authors' construction.

Our findings on the greater vulnerability of FR-governed areas to conflict in the wake of external shocks are consistent with prior qualitative research (Naseemullah, 2014, 2022). Specifically, our results shed empirical light on the claim in Naseemullah (2014, p. 519) that 'the destruction of the regular means through which social elites were able to negotiate with the agents of the state was a significant enabling factor for insurgent conflict' in the northwest. We also engage with other competing explanations and rule out the potential role of conflict spillover from neighbouring Afghanistan, the possibility of post-9/11 income shocks, US drone strikes, and the differential provision of public infrastructure (roads, railroads, waterways, and health centres).

Our paper contributes to a well-traversed academic terrain on the long-run determinants of conflict, especially the role of institutions (Bang and Mitra, 2017; Bellows and Miguel, 2006; Besley and Persson, 2010; Collier and Hoeffler, 2004; Ciccone, 2008; Fearon and Laitin, 2003; Fetzer and Kyburz, 2024; Heldring, 2021; Herbst, 2000; La Ferrara and Bates, 2001; Miguel et al., 2004; Voors and Bulte, 2014)—see Blattman and Miguel (2010) for a detailed review.[5] Our work differs from existing literature in several important respects. First, while prior research has explored broad institutional effects, the impact of 'specific political and legal institutions' remains poorly understood. As Blattman and Miguel (2010, p. 28) argue, key institutional features are 'yet to be carefully defined and measured'. Furthermore, most studies focus on cross-country comparisons, overlooking institutional heterogeneity within nations. To address these gaps, we examine the effects of a specific form of indirect rule that shaped distinct institutional arrangements in frontier regions. In this regard, we address an important research puzzle highlighted by Sambanis (2005): Does the extent to which a state exercises control over its peripheral territories impact conflict? While this question has received some attention in disciplines outside economics (e.g. Boone (2003); Naseemullah (2022)), the 'evidence base' for past studies is limited as there have been few, if any, notable attempts to 'systematically gather empirical evidence' (Cuvelier et al., 2014, p. 346-47)

Second, as Blattman and Miguel (2010, p. 30) argue, 'an important limitation' of prior work is that it mainly focuses on domestic drivers of conflict. The role of international factors has only recently come under closer intellectual scrutiny with studies probing the impact of the international system (Kalyvas and Balcells, 2010), terms of trade shocks (Frankema et al., 2018), conflict spillovers from neighbouring countries (Hegre and Sambanis, 2006), presence of transboundary ethnic groups (Gleditsch, 2007), cross-national security cooperation (Richard and Eynde, 2023), refugee flows (Salehyan and Gleditsch, 2006), foreign aid (Nielsen et al., 2011; Savun and Tirone, 2011), and foreign interventions (Rohner, 2024). However, barring these exceptions, the salience of international dimension has been insufficiently explored. We contribute to this literature by highlighting the role of geo-political shocks (i.e. the post-9/11 war on terror) in shaping the relationship between institutions and conflict. Additionally, our work provides confirmatory evidence on two important insights in Blattman and Miguel (2010, p. 18), namely that: (a) the impact of institutions on conflict can be conditional on other factors and (b) 'non-economic explanations' such as citizen's 'emotional and ideological outrage' can shape grievances that underpin violent action.

Third, a key empirical challenge in conflict studies is isolating the impact of institutions from other conflict drivers like geography, climate, and income shocks. As Blattman and Miguel (2010, p. 26) suggest, 'credible causal inference' requires focusing on a 'single, or a small number of exogenous conflict determinants'. In this spirit our paper is situated within a growing body of research leveraging sub-national variations to study core conflict drivers using robust empirical strategies. For instance, studies have examined the effects of military strategies across neighbouring regions (Dell et al., 2018), segmentary lineage across ethnic boundaries (Moscona et al., 2020), and colonial-era bordermaking (Michalopoulos and Papaioannou, 2016) on conflict. An advantage of our empirical setting is that factors traditionally considered as important conflict drivers, such as ethnic diversity, religion, segmentary lineage, and natural resource intensity are naturally controlled for in our study area, enabling a focused analysis of the impact of frontier rule.

[5] Conflict is typically described as the result of bargaining failure and commitment problems. To enforce commitments over time, it is important to have strong government institutions and checks and balances on executive power (Herbst, 2000; Bates, 2008).

Finally, our work is situated within the expanding literature on the long-run impact of history on development, especially the persistent impact of colonial-era institutions (Acemoglu and Robinson, 2012; Nunn, 2009). We contribute to this literature by building on the idea that colonialism was not a 'singular treatment', as colonizers often built diverse institutional arrangements even within the same territory (Mamdani, 2018; Boone, 2003). Furthermore, besides showing that historical institutions matter for conflict, we also demonstrate 'why' and 'when' they matter. Our work thus complements a niche literature on 'time-varying persistence', the idea the impact of history can remain latent until activated through interaction with other factors or shocks (Fouka, 2020; Cantoni and Yuchtman, 2021).

Within the broader genre of historical work, we contribute to two key sub-strands. The first is work by Acemoglu et al. (2014) who study the impact of African chiefs on development. While tribal elites form key part of our analysis, our argument is not one of extractive elites but their over-sized role within the larger architecture of frontier governance that makes it more vulnerable to violence in the face of shocks. Second, we complement prior scholarship on the impact of historical borders (Becker et al., 2016; Dell, 2010). In particular, our paper connects more directly with an emerging strand of scholarship on the impact of historical frontiers on long-run inequality (Oto-Peralías and Romero-Ávila, 2017), economic geography (Chronopoulos et al., 2021), and individual and gender norms (Bazzi et al., 2020, 2023). Our work complements this scholarship by treating frontiers not just as a purely geographic dimension or distinctive norm-creating spaces but as a profound institutional category. To this end, our paper is closer in spirit to Popescu et al. (2023) that examines the developmental legacy of a military buffer zone in the Hapsburg Empire. We differ from this work in two key respects. Firstly, the nature of our institutional treatment is different. While Popescu et al. (2023) focuses on the state's limited provision of infrastructure and institutional arrangements for property and labour markets, we highlight the role of institutions of conflict management.[6] Secondly, we focus on a different outcome of interest (i.e., conflict against the state). We contribute to this niche literature on historical frontiers with what we believe is the first empirical analysis of how historical institutional differences in frontier regions influence contemporary conflict.[7]

The paper is structured as follows. Section 2 provides the historical context of frontier rule. Section 3 describes the data, outlines the empirical strategy and presents key findings of our empirical analysis. Section 4 identifies mechanisms and rules out competing explanations. Section 5 concludes.

2 The Historical Context of Frontier Rule

In this section we discuss the emergence of frontier rule (FR) in the north-western frontier of British India, highlighting its salient features, the imperial rationale behind its introduction, and the idiosyncratic nature of its border. We also discuss the salience of

[6] In fact, we demonstrate that there are no statistically significant differences in the provision of public infrastructure in closely situated spatial units in FR and non-FR areas (see Section 4.3). Another difference is the role of elites. In Popescu's frontier setting the task of securing the frontier was delegated to peasants and refugees while in our context, there was a greater delegation of power to local elites.

[7] Our paper also complements Callen et al. (2024) who study Pakistan's north-western frontier as a case study to explain why states leave their territories ungoverned.

the 9/11 shock for explaining violence against the state in frontier regions.

2.1 Frontier rule in British India

The north-western frontier of British India was carved out of Punjab as a separate province in 1901 by Lord Curzon, the viceroy of British India (1898–1905). The newly created North-West Frontier Province (NWFP) was bifurcated into settled regions and the frontier tracts. The latter were populated by tribes adjacent to Afghanistan.[8] While the two regions shared the same ethnicity, religion, and social structure, they were subjected to a sharply distinctive category of institutional rule by the British.[9] Table 1 provides a stark illustration of this institutional discontinuity. While frontier areas were marked by thin state presence, the settled districts were administered through a well-developed bureaucratic system that included deputy commissioners and revenue officials. By contrast, colonial interests in frontier areas were primarily overseen by political agents, officers of the British Raj that helped to maintain relations with tribes on behalf of the colonial state, gathered intelligence, and provided financial subsidies to tribal elites.

Another key difference was the absence of formal institutions of conflict management (e.g., courts and electoral politics) in frontier regions. While inhabitants of non-frontier regions had at least some modicum of judicial protection through divisional and district courts along with the universal application of the Indian Penal Code, frontier dwellers were 'legally disenfranchised' and subjected to an alternative judicial system that relied on local elite intermediation (and adjudication) rather than courts and judiciary.[10] Local tribal elites (e.g., *Maliks* and *Khans*) were empowered to adjudicate disputes through customary practices and informal institutions known as the *jirga* (a traditional congregation of tribal elders where decisions were made by consensus). While *jirgas* were informal consultative bodies that historically varied in form and purpose, the British standardized the modes of tribal governance and made *jirgas* the principal avenue for dispute resolution. The tribal judiciary, described as the 'Council of Elders' in the 1887 regulation, was typically composed of a handful of appointed tribal leaders. Importantly, these leaders did not necessarily act as extractive elites and operated within an inherently egalitarian and non-hierarchical Pashtun society.[11] Frontier dwellers were also deprived of political representation. Under British rule, restricted enfranchisement was gradually extended

[8] Initially, the NWFP consisted of the following five settled districts: Peshawar, Kohat, Hazara, Bannu, and Dera Ismail Khan. Frontier areas consisted of seven historically-defined tribal agencies that lied in the liminal space between the settled districts and Durand line boundary with Afghanistan agreed in 1893. These were: Dir, Swat, Chitral, Khyber, Kurram, North Waziristan, and South Waziristan.

[9] It is important to note that Pashtun tribes existed on both sides of the frontier rule border. The difference between frontier and non-frontier areas was thus not merely a distinction between tribal and non-tribal. The emphasis on border tribes was more a part of colonial rhetoric and imagination. As Scott (2010, p. 30) argues, there is a tendency for centralized state to view 'all those who had a reason to flee state power for whatever reason' as 'tribalizing themselves'.

[10] An important element of this exceptional legal regime was the Frontier Crimes Regulation (FCR), introduced in 1872. Described as 'draconian' and discriminatory, the FCR codified collective punishments and denied frontier residents the right to appeal or equality before the law.

[11] Colonial archives consistently describe the border tribes as 'exceedingly democratic' with 'no recognized headmen' (Ibbetson, 1881, p. 10). In this context, the basis of authority rests on consensual legitimacy. As Ibbetson (1881, p. 201) notes: 'Each section of a tribe, however small, has its leading Khan Khel or Chief House, usually the eldest branch of the tribe, whose Malik is known as Khan, and acts as chief of the whole tribe. But he is seldom more than their leader in war and their agent in dealings with others; he possesses influence rather than power; and the real authority rests with the *jirgah*, a democratic council composed of all the Maliks'.

to residents of settled districts through legislative councils, assemblies, and district and municipal boards. However, even this nominal and limited electoral representation was denied to frontier residents.

Finally, frontier areas had distinct security and policing arrangements, which ensured relative peace in these regions. Unlike the elaborate policing structure of settled districts, colonial administration relied on locally recruited militias (*khasadars* and levies) to maintain social order in frontier areas. *Khasadars* had the authority to arrest offenders and, if necessary, refer them to tribal councils for justice. From 1915, they were supported by the Frontier Constabulary (FC), a paramilitary force tasked with patrolling borders, monitoring foreign threats, and guarding the boundary between tribal agencies and settled districts. These arrangements, supplemented by army officers attached to paramilitary units and regular troops stationed in nearby cantonments, reinforced stability. Additionally, the British Indian Army maintained garrisons in strategic frontier locations like Khyber and Waziristan to further secure the region.

The fundamental architecture of frontier rule endured after the end of British rule in India. After gaining independence in 1947, frontier residents benefited from better provision of infrastructure and job opportunities in the public sector.[12] However, the colonially sanctioned 'rule of difference' continued unabated (Naseemullah, 2022, p. 22). Frontier regions remained legally and politically marginalized. This effectively meant that neither the Supreme Court nor High Courts were able to exercise their jurisdiction in frontier regions. Furthermore, parliamentary laws that governed the operation of political parties did not extend to frontier areas. Consequently, neither of Pakistan's mainstream political parties could operate and field candidates in these regions. Limited adult franchise was only extended in 1997 that gave tribal leaders the right to vote in a non-party-based election. While the exclusionary legal and political restrictions applied to frontier regions were finally withdrawn in 2018, this has thus far only existed on paper as little has substantially changed on the ground (Mahsud et al., 2021).

Imperial rationale for frontier rule.—In extending 'exceptional' institutional arrangements in frontier territories, colonial rulers were influenced by two key factors: fear and frugality (Naseemullah, 2022). The north-west frontier of British India, historically a strategic area between Afghanistan, Central Asia, China, and present-day Pakistan, initially served as a buffer against possible external threats from Tsarist Russia within the geopolitical competition known as the 'Great Game' (Hopkirk, 2001). However, as the prospect of Russian overreach diminished over time, the perceived threat from Russia receded. Instead, as Tripodi (2009, p. 3) argues, the "true threat to British India was perceived to lie within." Regular skirmishes between colonial forces and frontier tribes posed ongoing challenges to state authority in these areas, potentially leading to significant "popular uprisings" that could undermine British rule throughout India.[13] Additionally, the frontier had limited tax potential. Compared to settled districts, frontier areas had, on average, different climate, and topography, potentially resulting in more limited agricultural surplus. Consequently, extending state authority through for-

[12] As per the most recent census conducted in 2017, the frontier tribal agencies consist of around 3,000 villages with a total population of roughly three million people.

[13] While the British initially faced some resistance from frontier tribes that might have contributed to the imposition of frontier rule, once these institutional arrangements were put in place, they ensured political order and relative peace for a long period that extended well into the post-colonial era (Naseemullah, 2014, p. 510).

mal institutional structures was relatively costly for a more frugal colonial administration (Callen et al., 2024).

A different cartographic regime in the frontier.—Whilst these broad imperial motivations might have shaped the colonial decision to establish a 'rule of difference' in frontier regions, the exact placement of the frontier-rule (FR) border was subject to a significant degree of 'randomness'. Historical evidence clearly shows that, under British rule, frontier areas were subjected to a very different 'cartographic regime' compared to the rest of India. As non-frontier regions were 'being slowly and "precisely" mapped' through trigonometrical surveys, the process 'of "knowing the country" [was] much less developed along the frontier' (Cons, 2005, 45). By contrast, borders of the North-West Frontier 'were fuzzy and ill-defined, largely abutting the blank space on maps where surveyors, explorers, and mapping projects were yet to be undertaken' (Cons, 2005, 14). Rather than using trigonometric surveys known for their accuracy and precision, the British resorted to reconnaissance surveying in frontier regions, which were preliminary, provisional, and more easily susceptible to unknown and idiosyncratic considerations.[14] An important implication of this imprecise process of border-making was that the FR border was neither based on scientific considerations nor was it a natural border based on sharp differences in geography, thereby ruling out a simplified distinction between hills and plains advanced by Scott (2010). While there are broader geographic differences between frontier rule areas and settled districts, the terrain in frontier rule areas varied significantly, with rugged terrain interspersed with fertile valleys and plains.[15] Online Appendix B offers additional evidence on these arguments.

2.2 The 9/11 shock to grievance against the state

The year 2001 marked a significant turning point in international relations with serious implications for conflict in Pakistan's frontier areas. Following 9/11, the United States launched the war on terror, targeting Afghanistan. As a key neighbour, Pakistan was pressured to provide intelligence and logistical support, leading to a major foreign policy shift that overturned its well-established Afghan policy.[16] General Musharraf's decision to join the US-led war against Afghanistan was deeply unpopular, generating widespread and persistent public resentment across Pakistan.[17] Opinion surveys reveal a sharp rise in anti-US sentiment among Pakistanis over time. A 2000 Pew survey showed that 58 percent held an 'unfavourable' view of the US, which surged to 82 percent after 9/11.[18] Similarly, a Gallup poll on June 18, 2002, found 62 percent opposing Pakistan's support for the US-led war in Afghanistan. By 2013, 71 percent still disapproved of cooperation with

[14] Narrative reports that formed part of such surveys frequently alluded to a colonial imagination of the north-western frontier that privileged ideas of 'adventure' and 'romance' of the strategic buffer zone over factors that might have led to a more scientific determination of the frontier border.

[15] This is consistent with the evidence in Section 3.2 that shows the absence of discontinuity in geophysical features as well as other relevant dimensions across the frontier rule border.

[16] Two decades earlier, Pakistan, with US and Western backing, supported the Afghan Mujahideen against the Soviets, uniting with frontier tribesmen against a perceived anti-Islamic foe. However, in 2001, Pakistan was forced to break ties with the Taliban—its former allies—and back US efforts against them, marking a stark 180-degree reversal of its longstanding Afghan policy.

[17] The US attack on Afghanistan was seen as superpower aggression against one of the world's poorest states. General Musharraf's regime defended this policy shift as survival strategy in the face of the shifting tide of global opinion and intense US pressure. For further details, see Reuters (2006).

[18] The data is from Pew Research Center's *Global Attitudes Survey*, accessible at: https://www.pewresearch.org/global/datasets/.

the US in its war on terror. The 9/11-induced grievance against the state was noticeably higher among residents of FR areas where, in response to the US demand, the military substantially increased its presence for securing the Afghan border.[19] While initially the military only 'dominated the space' without conducting 'aggressive operations', its mere presence was seen as an 'alien force doing the bidding of a foreign power' which fuelled a 'local uprising' (Nawaz, 2011, p. 6-8).[20]

The year 2001 thus represented a universal shock to grievance against the state that disproportionately affected frontier areas. This external shock was relatively exogenous to the local proclivity for violent conflict along Pakistan's North-West Frontier. While recognizing that these regions had hosted many fighters involved in the armed struggle against the Soviets in the 1980s and that militants in Afghanistan might have maintained some links across the border in Pakistan after the Soviet withdrawal in 1989, the 9/11 attacks were part of a broader global phenomenon of Islamic Jihad that cannot be conceivably linked to the potential for conflict in frontier areas. Specifically, both the timing and location of the 9/11 shock are orthogonal to the prospects for localized conflict in frontier regions. Pakistan witnessed a significant surge in violence in the post-9/11 period. Around 12,891 attacks were conducted against the state and civilian targets after 2001, a noticeable increase compared to the 1,845 attacks in the entire pre-9/11 era stretching from 1970 to 2000 (GTD, 2021). The intensity of such violence was considerably higher in frontier regions. While militant outfits involved in this violence primarily emerged after 9/11 (e.g., TTP and TNSM[21]), they might have benefited from the organizational infrastructure put together during the 1980s Afghan Jihad against the Soviets. Their recruits enjoyed deep social and ethnic ties with local populations and were overwhelmingly drawn from disenchanted segments of local tribes.[22] The post-9/11 surge in violence prompted domestic and global policy responses. Pakistani forces launched military offensives in frontier areas against alleged terrorist sanctuaries, while the US conducted drone strikes targeting Al-Qaeda affiliates in Pakistan's North-West from 2004. These strikes peaked in 2010 and then declined sharply thereafter before ending under the Obama administration in 2016 (see Online Appendix Figure F2).

3 The Effect of Frontier Rule on Conflict

3.1 Data and Descriptives

Frontier rule border.—We utilize colonial-era archives to reconstruct the historical frontier rule border that came into force in 1901 on the direction of the then governor general of India, Lord Curzon. It was not merely a 'cartographic distinction' but represented a sharply distinct category of institutional rule that consistently remained in force till 2018 (Kolsky, 2015, p. 1225). The FR border separated the frontier agencies

[19]A survey report showed that some 85 percent of respondents in frontier areas opposed the presence of the US military in the region (Shinwari, 2012, p. 86). In 2011 around 58 percent of survey respondents viewed the US in 'very unfavourable terms' (Shinwari, 2012, p. 129).

[20]Nawaz (2011, p. 10) describes this policy of 'dominating space' as 'sitzkrieg', which meant 'sitting in camps without any aggressive actions'.

[21]TTP stands for 'Tehreek-e-Taliban Pakistan' and TNSM denotes 'Tehreek-e-Nifaze-Shariate Mohammdi'.

[22]These included, for example, the Alizai clan of Mehsuds, Ibrahim Khel clan of Utmanzai Waziris, Kaka Khel subtribe of Ahmadzai Waziris, and Mezi sub-tribe of the Zadranis (Jones and Fair, 2010).

from the settled districts of the North-West Frontier Province (NWFP) of British India. Specifically, the FR areas comprised the seven agencies of Dir, Swat, Chitral, Khyber, Kurram, North Waziristan, and South Waziristan, while the non-FR regions included the five settled districts of Peshawar, Kohat, Hazara, Bannu, and Dera Ismail Khan.

Conflict data.—Given our interest in explaining sovereignty-contesting forms of violence, our main outcome of interest captures attacks against military personnel and installations at the 10km-by-10km grid cell. Our focus on military targets is motivated by the well-accepted fact that the Pakistani military is the locus of state power and is therefore the primary target for 'sovereignty-contesting' forms of violence.[23] The underlying data comes from the Global Terrorism Database (GTD, 2021) that reports more than 14,500 conflict incidents in Pakistan from 1 January 1970 to 31 December 2018. We construct three measures of attacks against the state at the 10km-by-10km grid cell level for the period 1970-2018: (a) the number of incidents, (b) the number of deaths, and (c) the number of injuries. In robustness analysis, we expand the definition of state targets to include attacks on police, government officials, and state utility installations. For our mechanism analysis, we develop a separate measure of attacks on tribal elders (*Maliks*), using geocoded GTD data to aggregate these attacks at the 10km-by-10km grid cell level. Data is available from 2006, marking the first recorded attack on a tribal elder. Our analysis also utilizes two additional conflict data sources. First, the Uppsala Conflict Data Program (UCDP) provides geo-coded conflict event data to validate the robustness of our findings with an alternative source.[24] Second, a geo-coded dataset on drone strikes from Usmani (2017) helps rule out grievances from post-9/11 US drone strikes as a causal factor. Further details on these data sources are in Online Appendix A1.

Geophysical features.—To assess the statistical validity of our SRD estimation, we carry out balance tests for key geophysical features. In this regard, we use data on elevation from the Shuttle Radar Topography Mission (version 2018) to construct indices of ruggedness, slope, and topography at the 10km-by-10km grid cell level. Following Riley et al. (1999) and Nunn and Puga (2012), we construct the terrain ruggedness index (TRI) for each 10km-by-10km grid cell, with higher values indicating higher terrain ruggedness. We also construct a slope index that measures the change in elevation across space, and the topographic position index (TPI) that is a measure of an area's elevation relative to its surroundings. We also utilize the GAEZ Data Portal (2012) to compute grid cell-level measures of wheat suitability based on the 'low-input' and 'rain-fed' parameters that closely proxy the historical conditions under which wheat was grown in Pakistan. Using precipitation data from the Global Climate Database (Hijmans et al., 2005), we matched average rainfall between 1970 and 2000 to each 10km-by-10km grid cell to construct a measure of long-term average difference in precipitation levels on either side of the FR border. To capture the long-run effects of temperature on both sides of the FR border, we use the same source to compute average temperature between 1970 and 2000 for each grid cell. Further details are available in Online Appendix A2.

Historical factors.—Our empirical analysis accounts for two key historical dimensions that could have potentially shaped the institutional discontinuity around the FR border and the trajectory of conflict against the state. The first is the pre-FR population density

[23]Other coercive actors of the state, such as the police, levies, and *khassadars*, are locally recruited and are therefore viewed less as an alien force and more as part of local society.

[24]The link to the Uppsala Conflict Data Program (UCDP) website is here: https://www.pcr.uu.se/research/ucdp/about-ucdp/.

for which we draw on the HYDE (2006) database that provides internally consistent 30 arc second (1km^2) grid cell-level estimates of population density at 100-year intervals for the last 12,000 years. The second is pre-colonial conflict. For this we utilize a dataset compiled by Dincecco et al. (2022) that draws on information on historical conflicts, organized alphabetically by individual conflict names, in a celebrated volume from Jaques (2006).[25] For other dimensions like Mughal-era roads and Islamic trade and pilgrimage routes, we use geo-referenced data from the Old World Trade Routes Project (Ciolek, 2012). For a full description of the construction of the historical measures see Online Appendix A3.

Descriptive evidence.—Table 2 presents average differences in three measures of conflict against the state on either side of the FR border. The table lists the means for FR and non-FR areas, followed by the estimated differences for each measure. Columns 1–3 display averages for the entire sample, while columns 4–6 focus on a 50-km buffer zone on either side of the FR border. This buffer zone is the primary sample used for our empirical analysis. Across all measures, and regardless of whether the full or restricted sample is used, the intensity of conflict against the state is statistically significantly higher in FR areas compared to non-FR areas. Specifically, FR areas exhibit between 36% and 57% more conflict intensity than non-FR areas, depending on the measure used. Figure 2 plots conflict events during 1970-2018 on a district-level map of Pakistan's North-West Frontier using latitude and longitude coordinates. It clearly shows a higher density of attacks against the state within the FR boundary (left of the border).

3.2 Empirical Strategy

Utilizing the sharp institutional discontinuity between areas that historically fell under frontier rule (FR areas) and settled regions (non-FR areas), we estimate a spatial regression discontinuity (SRD) specification that takes the following form:

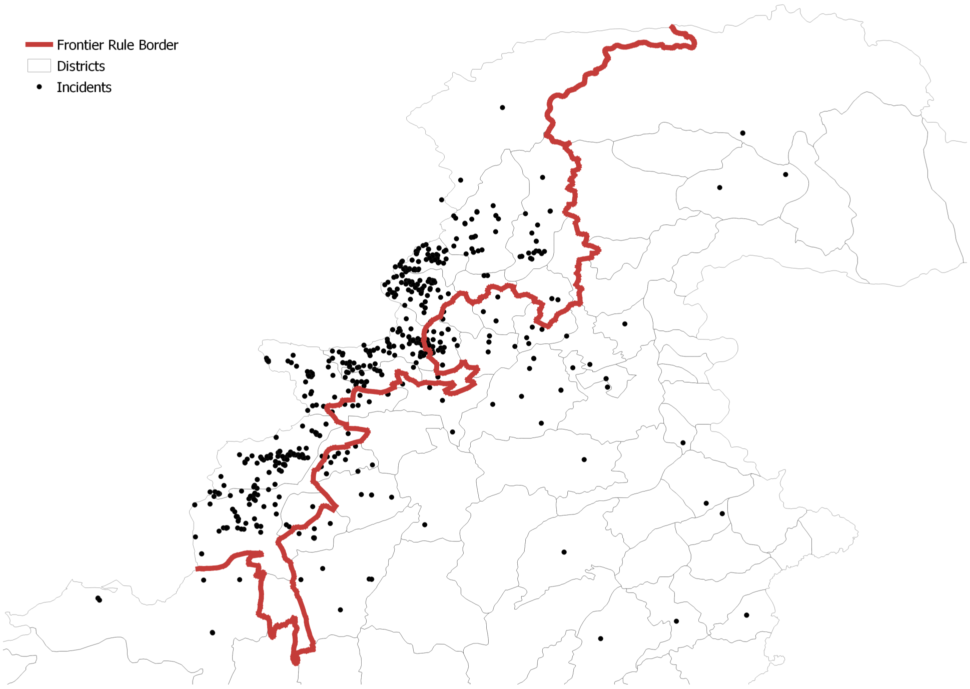
$$y_{i,j} = \alpha_0 + \alpha_1 FrontierRule_i + \mathbf{X_i'}\beta + f(location_i) + \phi_j + \epsilon_{i,j} \tag{1}$$

where $y_{i,j}$ is a measure of conflict against the state in a 10km-by-10km grid cell i along the border segment j. $FrontierRule_i$ is a dummy variable indicating that grid cell i is inside the FR boundary. $\mathbf{X_i'}$ is a vector of covariates that includes the following set of grid-cell-level geographic, climatic, and historical controls: terrain ruggedness, slope, topography, wheat suitability, temperature, precipitation, pre-FR conflict incidence, and pre-FR population density. $f(location_i)$ is a polynomial that controls for a smooth function of the geographic location of grid cells. In our main analysis, we use a grid cell's Euclidean distance from the FR border as the running variable and, following Calonico et al. (2014), Cattaneo et al. (2020), and Gelman and Imbens (2019), use a local linear specification which is estimated separately on both sides of the border. In robustness analysis, we experiment with alternative functional forms. We also use a triangular weighting kernel and calculate the optimal bandwidth using the MSE-minimizing procedure suggested by Cattaneo et al. (2020).

We divide the FR boundary into fixed 20-km segments to which grid cells are then

[25]For each individual conflict, Jaques provides a paragraph-length description on the type of conflict (e.g., land, sea, etc.), its date, approximate duration (e.g. single day), approximate location, and major participants of the conflict.

Figure 2: Spread of conflict incidents against the state across the FR border (1970–2018)



Notes: This map shows the spread of conflict incidents against the state from 1970 to 2018. Each black dot represents an attack against the state (defined here as military personnel or installations) and the red line denotes the historical FR border (as of 1901) separating frontier areas (left side of the border) from settled districts (right side of the border).

matched; ϕ_j are the associated border segment fixed effects which ensure that grid cells are compared across the same segment of the border.[26] Finally, to account for spatial correlation, we cluster the standard errors at the FR border segment level. Our parameter of interest is α_1, the SRD estimate of the impact of frontier rule on conflict against the state. The unit of observation in our empirical analysis is a 10km-by-10km grid cell, and the sample is restricted to grid cells falling within a 50-km buffer zone around the FR border. Figure 3 (Panel A) illustrates our SRD set-up, showing contiguous 10km-by-10km grid cells on either side of a specific segment of the FR border (red line), with some areas falling under frontier rule (grey cells) and others outside it (white cells). It also displays the precise location of conflict incidents against the state (black dots) along the specific segment. Figure 3 (Panel B) shows the 50-km buffer zone (shaded in grey) within which our analysis is restricted.

Identification.—The SRD approach allows us to compare conflict incidence in areas that are geographically sufficiently close to each other, but where one area is subject to frontier rule and the other is not.[27] An important identification concern here is that the frontier rule border might have been strategically chosen for reasons that could shape conflict. However, as argued in section 2.1 (and Online Appendix B), even if broad strategic motivations might have shaped which areas would be subjected to frontier rule,

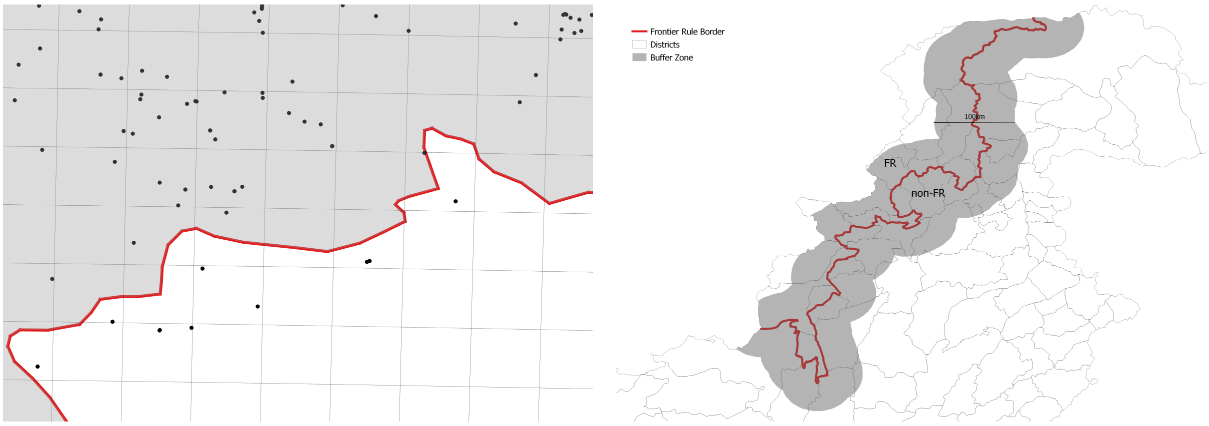
[26]Other key studies that incorporate border segment fixed effects in an SRD specification include Dell (2010); Dell et al. (2018).

[27]Our approach is therefore akin to past studies that have leveraged a similar spatial focus on a small sub-region (see, for example, Dell et al. (2018); Dell and Olken (2020); Lowes and Montero (2021); Popescu et al. (2023)).

Figure 3: Illustration of the SRD setup and area of study

Panel A: SRD setup

Panel B: Area of Study



Notes: Panel A illustrates the SRD setup. Every square is a 10km-by-10km grid cell. The red line is the FR border. The grey shade represents the area inside the FR border, whereas the white shade represents areas outside the FR border. The black dots represent geocoded locations of conflict incidents against the state. Panel B shows the area of study within which our sample is restricted. It encompasses all those grid cells that lie within a 50-km buffer zone around the FR boundary.

the exact placement of the border was relatively random and imprecise, lacking scientific justification or a clear geographic basis. Unlike non-frontier regions in the rest of British India, where precise trigonometrical surveys ensured systematic mapping, frontier areas were subject to a much less rigorous cartographic process that was prone to subjective and ad hoc influences. It is thus unlikely that the FR border was selected based on characteristics that vary discontinuously at the border.

To ensure that areas just outside the FR boundary are a good counter-factual for regions just inside the boundary, we thus require the standard assumption that all relevant factors varied smoothly across the border. These include, among others, unobservable dimensions, emanating from different sources grounded in the geography, climate, and history. To assess the plausibility of this assumption, we carry out balance tests for key geographic, climatic, and pre-FR characteristics using specification (1). In selecting these dimensions, we closely follow prior literature relating conflict with such factors as ruggedness (Fearon and Laitin, 2003; Nunn and Puga, 2012; Carter et al., 2019), climate and topography (Miguel et al., 2004; Burke et al., 2015), historical population density (Herbst, 2000), and historical exposure to conflict (Fearon and Laitin, 2014; Dincecco et al., 2022).[28] The balance tests are conducted at the 10-by-10 km grid-cell level with border segment fixed effects included in the specification and standard errors clustered at the 20km border segment-level. Accordingly, Table 3 shows balance for the following dimensions: terrain ruggedness, slope, topography, wheat suitability, temperature, pre-

[28]These dimensions are either directly correlated with conflict or serve as proxies for conflict determinants that are difficult to observe. For example, low per capita income, negative income shocks, and poverty are consistently flagged as important correlates of conflict (Blattman and Miguel, 2010). While historical (especially pre-colonial) data on income are unavailable, climatic factors (e.g. rainfall) and historical population density act as useful proxies. Similarly, state authority and capacity have been identified as important determinants of conflict (Besley and Reynal-Querol, 2014; Depetris-Chauvin, 2015). Geographic factors that constrain the reach of the state (Scott, 2010) can thus act as proxies for state authority and capacity, dimensions that are otherwise hard to measure.

cipitation (mean and standard deviation), pre-colonial conflict intensity, and population density. For each of the eight factors, the coefficient estimate on the FR indicator variable is consistently small in magnitude and statistically indistinguishable from zero. The associated binscatter plots showing lack of discontinuity are presented in Online Appendix Figure C5.

We recognize that other factors can challenge the comparability of FR and non-FR areas. For instance, prior research on conflict in Africa shows that ethnic groups organized around segmentary lineages are more likely to engage in violent conflict that is both larger in scale and longer in duration (Moscona et al., 2020). Moreover, studies have found that religious and ethnic differences, are often associated with higher levels of conflict (Bazzi and Gudgeon, 2021; Esteban et al., 2012; Reynal-Querol, 2002). However, an advantage of our empirical setting is that social structure, ethnic composition, and religious identity are similar across both sides of the FR border, and thus naturally controlled. There are at least two reasons why these factors are unlikely to pose a concern here. First, historical and anthropological studies indicate that segmentary lineage among frontier tribes was unpredictable and fluid. Second, tribes on both sides of the FR border are predominantly of the same ethnic (Pashtuns) and religious (Islam) groups, showing a high degree of homogeneity. Although residents on both sides are majority Sunni Muslims, variations within Sunni Islam, particularly Deobandi ideology, may drive differing motivations for violence. Deobandi Islam's strict Sharia interpretation and ties to extremism are linked to rising intolerance. However, geo-coded data reveals similar exposure to Deobandi madrassahs on both sides, supporting the study's ability to isolate the impact of FR rule on violence from religious ideology. Online Appendix C1 offers further evidence on the balance across FR and non-FR areas in social structure, ethnicity, and religion.

Another identification challenge is selective sorting and migration. The former is unlikely to apply in our context as sub-regions (i.e., grid-cells) lacked any negotiating power to shape the historic FR border. However, differential institutional rule might have resulted in selective migration (into or from FR regions) during or after the initial border assignment. While we do not have systematic evidence to rule out selective migration during the colonial period, there is no anecdotal evidence to suggest that frontier rule led to any selective in- or out-migration in these regions. Moreover, we conduct several tests based on census and survey data to rule out selective migration in the contemporary period. We first use census data to show that population growth rates are fairly similar across the two most recent census periods in both the FR and adjacent non-FR regions, suggesting low net migration either side of the FR border. Next, we analyze migration data to (a) demonstrate no significant differences in in- and out-migration rates between FR and neighbouring non-FR areas, and (b) highlight the very low levels of in-migration in both FR and adjacent non-FR regions compared to the rest of the country. Online Appendix C2 presents the corresponding evidence.

3.3 Spatial Regression Discontinuity (SRD) Results

We first examine the raw relationships in our SRD sample using three measures of conflict against the state: number of incidents, number of deaths, and number of injuries. Figure 4 shows the binscatter plots of the unconditional relationship between each of the three measures of conflict against the state and distance from the FR border. Following Korting et al. (2023), we use small bins (16 bins of size 5km each) and default y-axis scaling.[29] Even in the raw data, a strong discontinuity is visible at the FR border. Moving from just outside to just inside the FR border, there is a clear discontinuous increase in conflict against the state. A similar pattern exists for smaller bins (of size 2.5km each)—See Online Appendix Figure F1. Next, in Table 4, we present the SRD estimates of the relationship between frontier rule and conflict incidence against the state. Overall, grid-cells just inside the historical boundary of frontier rule experienced significantly higher conflict against the state in all specifications, whether without controls (columns 1, 3, and 5) or with controls (columns 2, 4, and 6). Specifically, areas just inside the boundary of frontier rule are associated with an increase in conflict of 0.59 standard deviations.[30]

In Online Appendix Table E1 (description in Appendix D1), we show that the baseline results survive when the sample is restricted to grid cells within two alternative buffer zones around the FR border: a broader buffer zone at 60km from the border (Panel A) and the other narrower at 40km from the border (Panel B). As the results show, regardless of these restrictions imposed on the sample, the effect on conflict of moving from just outside to just inside the FR border is both positive and statistically significant. Next, Online Appendix Table E2 (description in Appendix D1) examines the sensitivity of our results to the inclusion of fixed effects for shorter border segments (i.e., 18km and 15km instead of 20km).[31] Whether we restrict the length of the border segments to 18km (Panel A) or 15km (Panel B), we find a positive and statistically significant effect of frontier rule on conflict against the state.

3.4 Robustness tests

We now conduct a battery of robustness checks and report the results in Online Appendix E. One concern is that our results might be capturing the effect of a *border* rather than the effect of *being inside the border* that emanates from an institutional discontinuity. This concern is important to address as recent literature demonstrates that violence is systematically higher in closer proximity to borders (Michalopoulos and Papaioannou, 2016; Depetris-Chauvin and Özak, 2020). A related concern is that our SRD estimates could be susceptible to ambiguity in the treatment status. This could happen if, for instance, grid cells very close to the border have some of their area outside FR (and are therefore not treated) and some inside FR (and thus treated). To rule out these concerns, we exclude all grid cells from our sample that are close to the FR border. Specifically, in our donut hole analysis, we exclude grid cells within 0.5km of the FR border in either direction. Our results hold to this exclusion (see Online Appendix Table E3 and D1). To probe further robustness, we reduce the donut hole radius from 0.5km to 0.1km. Despite the successive deletion of contiguous grid cells, our RD estimates remain positive and statistically significant (see Online Appendix Figure F7).

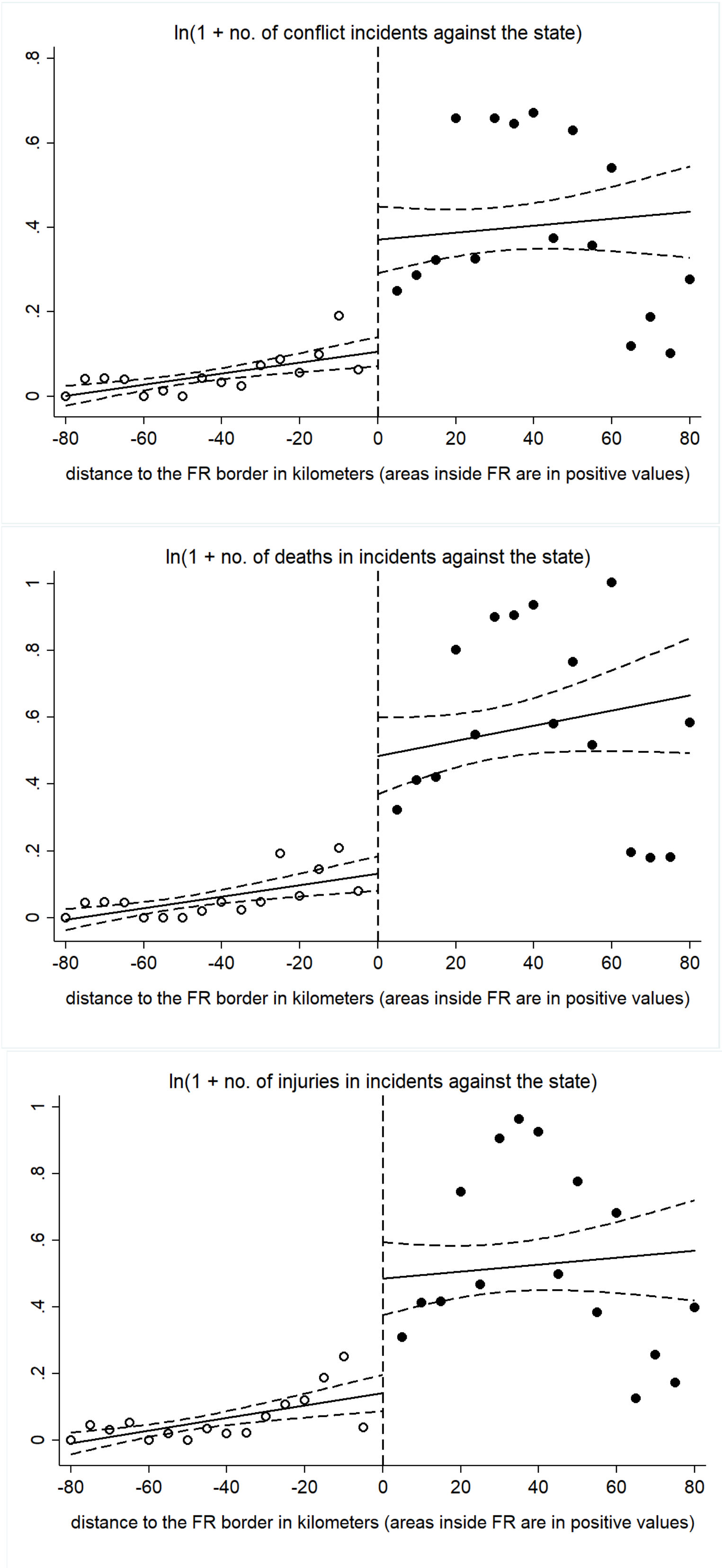
To assess the sensitivity of our findings to alternative functional forms, the Online Ap-

[29] As Korting et al. (2023) show, the size and spacing of bins along with other recommended conditions perform better on several econometric criteria. Selection of smaller bins, in particular, leads to lower type-I error rates.

[30] The value of 0.59 is calculated by dividing the coefficient on the **Inside FR** indicator variable in column 2 of Table 4 by the standard deviation of ln(1+incidents against state) in the 50km buffer zone sample, i.e., 0.358/0.609.

[31] As border segment fixed effects account for treatment effect heterogeneity along the FR border, this sensitivity analysis is important to the robustness of our findings.

Figure 4: Conflict against state and FR border distance (the raw relationship)



Notes: Binned scatterplots (16 bins of size 5km each) of the unconditional relationship between conflict against the state and distance to the FR border. The y-axis reports the natural log of 1 plus the incidence of conflict against the state for each of our three measures. The x-axis reports the distance (in km) from the FR border for areas under FR and non-FR. The border itself is at km 0 with positive values indicating km inside the FR territory.

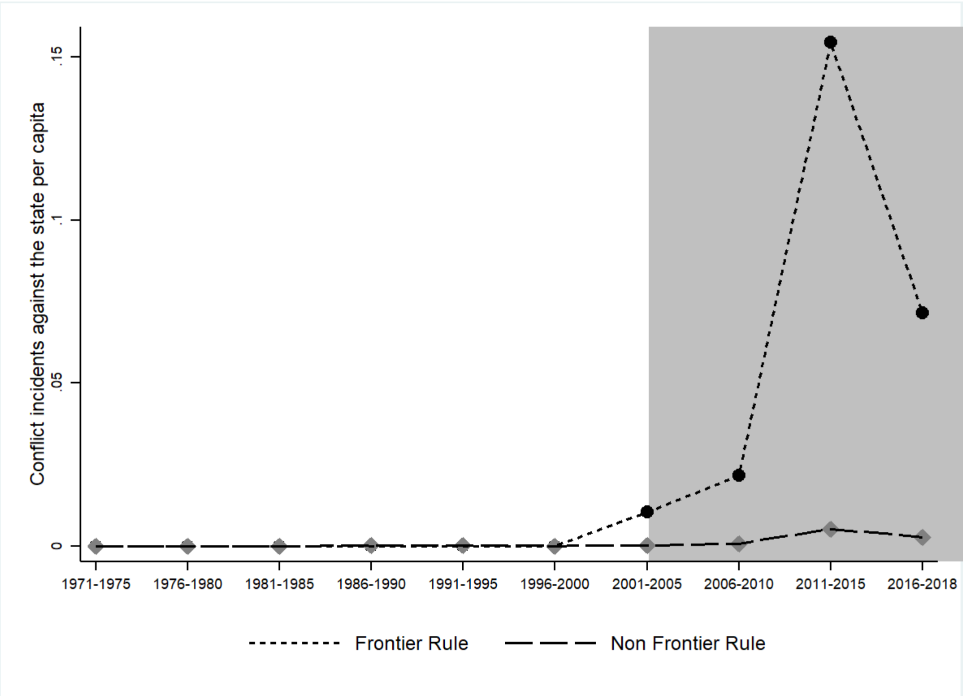
pendix E reports several complementary robustness tests. We first increase the order of the polynomial of our running variable (distance to the FR border), which according to Cattaneo et al. (2020) reduces the approximation error in estimating the RD effect. Accordingly, we use a 'quadratic' polynomial as the functional form for the running variable and show that our estimates remain consistent both in terms of sign and statistical significance (see Online Appendix Table E4 and D1). Next, we use latitude, longitude, and their interactions as the running variables rather than the Euclidean distance. An advantage of this approach is that it helps to account more directly for features that vary over a two-dimensional space (Dell et al., 2018; Moscona et al., 2020). Following Dell et al. (2018), we also include fixed effects for four broadly defined segments of the frontier rule border and use Conley standard errors to account for spatial correlation. Our results remain unchanged (see Online Appendix Table E5 and D1). Our SRD estimates also remain consistent in terms of sign and statistical significance when we choose a manual approach towards bandwidth selection, using a bandwidth of 15, 12, or 10km on either side of the FR border (see Online Appendix Table E6 and D1), and the use of a different kernel weighting strategy for observations close to the FR border (see Online Appendix Table E7 and D1). Online Appendix E also addresses another concern emanating from log-like transformations of zero-valued outcomes, which is the case with our measures of conflict. As Chen and Roth (2024) show, such transformations are not scale-invariant, preventing us from interpreting average treatment effects in percentage terms. We implement two solutions proposed by Chen and Roth (2024): estimating scale-invariant normalized parameters via Poisson regression (Online Appendix Table E8 and D2) and explicitly calibrating the value on the intensive relative to extensive margins (Online Appendix Table E9 and D2). The results hold in both approaches.

A potential concern is that our results could simply be reflecting structural differences in the northeast–southwest dimension rather than any genuine institutional effect of the border demarcating frontier rule. To rule this out, we conduct a falsification test that consists in shifting the original FR border south-westward (see Online Appendix Figure F8 for a map showing both the original and the shifted borders). Reassuringly, we do not find any statistically significant differences in violence against the state between grid cells on either side of this placebo border, thereby confirming that our results cannot be attributed to structural characteristics that vary in a northeast–southwest dimension (see Online Appendix Table E10 and D3). We also test the robustness of our findings to the use of an alternative conflict data source. Our baseline estimates rely on conflict events recorded in the GTD (2021). While there may be concerns about measurement errors, especially in earlier periods, the GTD's data comes from open media sources that are independently verified for credibility. Moreover, Pakistan's frontier areas are extensively studied, making systematic omissions unlikely. To address potential data source concerns, we re-estimate our baseline specification using conflict data from the Uppsala Conflict Data Program (UCDP). The UCDP, with nearly 40 years of history, is the oldest ongoing civil war data collection project. However, unlike the GTD, the UCDP does not disaggregate conflict events by target types, preventing direct comparison between the two datasets. Notwithstanding this limitation, our baseline results are strongly validated by the UCDP data (see Online Appendix Table E11 and D4). Finally, we extend our analysis by re-estimating the baseline specification for a broader measure of conflict that captures violence against broader state targets, such as the police, government officials, roads, bridges, etc. Our results remain unchanged (Online Appendix Table E12 and D4).

3.5 The 9/11 shock and conflict in FR areas

We next utilize the temporal dimension of our dataset to examine the trajectory of violence against the state in the period, 1971 to 2018. Figure 5 charts the evolution of conflict incidents against the state separately for FR and non-FR regions. As Figure 5 shows, there is practically no difference in conflict between FR and non-FR areas prior to 2001. However, after 2001, conflict in FR regions diverges sharply, with a noticeable rise in violent attacks. This increase continues steadily until 2010, followed by a steep rise during the period, 2011–2015. The violence in FR areas then subsides following major military operations by Pakistan Army between 2016 and 2018. Despite this, a discernible difference in conflict incidence remains between FR and non-FR regions in the 2016–2018 period, indicating that violence did not revert to pre-2001 levels.

Figure 5: The evolution of conflict incidents in Pakistan, pre- and post-9/11



Notes: This figure charts the evolution of conflict incidents between the FR and non-FR areas averaged over five-year windows during the period 1971–2018 in an unrestricted sample covering all sub-districts (*tehsils*) of Pakistan. The variable on the y-axis is the number of conflict incidents against the state per capita.

Table 5 formally tests the salience of the 9/11 shock for the rise in conflict against the state by separately estimating the SRD specification in equation 1 for the pre- and post–2001 periods. The results in Table 5 reveal a striking pattern: before 9/11, there is no statistically significant discontinuity in any measure of violent conflict against the state (columns 1–6). After 9/11, however, areas just inside the FR border show a sharp and significant increase in conflict compared to areas just outside, with consistently positive and statistically significant coefficients (columns 7–12). These findings are robust to extending the buffer zone to 60 km (Online Appendix Table E13 and D5) and using an alternative conflict data source (Online Appendix E14 and D5).

4 Mechanisms

We have just shown that the frontier rule areas experienced a discontinuous rise in sovereignty-contesting forms of violence after the geo-political shock of 9/11. Next, we offer concrete evidence on three features of frontier rule that made it particularly vulnerable to the 9/11 shock: (a) absence of formal institutions of conflict management; (b) overwhelming reliance on local elites; and (c) low trust in the state. Furthermore, we show that as a local insurgency took hold around 2004, tribal elites became an important casualty. Their strategic targeting and assassination effectively removed the main pillar of frontier rule, thereby intensifying conflict and unraveling social order.[32] Finally, we rule out potential competing explanations for our results.

4.1 Institutional fragility of frontier rule

Using data from a nationally representative survey of individuals carried out by the Free and Fair Election Network (FAFEN) in 2016, we estimate linear probability models to investigate the three inter-related features of frontier rule mentioned above that made it vulnerable to the 9/11 shock. We first probe whether residents in FR areas had less reliance on elected members of parliament and greater recourse to tribal *jirga* (consultative assembly of elders).[33] In this regard, we construct three binary dependent variables that indicate whether a respondent had: (a) recourse to a member of the national assembly (MNA) for dispute resolution, (b) no contact with an MNA in the last two months, and (c) recourse to a tribal assembly (*jirga*). Our key explanatory variable is a dummy for residence in FR region. Control variables include age, locality-level fixed effects, gender, education, income source, and household income range. Results in Table 6 confirm that FR residents: had limited recourse to their elected representatives (i.e., MNAs) for dispute resolution (columns 1–2); were systematically less likely to have established contact with the MNA in the two months prior to the survey (columns 3–4); and were more likely to resort to the tribal *jirga* for dispute resolution (columns 5–6). The FR status dummy is statistically significant across all specifications. To examine the connection between frontier rule and trust in state institutions we again use the FAFEN survey data to estimate linear probability models where the dependent variable is a binary indicator that is equal to one when a respondent expresses 'very little or no trust' in state institutions. As results in Table 7 show, residents in FR areas are significantly more likely to have 'very little or no trust' in the parliament (columns 1–2), the district court (columns 3–4), the high court (columns 5–6), and the supreme court (columns 7–8), with the FR status dummy being positive and statistically significant at the 1% level in all models.

Our findings align closely with evidence from independent surveys, underscoring the centrality of tribal leaders to local governance and dispute resolution. A 2011 survey revealed that 74.4% of respondents in FR areas were aware of *jirgas*, and 43% of respondents turned to *jirgas* for dispute resolution; 31% initially took their disputes to local leaders (*Khans* or *Maliks*), while only 6% resorted to courts in the adjoining districts of

[32] Our evidence is consistent with the prediction in Naseemullah (2014, p. 507) that when frontier rule is 'marginalized or disrupted [...] channels of communication are weakened and commitments become less credible. Consequently, tensions are much more likely to explode into large-scale social disorder'.

[33] Frontier residents were practically disenfranchised until 1997, when limited suffrage was introduced through non-party-based elections that preserved tribal *Maliks'* control over local society and restricted broader political engagement (Ullah and Hayat, 2017).

Khyber Pakhtunkhwa (Shinwari, 2011). In the same survey, tribal elders emerged as the most trusted institution, while MNAs received the lowest trust ratings (Shinwari, 2011). It is worth emphasizing that the ability to engage in electoral politics in non-FR areas allowed the 9/11 induced grievance against the state to be channelized through the ballot box. This dynamic was notably reflected in the rise of a multi-party religious alliance in non-FR areas that secured a landslide victory on a single-point agenda of opposition to the US-led war on terror and Pakistan's involvement in it (see discussion in Online Appendix G1). By contrast, such grievances could not be channelized in FR areas due to the absence of formal avenues of political participation.

4.2 Assassinations of tribal leaders

We have shown that the *jirga* system, led by tribal elders, remains the primary (and preferred) mode of conflict resolution in FR areas, with limited access to and trust in formal state institutions. We next show that the disruption to frontier rule in the wake of the 9/11–induced shock primarily took place through the systematic and strategic targeting of tribal elders. To motivate our discussion, Figure F5 (Online Appendix) reveals a clear spatial discontinuity, with significantly more attacks against tribal elders in FR regions than in non-FR areas. To formally examine this, we re-estimate our SRD specification, replacing the dependent variable with the number of incidents targeting tribal elders (i.e. attacks, deaths, and injuries). We focus on post-2001 violence within a 50-km buffer around the FR border using 10km-by-10km grid cell data. The results, reported in Table 8, reveal a discontinuous rise in violent incidents targeted against tribal chiefs in the post-9/11 period as one moves from just outside to just inside the FR border (Columns 1-2). A similar pattern holds for the number of deaths (columns 3–4) and injuries (columns 5–6) in attacks against tribal leaders.

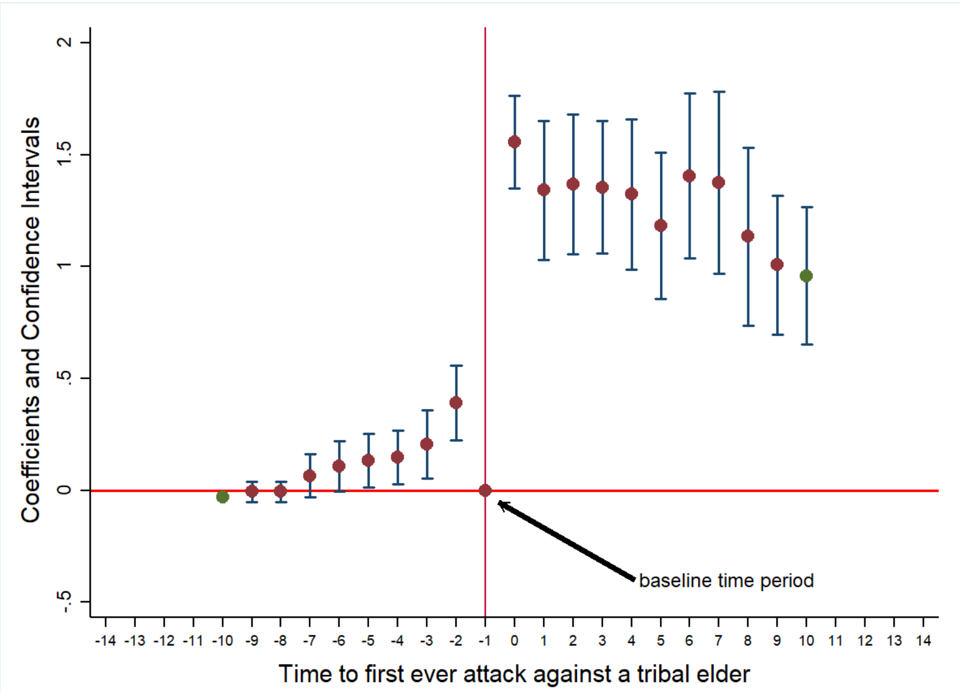
Next, we provide a specific test of whether such a strategic targeting of tribal elders led to a significant escalation of violence. Specifically, we probe whether spatial units in the FR region that witnessed an attack on a tribal elder for the first time experienced more intensified conflict in subsequent years relative to spatial units that did not witness such an attack. To do so we estimate a version of the difference-in-differences specification that uses leads and lags to estimate the effects before, during, and after a tribal elder is first targeted:

$$y_{i,s,t} = \nu_s + \gamma_t + \sum_{\tau=0}^{m} \delta_{-\tau} * D_{i,s,t-\tau} + \sum_{\tau=1}^{q} \delta_{+\tau} * D_{i,s,t+\tau} + \epsilon_{i,s,t} \tag{2}$$

where $y_{i,s,t}$ is a measure of overall conflict incidence in grid cell i within district s in year t. $D_{i,s,t}$ is an indicator for when an attack against a tribal elder takes place for the first time in grid cell i in district s. ν_s are district-fixed effects that control for time-invariant characteristics at the district level. γ_t are year-fixed effects that control for shocks common to all districts in any given year. $\sum_{\tau=0}^{m} \delta_{-\tau} * D_{i,s,t-\tau}$ allow for m lags $(\delta_{-1}, \delta_{-2}, ..., \delta_{-m})$ or 'post–tribal elders attack effects' and $\sum_{\tau=1}^{q} \delta_{+\tau} * D_{i,s,t+\tau}$ allow for q leads $(\delta_{+1}, \delta_{+2}, ..., \delta_{+q})$ or 'pre–tribal elders attack effects'. The former is referred to as 'post-treatment effects' and the latter as 'anticipatory effects' in the standard treatment effects literature (See Angrist and Pischke (2009)). The estimated leads and lags, with respective coefficients and confidence intervals, are plotted in Figure 6. The estimated effects reveal an interesting pattern. Although there is a gradual uptick in violence several years before a tribal elder is first attacked in a grid cell, there is a noticeable jump in violence after such an attack. The sharply increasing effects persist even ten years after the attack first took place. This clearly suggests that targeted attacks on tribal elders led to a subsequent escalation of violence.

Taken together, our evidence is consistent with the view that the strategic elimination of tribal elders dismantled the primary pillar of social order, creating an institutional void that served as a fertile breeding ground for conflict against the state in the absence of any formal avenues for conflict management. Our findings align with qualitative accounts, such as Naseemullah (2014, p. 515) who argues that 'the disruption of the frontier rule that lay at the heart of political order in FATA is responsible for the nature and extent of conflict following the exogenous shock of the war'. Over 90% of tribal elders were reportedly killed or wounded in FR areas (GTD, 2021; SATP, 2021), with 150 *Maliks* killed in 2008 alone (Jones and Fair, 2010; Mariam, 2020). As Naseemullah (2014, p. 518) notes, 'this struck a serious blow against the structures within tribal society that were successful interlocutors with the state' and helped to maintain political order.

Figure 6: The estimated impact of targeted attacks on tribal elders on conflict escalation



Notes: This figure plots the coefficients and confidence intervals for the estimated relationship between the first-ever attack on a tribal elder and the overall level of conflict in the same grid cell. The dependent variable is ln (1 + all conflict incidents). Estimates are from the model in equation 2 that allows for effects before, during, and after the first-ever attack on a tribal elder and includes district and year-fixed effects.

4.3 Competing explanations

We have thus far attributed the disproportionate rise in violence against the state in frontier areas post-9/11 to the inherent vulnerability of frontier rule to external shocks. In this section, we evaluate and rule out key alternative explanations for our empirical findings. Specifically, we address four competing explanations built around: (a) potential conflict spillover from Afghanistan; (b) income shocks; (c) US drone strikes; and (d) pre-9/11 differences in infrastructure provision.

Spillover from Afghanistan.—A potential concern is that the relative uptick in violence in FR areas after 9/11 may have been caused by the spillover of conflict from Afghanistan rather than the fragility of underlying institutional arrangements. Such spillover is possible for several reasons. Afghanistan shares a long border with Pakistan (1,640 miles), a sizeable portion of which is with frontier areas (i.e., 373 miles). Following the US invasion in 2001, Afghanistan witnessed an active phase of conflict. Given the presence of Taliban sympathizers in Pakistan, this conflict might have spilled over into FR areas. One pathway for such spillover could be the influx of Afghan refugees fleeing war and instability. While most refugees were civilians settling in urban centers like Lahore, Karachi, and Peshawar, some militants might have retreated into north-western Pakistan disguised as refugees, using the region as a base to launch retaliatory attacks on state installations in response to Pakistan's support for the US-led war.

While it is difficult to completely rule out the possibility of conflict spilling over from Afghanistan, we present several pieces of evidence to argue that the post-9/11 disruption of frontier rule in Pakistan cannot be entirely attributed to such spillover. We begin by showing the spatial distribution of conflict incidents in Afghanistan and Pakistan (See Figure F4 in Online Appendix). As the figure shows, there is a high concentration of attacks against the state on the Afghan side of the Durand line, the international border separating Afghanistan and Pakistan. It is important to highlight that the Afghan border, especially the segment adjacent to FR areas, has been closely monitored and surveilled in the post-9/11 period through 900 border checkpoints. Soon after 2001 attack on Afghanistan, the US sponsored the Border Security Program to secure the Pak-Afghan border through strict aerial and on-the-ground oversight. It entailed the construction of additional 137 border outposts and provision of surveillance aircrafts, helicopters, night vision goggles, and binoculars.[34] Despite such tight border surveillance, it is still possible that some militants from Afghanistan might have slipped through the border into Pakistan's frontier areas and instigated violence against the state.

In what follows, we provide an array of evidence to argue that this possibility, although remote, is unlikely to systematically explain our results. Firstly, to rule out spatial spillover from Afghanistan, we compute the distance of the centroid of each grid cell from the Durand line border and include it as an additional covariate in our SRD specification. As Online Appendix Table E15 (description in D5) shows, the results survive. In a second related exercise, we exclude all grid cells in our 50km buffer zone that are contiguous to the Afghan border. These grid cells can be most worrisome in terms of potential spillover. As Online Appendix Table E16 (description in D5) reveals, our results remain unchanged on this restricted sample. As a third strategy, we utilize the information in the GTD to identify the perpetrators or originators of attacks against state targets. In Online Appendix Table E17 (description in Appendix D5) we categorize these attacks by type of militant outfits, distinguishing between local, foreign, and unknown organizations. Information is provided for the whole sample period, 1970–2018 (columns 1–2), the pre-2001 period (columns 3–4), and the post-9/11 era (columns 5–6). Regardless of whether we restrict this exercise to the whole period or to the post-9/11 era, more than 95 per cent

[34]For further details, see the report submitted to the US Government Accountability Office (GAO), report number GAO-09-263SP entitled *Securing, Stabilizing, and Developing Pakistan's Border Area with Afghanistan: Key Issues for Congressional Oversight.* Available at: https://www.gao.gov/assets/a286308.html

of the known attacks were claimed by local outfits rather than Afghan-based militants. These include Pakistan-based outfits, such as the *Tehreek-i-Taliban Pakistan (TTP), Lashkar-e-Jhangvi, Tehreek-i-Nifaz-e-Shariat-e-Mohammadi, and Sipah-e-Sahaba,* among others.

These results are consistent with extensive qualitative literature highlighting the local roots of the insurgency in FR areas (Jones and Fair, 2010; Nawaz, 2011; Naseemullah, 2014; Watts et al., 2014). There are essentially two main reasons why Afghan militants may have desisted from launching widespread attacks against the Pakistani state in FR regions. First, it is generally difficult for cross-border militants to develop and sustain an organized network in another country. In addition to requiring grassroots support from the local populace, they need a clandestine military architecture which keeps fighters supplied with both weapons and rations. While there is plenty of evidence that local insurgent groups like the TTP developed such an architecture in Pakistan's tribal areas along the Afghan border, the same is not true for Afghan groups (Elahi, 2019). Instead, the Afghan factions were more likely to have used Pakistan's FR areas as a sanctuary from where they could launch cross-border attacks against US forces inside Afghanistan.

The second reason is related to the Pakistani state's nuanced strategy for dealing with militant outfits within its borders. After 9/11, the Pakistani deep state, primarily its military and intelligence services, 'established a differentiated framework for dealing with divergent outfits' (Lynch, 2018, p. 68). As part of this, any group that 'remained supportive or neutral in its approach to the Pakistani state' would often be overlooked and left to its own devices (Lynch, 2018, p. 68). By contrast, groups that 'threatened the Pakistan state or viewed international Islamist jihad as the highest order priority' would be dealt with severely (Fair et al., 2010; Hussain, 2005; Rana and Ansari, 2004). Faced with this differentiated approach, Afghan groups were less likely to engage in systemic violence against the Pakistani state.

Even if we were to admit the possibility of such conflict spillover, it is not easy to understand why the Afghan attackers would stop at the FR border and not engage in higher-profile targets in settled regions. Indeed, after Musharraf's decision to join the US-led war in Afghanistan, major Pakistani cities (e.g., Peshawar, Lahore, Rawalpindi, Karachi) witnessed a spate of violent attacks which became important national incidents and key pressure points for public policy. Finally, if conflict did indeed spill over from Afghanistan to FR areas, why do we not see a similar spillover in the lower half of the Afghanistan-Pakistan border (see Online Appendix Figure F4). Taken together, both the quantitative and contextual evidence reassure us that the potential overflow of conflict from Afghanistan was not the main driver of the post-9/11 trajectory of violence against the state in FR areas.

Income shocks.—The post-9/11 surge in conflict in FR areas may stem from disruptions to the local economy rather than the inherent institutional fragility of frontier rule. This distinction is important as prior research identifies income shocks as a key conflict driver (Blattman and Miguel, 2010). Two potential sources of such shocks are commodity price fluctuations tied to natural resources and cross-border smuggling. However, these are easy to rule out as possible explanations for our results. As detailed in Online Appendix G2, Pakistan's North-western region lacks significant natural resource wealth and the limited mineral resources present there are evenly distributed across the FR border. Similarly, Online Appendix G3 shows that the US invasion of Afghanistan did not result in a sustained disruption to cross-border smuggling in FR areas. Instead, the primary economic shock came from military operations, which, as shown in the timeline of events in FR areas in Online Appendix Figure F6, intensified after 2009 (Jones and Fair, 2010; Nawaz, 2011). Even if concentrated and targeted, these operations displaced populations and disrupted local economic activity. However, we can rule out this concern by showing that the rise in local insurgency in FR areas predates military operations that were, in fact, an endogenous response to the uptick in violence.

To do so, we estimate a basic event study specification that charts the differential evolution of conflict incidence between FR and non-FR areas before and after 2001:

$$y_{i,d,t} = \nu_d + \gamma_t + \mathbf{\Gamma_t}(FrontierRule_{i,d} \times Year_t) + \epsilon_{i,d,t} \tag{3}$$

Here, $y_{i,d,t}$ is a measure of overall conflict incidence (i.e., ln(1 + all conflict incidents)) in sub-district i within district d in year t. ν_d and γ_t are district and year fixed effects, respectively. The term $(FrontierRule_{i,d} \times Year_t)$ is the interaction between the indicator for whether sub-district i is exposed to historical frontier rule and the full set of year fixed effects. Finally, the vector of estimated interaction coefficients, $\mathbf{\Gamma_t}$, shows the relationship between frontier rule and conflict over time. Specifically, it charts the evolution of conflict in FR areas relative to non-FR areas in each year of our conflict panel from 1970 to 2018.[35]

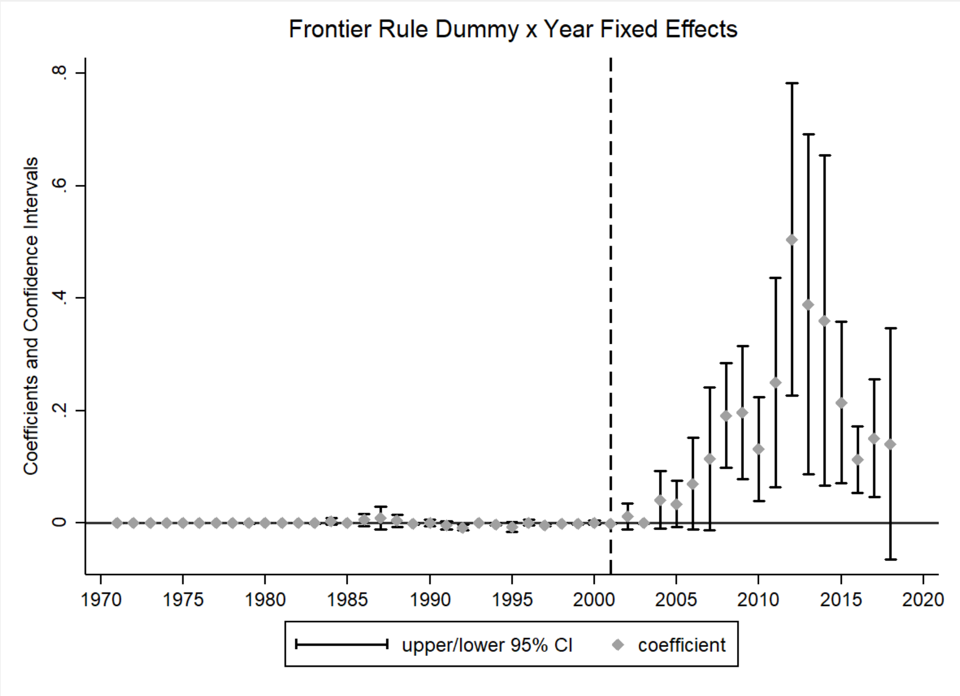
The result from estimating equation 3 is displayed in Figure 7, which plots the point estimates and corresponding confidence intervals on the dummy for frontier rule interacted with year fixed effects. As the figure shows, the conflict trajectory of FR areas begins to diverge from non-FR areas in 2004, which is the year when the local insurgency takes root. This result in conjunction with the timeline in Online Appendix Figure F6 shows that the uptick in violence in the FR areas (in 2004) pre-dates the intensive phase of military operations (2009–14), thereby offering conclusive evidence against income shocks being the primary explanation for our results. What these results also highlight is the salience of timing and sequencing of key events in our causal story. This closely follows the spirit of Pierson (2004, p. 67) who argued that 'long-term outcomes of interest depend on the relative timing of important processes [...] A variable's impact cannot be predicted without an appreciation for when it appears within a sequence unfolding over time'. This is especially important in the context of insurgency-based violence where several mutually reinforcing factors are triggered in a sequence that is drawn out over time.

Drone strikes.—An important part of the US war on terror was the use of unmanned drones to take out specific insurgent targets in Afghanistan and north-west Pakistan, including frontier areas which are the focus of this study. While drone strikes specifically targeted the militants, their collateral damage sometimes included the deaths of innocent civilians. This might have led to a rise in local grievances. In a survey in frontier areas, 63 per cent of respondents considered drone attacks as 'never justified' (Shinwari, 2012, p. xvi and 88).[36] Such grievances can trigger further conflict. Recent studies offer mixed evidence on the possible impact of drone strikes on violence, with some authors establishing

[35] The estimated interaction coefficients in Γ_t have to be measured relative to a base time period, which we take to be the first year in our conflict panel: 1970.

[36] US drone strikes typically relied on some tacit collaboration between the US and Pakistani military. To highlight the sort of grievances this gave rise to, Jones and Fair (2010, p. 70) cite a local religious leader as remarking that US 'attacks were carried out in the presence of the Pakistan Army; we cannot ignore our army's cooperation with foreign forces in actions that kill innocent people'.

Figure 7: The Frontier Rule effect over time



Notes: This figure plots the point estimates and confidence intervals of the frontier rule (FR) dummy interacted with year fixed effects for the specification in equation 3. The coefficient for the base year (1970) was set to zero and is not shown in the figure. The analysis is conducted at the sub-district *(tehsil)* level. The sample includes all sub-districts of Pakistan. The coefficient on the FR interaction dummy progressively increases from 2001 onwards until it becomes statistically significant in 2008 and reaches its peak in 2012. Notably, there is a significant drop in the coefficient capturing the differential FR effect in 2014. This coincides with the launch of Zarb-e-Azb, the most serious and effective military operation to date. Although the FR interaction coefficient declines after 2014, it remains considerably higher in magnitude relative to the pre-2001 period, indicating that overall conflict incidence in FR areas does not revert to its pre-9/11 levels even after the 2014 military operation.

a decrease in militant violence in the wake of drone strikes (Johnston and Sarbahi, 2016) and others documenting a positive impact of such strikes on terrorist violence (Mahmood and Jetter, 2023). The latter use a novel instrumental variable strategy to show that drone strikes increased anti-US sentiment amongst both insiders (members of terrorist organizations) and outsiders (the Pakistani populace), thereby translating into greater violence. Other more general work in the area has argued that drone strikes could heighten local grievances and provide ideological fodder to local insurgencies (Hudson et al., 2011).

This raises the possibility that the post-9/11 rise in state-directed violence in FR areas can potentially be a result of unpopular drone strikes rather than the institutional fragility of frontier rule in the face of external shocks. As argued before, drone strikes were an endogenous response to the rise in localized violence that had already begun in 2004 (see Figures 5 and 7). As such, these strikes might have fed into the ongoing conflict but were not the cause of the original rise in violence in FR areas. However, to the extent that drone strikes might interfere with our explanation of the core results, we devise a test that excludes from our sample all grid cells that witnessed drone attacks and re-estimate the SRD specification. To do so, we leverage a geo-coded dataset on the location of drone strikes compiled by Usmani (2017). The dataset provides extensive information on the 397 drone attacks in Pakistan, including those in FR regions, during the 2004–16 period.

Online Appendix Figure F3 visually represents these attacks, and Online Appendix Table E18 (description in D5) shows that our results remain robust even after excluding drone-exposed grid cells. A residual concern is that drone attacks might displace or divert violence into neighbouring regions. However, the empirical analysis in Johnston and Sarbahi (2016, Table 5) shows no evidence of violence spillover into neighbouring areas. Overall, our evidence supports the interpretation that drone attacks were not the primary driver of the original uptick in violence post-9/11.

Public goods provision.—Geographic peripheries have historically suffered from a more deficient provision of infrastructure. An important historical legacy of border buffer zones is the systematically lower investment in infrastructure (Popescu et al., 2023). Such differential infrastructural provision can cumulatively set regions on different economic trajectories by shaping trade costs, inter-regional price differences, and real incomes (Donaldson, 2018; Dell and Olken, 2020). These, in turn, are important correlates of conflict. Accordingly, if there were systematic differences in public goods provision between FR and non-FR areas, this could be an alternative mechanism behind the frontier regions' greater proclivity towards conflict after 9/11. To consider this possibility, we examine discontinuity across the FR border in an array of contemporary and historical measures of public infrastructure, measured at the 10km-by-10km grid-cell level. The SRD estimates are reported in Online Appendix Table E19 (description in D5). We begin with contemporary measures of infrastructure. In column 1 we use the number of health sites per 10,000 persons in 2017 as the main outcome. In columns 2–3, we examine discontinuity in the length of roads and the length of waterways, both in kilometres and measured in a pre-9/11 year (1992). Subsequently, we examine measures of historical infrastructure and underdevelopment covering the colonial and pre-colonial periods. In doing so, we are motivated by prior work on the long-run impact of British railroads (Donaldson, 2018) and early Roman roads on contemporary infrastructure provision and economic prosperity (Dalgaard et al., 2022). Similarly, ancient trade routes are an important predictor of the spread of Islam (Michalopoulos et al., 2018), urban growth and prosperity (Blaydes and Paik, 2021; Paik and Shahi, 2023). In this spirit, we investigate in columns 4–6, respectively, potential discontinuities in railroad coverage in the British colonial era, distance to major roads in the Mughal Empire (c.1556–1707), and distance to Islamic trade and pilgrimage routes (c.1300–1600). The results, reported in Online Appendix Table E19 (description in D5), show that there is no statistically significant discontinuity at the FR border in any of these infrastructure measures.

5 Conclusion

Our central argument in this paper is that exceptional institutional arrangements in frontier regions, which were typically established during colonial rule and persisted into the post-colonial era, form a more fragile basis for peace in the face of shocks. The fragility of exceptional frontier rule stems from its greater reliance on elite intermediation, lower trust in the state, and the absence of formal institutions of conflict management that can channelize grievances. We argue that, when faced with shocks, such institutional fragility is likely to manifest in 'sovereignty-contesting' forms of violence. To empirically probe this argument, we combined spatially granular data on conflict with a historical frontier that demarcated a 'rule of difference' by the British Empire in Pakistan's North-West. Our results, based on a spatial RD design, show that regions just inside the arbitrarily defined historical boundary of frontier rule experienced a significant increase in attacks against the state after 9/11 when compared with regions just outside the boundary.

We argue that 9/11 was a shock to grievances against the state caused by the Pakistani state's unpopular decision to join the US-led war on terror. In frontier areas that had historically suffered from an institutional void, these local grievances translated into heightened conflict. We demonstrate that the 9/11-induced disruption to frontier rule seems to have taken place through the systematic targeting of tribal leaders who were the main interlocutors between frontier residents and the state. Their removal, especially in the absence of any alternative formal avenues of conflict resolution, intensified local conflict. We rule out multiple competing explanations behind the post-9/11 rise in violence in FR areas. These include the role of civil conflict spilling over from Afghanistan, income shocks, drone attacks, and differences in public goods provision.

Our paper has important implications for the study of conflict, especially the role of institutions in driving conflict. As Kolsky (2015, p. 1244) noted, 'frontiers have historically been spaces with greater potential for extreme violence'. Yet, we have limited knowledge of factors that feed into the greater proclivity of frontier spaces to violence. Evidence presented in this paper echoes the important insight in Hopkins (2020, p. 2) that any study of the deep drivers of violence must contend with the legacies of how imperial powers 'defined' and 'governed' their frontier territories. While the legacy of frontier governance has received some scholarly attention in other disciplines—notably history, anthropology, and international relations—this paper offers the first systematic empirical enquiry of its impact on contemporary conflict. In doing so, we also contribute to existing literature by showing how a specific historically embedded institutional arrangement shaped conflict in the face of a geo-political shock, thereby underscoring the importance of accounting for the interplay between domestic and external factors in driving conflict.

Not only do we offer a novel institutional explanation for the greater susceptibility of peripheries to conflict we also shed light on why the extension of coercive authority in areas of limited statehood often triggers more violence. Our results offer a plausible explanation as to why counter-insurgency campaigns carried out after 9/11 in Asia, Africa, and the Middle East had limited success. As Comfort Ero, President of the International Crisis Group, argues, a 'military-only' response without addressing the underlying institutional deficits makes for a weak strategy. Our results also bear relevance for understanding the post-2001 rise of 'Islamic militancy'. The rise of Boko Haram in Nigeria, Al-Shabab in Kenya, and Al Qaeda in Pakistan has been spatially concentrated in regions that were once the frontiers of global empires. Our evidence on the strategic targeting of tribal elites carries huge relevance for understanding the spectacular growth of militancy in Africa and the Middle East. An investigative report by Reuters on militancy in Africa in 2021 describes such assassinations as a common pattern in the conflict playbook. In the heartland of Islamic militancy in Niger, Mali, and Burkina Faso, hundreds of village elders and community leaders were abducted or assassinated. Similar patterns of assassinations were observed in Somalia, Nigeria, and Iraq. These local leaders typically 'settled local disputes, collected taxes, and registered births and deaths' (Reuters, 2021). Their killings created a huge power vacuum, breaking the local population's link with the state and bringing life to a grinding halt. Indeed, as a political scientist quoted in Reuters (2021), argues: 'If you want maximum disorder, you kill the chief [...] If the agenda is to replace the state, killing the village chief is just the beginning of the process'.

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Table 1: Historical institutional discontinuity: Key illustrations

	Frontier Agencies	Settled Districts
Bureaucratic Administration	Political Agent as the sole official representative of the colonial administration. These were often ex-military officials who were responsible for managing the relationship between the colonial state and tribes	Each district with a Deputy Commissioner supported by Tahsildars and Naib Tahsildars invested with criminal, civil and revenue powers
		Field Kanungos (revenue officials) responsible for supervising Patwaris (accountants)
		Patwaris (accountants) responsible for maintaining revenue records of between 4 to 5 villages
		Chaukidars (village headmen) responsible for collective revenue
Justice System	Jirga system (council of tribal elders) used for dispute resolution	Divisional Courts established under regulation VII of 1901
	Criminal justice was governed through the Frontier Crimes Regulation (FCR), introduced in 1872	District Courts established under regulation VII of 1901
Representative Institutions	No electoral representation allowed until 1997 when only local elites (Maliks) were allowed to vote	Rural District Boards constituted under Act XX of 1883
		Municipal Boards constituted under Act XV of 1867
		Provincial legislature constituted under the Government of India Act 1935. Elections to the legislature held in 1937 on a restricted franchise basis with separate electorates for Muslims and Non-Muslims. The main political parties contesting were the Congress, the Muslim Nationalist party, the Hindu–Sikh Nationalist Party (HSNP), and the Muslim Independent Party (MIP)
Policing & Security	From 1890s onwards Khassadars working under Maliks for border protection	Administration of the civil police force in the settled districts vested in an Inspector-General
	Power to 'arrest', 'call for tribal jirgahs' (councils) and 'dispense justice on the spot'	Each district under a Superintendant working under the general control of the Deputy Commissioner
	From 1915 onwards Khassadars supported by the Frontier Constabulary, responsible for patrolling the border between Frontier Agencies and Settled Districts	Police jurisdiction based on thanas (units of civil police administration), each under the control of a sub-inspector

Notes: This table was compiled using information from the Imperial Gazetteer of India for the Northwest Frontier Province, 1908, Nichols, 2013, and Kolsky, 2015.

Table 2: Frontier rule: Analysis of mean differences

	Whole Sample			Within 50km of FR border		
	FR	Non-FR	Mean difference	FR	Non-FR	Mean difference
	Mean values			Mean values		
	(1)	(2)	(3)	(4)	(5)	(6)
Conflict incidents against the state	1.466	0.098	1.369***	1.785	0.170	1.615***
	656	*8567*	(0.221)	*484*	*634*	(0.298)
ln(1+Conflict incidents against the state)	0.371	0.032	0.339***	0.421	0.071	0.350***
	656	*8567*	(0.030)	*484*	*634*	(0.039)
Deaths in incidents against the state	4.233	0.176	4.057***	4.940	0.514	4.426***
	656	*8567*	(0.592)	*484*	*634*	(0.786)
ln(1+Deaths in incidents against the state)	0.517	0.031	0.487***	0.576	0.087	0.489***
	656	*8567*	(0.044)	*484*	*634*	(0.056)
Injuries in incidents against the state	3.872	0.259	3.613***	4.822	0.648	4.174***
	656	*8567*	(0.602)	*484*	*634*	(0.835)
ln(1+Injuries in incidents against the state)	0.486	0.034	0.452***	0.561	0.092	0.469***
	656	*8567*	(0.042)	*484*	*634*	(0.056)

Notes: The unit of observation is a 10km-by-10km grid cell. Columns 1-3 are based on the full sample of grid cells that comprise Pakistan, whereas, columns 4-6 restrict the sample to a 50 km buffer zone either side of the FR border. Columns 1-2 report the mean of each conflict measure between the FR and non-FR grid cells for the full sample. Columns 4-5 report the mean of each conflict measure between the FR and non-FR grid cells for the sample restricted to a 50 km buffer zone around the FR border. Finally, columns 4 and 6 show the result for a two-sample t-test for difference in means in each of the conflict measure between the FR and non-FR grid cells. The number of observations is in italics. The standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table 3: Balance on geographic, climatic and historical characteristics

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border								
	Ruggedness	Slope	Topography	Precipitation (mean)	Precipitation (std.dev)	Temperature	Pre-FR conflict	Pre-FR pop density	Wheat suitability
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Inside FR	-19.150	-0.028	2.375	-7.722	1.154	0.059	-0.001	0.023	83.215
	(16.183)	(0.255)	(1.875)	(5.133)	(1.715)	(0.245)	(0.013)	(0.060)	(99.891)
Observations	1,106	1,106	1,106	1,118	1,118	1,118	1,118	1,118	1,119
Mean dep. var.	442.34	7.22	-0.36	504.47	33.33	14.78	0.01	1.86	991.40
SD dep. var.	398.11	6.35	11.56	250.80	30.26	9.74	0.10	0.99	1783.26
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	cerrd	cerrd	cerrd	cerrd	cerrd	cerrd	cerrd	cerrd	cerrd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. Columns 1-9 report the RD estimates for geographic, climatic, agricultural and historical variables within a 50 km buffer zone of the FR border. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. The standard errors are reported in parentheses and are clustered at the 20 km border segment level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table 4: Frontier rule and conflict against the state

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.337^{***}	0.358^{***}	0.494^{***}	0.310^{***}	0.775^{***}	0.736^{***}
	(0.059)	(0.059)	(0.081)	(0.080)	(0.086)	(0.087)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean Dep. Var.	0.223	0.224	0.299	0.300	0.295	0.296
SD Dep. Var.	0.607	0.609	0.880	0.882	0.873	0.875
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table 5: Frontier rule and conflict against the state in the Pre- and Post-9/11 era

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border											
	Pre–911						Post–911					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)		ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Inside FR	0.269	0.247	0.479	0.434	0.777	0.672	0.269^{***}	0.247^{***}	0.479^{***}	0.434^{***}	0.777^{***}	0.672^{***}
	(0.075)	(0.069)	(0.104)	(0.103)	(0.112)	(0.109)	(0.075)	(0.069)	(0.104)	(0.103)	(0.112)	(0.109)
Observations	1,099	1,086	1,099	1,086	1,099	1,086	1,099	1,086	1,099	1,086	1,099	1,086
Mean Dep. Var.	0.224	0.225	0.302	0.303	0.296	0.297	0.224	0.225	0.302	0.303	0.296	0.297
SD Dep. Var.	0.609	0.612	0.884	0.887	0.877	0.880	0.609	0.612	0.884	0.887	0.877	0.880
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
Clustering	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID

Notes: The unit of observation is a 10km-by-10km grid cell. Columns 1-6 restrict the sample to the period prior to 9/11 from 1970 to 2000 and columns 7-12 restrict the sample to the period after 9/11 from 2001 to 2018. In columns 1-2 and 7-8, the outcome variable is the number of conflict incidents against the state; in columns 3-4 and 9-10, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6 and 11-12, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table 6: Frontier rule and avenues of conflict management

	Recourse to an MNA		No Contact with MNA in last 2 months		Recourse to a Jirga	
	(1)	(2)	(3)	(4)	(5)	(6)
FR Status Dummy	-0.016^{***}	-0.019^{***}	0.027^{***}	0.011^{***}	0.601^{***}	0.542^{***}
	(0.002)	(0.003)	(0.003)	(0.004)	(0.020)	(0.021)
Observations	6,030	6,030	6,030	6,030	6,030	6,030
Mean Dep. Var.	0.015	0.015	0.973	0.973	0.217	0.217
SD Dep. Var.	0.123	0.123	0.163	0.163	0.412	0.412
Controls	No	Yes	No	Yes	No	Yes
Adjusted R^2	0.001	0.005	0.002	0.022	0.147	0.201

Notes: The unit of observation is an individual. The explanatory variable is a dummy for whether an individual resides in a household that is inside the FR boundary. Dependent variables are a dummy for MNA being the main recourse for dispute resolution (columns 1-2), a dummy for contact with MNA in last two months (columns 3-4) and a dummy for Jirga being main recourse for dispute resolution (columns 5-6). The control variables are gender, educational status, ln(age), hh source of income, hh monthly income range and locality fixed effects. Robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table 7: Frontier rule and trust in state institutions

	Low Trust in Parliament		Low Trust in District Court		Low Trust in High Court		Low Trust in Supreme Court	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FR Status Dummy	-0.016^{***}	-0.019^{***}	0.027^{***}	0.011^{***}	0.601^{***}	0.542^{***}	0.542^{***}	0.542^{***}
	(0.002)	(0.003)	(0.003)	(0.004)	(0.020)	(0.021)	(0.021)	(0.021)
Observations	6,030	6,030	6,030	6,030	6,030	6,030	6,030	6,030
Mean Dep. Var.	0.015	0.015	0.973	0.973	0.217	0.217	0.217	0.217
SD Dep. Var.	0.123	0.123	0.163	0.163	0.412	0.412	0.412	0.412
Controls	No	Yes	No	Yes	No	Yes	Yes	Yes
Adjusted R^2	0.001	0.005	0.002	0.022	0.147	0.201	0.201	0.201

Notes: The unit of observation is an individual. The explanatory variable is a dummy for whether an individual resides in a household that is inside the FR boundary. Dependent variables are a dummy for very little to no trust in parliament (columns 1-2), a dummy for very little to no trust in the district court (columns 3-4), a dummy for very little to no trust in the high court (columns 5-6) and a dummy for very little to no trust in the supreme court (columns 7-8). The control variables are gender, educational status, ln(age), hh source of income, hh monthly income range and locality fixed effects. Robust standard errors are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table 8: Frontier rule and the systematic targeting of tribal elders

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.112^{***}	0.098^{***}	0.082^{**}	0.071^{*}	0.078^{**}	0.072^{*}
	(0.033)	(0.032)	(0.038)	(0.037)	(0.039)	(0.039)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean Dep. Var.	0.054	0.055	0.056	0.057	0.039	0.040
SD Dep. Var.	0.268	0.269	0.337	0.339	0.285	0.287
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents targeting tribal elders; in columns 3-4, the dependent variable is the number of deaths in incidents targeting tribal elders; and in columns 5-6, the dependent variable is the number of injuries in incidents against tribal elders, all parameterized as $\ln(1+x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Online Appendix

Frontier Rule and Conflict

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Contents

Appendix A: Data Sources and Variable Definitions

A.1 Conflict data sources and variables

Global Terrorism Database.—The main source of our conflict data is the Global Terrorism Database (GTD, 2021) that provides information on more than 200,000 conflict incidents across the world since 1970. For each incident, information is provided on the time (day, month, and year), location (latitude and longitude), fatalities (wounded and killed), type (assassination, explosion, suicide, hijacking, etc.), target (military, civilians, businesses, government officials, religious institutions, non-governmental organizations, etc.), the source (militant outfit that carried out the attack), and the motivation for the attack (political, religious, etc.).

The GTD defines a terrorist incident if it fulfills the following three criteria: (i) the incident must be intentional; (ii) the incident must entail some level of violence or threat of violence; and (iii) the perpetrators must be sub-national actors. Additionally, at least two of the following three criteria must be present: (i) the act must aim to achieve a political, economic, religious, or social goal; (ii) there must be evidence of an intention to coerce, intimidate, or convey a message to a broader audience beyond the immediate victims; and (iii) the action must be outside the context of legitimate warfare activities.

Using the underlying data in the GTD, we construct three measures of attacks against the state: (a) number of incidents, (b) number of deaths, and (c) number of injuries at the 10km-by-10km grid cell level for the period, 1970-2018. Given our interest in explaining sovereignty-contesting forms of violence, we use the more restrictive definition of the state as being the military. This is motivated by the fact that the military is the main locus of state power in Pakistan and therefore the primary target for insurgency based 'sovereignty-contesting' forms of violence in the country. In our robustness analysis we expand this narrow definition of the state to incorporate other state actors and infrastructure such as the police, civil servants, parliamentarians, judges, school teachers, doctors, educational institutions, healthcare facilities, courts, roads, bridges, airports, electricity grids and gas installations.

Uppsala Conflict Dataset.—To demonstrate the robustness of our findings using an alternative data source, we also construct measures of conflict based on the Uppsala Conflict Dataset (UCD).[1] The UCD offers two key advantages: first, it provides a long time series of conflict events spanning 40 years, ensuring comprehensive historical coverage; second, its annual updates reduce the likelihood of omitting significant conflict events, thereby maintaining data completeness and accuracy. However, the UCD does not disaggregate conflict events by target type. Consequently, we use the dataset to construct measures of *overall* conflict at the 10km-by-10km grid cell level. The two measures we construct are parameterized as $\ln(1 + x)$, where x represents either the total number of conflict events or the number of deaths in these events.

[1] The link to the Uppsala Conflict Dataset (UCD) website is here: https://www.pcr.uu.se/research/ucdp/about-ucdp/.

A.2 Geophysical features data sources and variables

A.2.1 Terrain Features

Slope.—In our paper, we utilize the slope index developed by Nunn and Puga (2012) to measure slope at the 10km-by-10km grid cell level. Using high-resolution elevation data from NASA's Shuttle Radar Topography Mission, this index calculates the absolute value of the slope between a given elevation point and its eight adjacent points, then averages these values. Our slope variable represents the average slope index for each grid cell, with higher values indicating a steeper average gradient.

Ruggedness.—We utilize the terrain ruggedness index (TRI), originally devised by Riley et al. (1999) and further developed by Nunn and Puga (2012), to measure ruggedness at the 10km-by-10km grid cell level. Leveraging high-resolution elevation data from NASA's Shuttle Radar Topography Mission, this index is calculated as the square root of the sum of the squared differences in elevation between a central point and its eight adjacent points. In our study, we compute the average TRI value for each 10km-by-10km grid cell, with higher values indicating greater terrain ruggedness.

Topography.—We use the Topographic Position Index (TPI) in the Quantum Geographical Information System (QGIS) application to measure topography at the 10km-by-10km grid cell level. The TPI uses underlying elevation data from NASA's Shuttle Radar Topography Mission and is calculated by subtracting the mean elevation of eight surrounding points from the elevation of a central point. Our topography measure represents the average TPI for each grid cell, with higher values indicating more elevated features, such as ridges and hilltops.

A.2.2 Agro-climatic factors

Precipitation.—Precipitation data is sourced from the Global Climate Database created by Hijmans et al. (2005) and available through WorldClim (2020). The database provides both monthly average rainfall and the long-term average (in millimeters) for 1970–2000. We assign the long-term average rainfall to each 10km-by-10km grid cell to construct our precipitation measure. To capture rainfall variability, we compute the standard deviation of the long-term average rainfall for each grid cell.

Temperature.—Temperature data is also sourced from the Global Climate Database developed by Hijmans et al. (2005). This dataset includes monthly average temperature as well as the long-term average (in °C) for 1970–2000. We link each 10km-by-10km grid cell to the long-term average temperature to capture the persistent effects of temperature.

Wheat Suitability.—The data on wheat suitability comes from the Food and Agriculture Organization's Global Agro-Ecological Zones (FAO-GAEZ) dataset, which is available in raster format at a resolution of 30 arc-second (approximately 1km^2) from the GAEZ Data Portal. We compute grid cell-level measures by averaging over raster points within each 10km-by-10km grid cell. Note that the wheat suitability data is based on the 'low-input' and 'rain-fed' parameters that closely proxy the historical conditions under which wheat was grown in Pakistan.

A.3 Historical factors data sources and variables

Pre-FR Population Density.—Data on pre-FR (i.e., before 1901) population density is extracted from the HYDE (2006) database, which provides consistent 30-arc-second (1 km^2) resolution estimates of population density at 100-year intervals over the past 12,000 years. Using this high-resolution data, we construct a historical measure of population density by averaging estimates from 200 AD to 1800 AD at the 10km-by-10km grid cell level.

Pre-FR Conflict.—To measure pre-FR conflict intensity, we use a dataset compiled by Dincecco et al. (2022), which is based on historical conflict information contained in a celebrated volume from Jaques (2006). Jaques provides a detailed, alphabetically organized list of individual conflicts, each described in a paragraph with information on conflict type (e.g., land, sea), date, approximate duration (e.g., a single day), location, and major participants. Our measure of historical conflict intensity is represented by the number of these conflicts within each 10km-by-10km grid cell.

Pre-Colonial and Colonial Infrastructure.—We use two data sources to construct measures of historical infrastructure provision. The first source, the Old World Trade Routes Project (Ciolek, 1999), provides digitized maps of Mughal-era roads as well as Islamic trade and pilgrimage routes. For each grid cell, we calculate the distance to these historical infrastructures as an indicator of exposure to pre-colonial infrastructure. The second source is the DIVA-GIS website, from which we obtained a digital map of colonial-era railroads. Using this map, we measure the length of railroads passing through each grid cell to capture exposure to colonial-era infrastructure.

Appendix B: The idiosyncratic FR border

In this section, we present further contextual evidence to support our argument that the border of frontier rule was neither a scientific nor a natural border. While there might have been strategic motivations underpinning the British colonial administration's choice of the wider northwestern frontier zone as the site for imposing frontier rule, the exact placement of the frontier rule border was determined by idiosyncratic factors. To this end, we divide our discussion into two inter-related parts. Firstly, we use historical evidence to highlight the imprecise nature of border making in frontier areas. Secondly, we present evidence against the possibility that the frontier rule border was determined by sharp geographic discontinuities.

A different cartographic regime for FR areas.—Historical evidence clearly suggests that the mapping of frontier rule areas markedly differed from the rest of British India. In non-frontier regions the British pursued a scientific cartographic regime that emphasized precision and accuracy. By contrast this scientific regime did not apply to the frontier territories where the border making process was more random and arbitrary. The British Empire took great pride in scientifically mapping its imperial domains. The primary instrument for doing this was the 'Great Trigonometrical Survey of India' that divided British India into a 'series of triangles' that precisely mapped different parts of the colony. However, whilst imperial efforts to delineate the rest of British India's borders continued apace, the border of the North-West Frontier remained 'fuzzy and ill-defined' (Cons, 2005, p. 14). This is patently obvious from Figure B1 that shows the Trigonometric Survey Maps for three points in time: 1870 (Panel A), 1881 (Panel B), and 1907 (Panel C). As these maps show, while borders in the rest of British India were being precisely and accurately determined, the mapping of borders in frontier regions was noticeably imprecise. Compared to the precise and clearly defined 'triangles' in the rest of India, the border along northwestern frontier was represented through 'elongated lines'.

These contentions are supported by a wide body of historical literature that attests to the absence of a 'scientific frontier' delineating a border based on clear, identifiable, and objective criteria. However, this did not preclude other forms of surveying in frontier areas (Simpson, 2015; Barrow, 2003). As Cons (2005) argues:

> 'The lack of trigonometric surveying in frontier regions does not mean that other forms of surveying were not being employed, only that the particular rhetoric of scientific mapping cannot be applied within India's turn of the century frontier zone.' (Cons, 2005, p. 48)

Compared to scientific surveys used to map other parts of India, the British colonial administrators relied on 'reconnaissance surveys' to delineate the border in frontier areas. These surveys were based on narrative reports, which were shaped by the opinions of 'pundits' and 'native surveyors', making them susceptible to discretion and subjective assessments. As Cons (2005) notes:

> 'The difficult and romantic terrain contribute to the broader romance of the Great Game, as famously captured in Kipling's Kim. The Survey, Barrow argues, took a hand in constructing this romance by reverting to more "primitive" and less technical survey techniques (root surveys as opposed to triangulation) and, subsequently, disseminating the narrative reports from such surveys to the public as adventure narratives.' (Cons, 2005, p. 46)

Information feeding into these reconnaissance surveys was not made public, as it was typically classified for security purposes. In fact, as Cons (2005) argues, 'reconnaissance surveying suggests secrecy' (Cons, 2005, p. 51) where information on what these surveys are and the areas they covered was absent (Cons, 2005, pp. 48–49). The secrecy and ambiguity surrounding these surveys—and the consequent demarcation of the frontier rule border—were more likely to be influenced by discretion and idiosyncratic factors. Therefore, as Cons (2005) argues: '[the] reconnaissance zone might be productively read another way, as a zone that marks a space... [that]... problematize[s] a simplified and naturalized notion of the frontier' (Cons, 2005, p. 52). In fact, 'the status of these frontiers, drawing on the limited information in the maps, seems to be somewhat **ambiguous**.' (Cons, 2005, p. 51)

Variation in geophysical features in FR areas.—In many contexts, important geophysical features, such as deserts, rivers, coasts, and mountains, determined the natural boundary of states. In this regard, a prominent argument attributed to Scott (2010), highlights the challenges that states face in extending their authority over mountainous or rugged regions compared to plains. Scott's central thesis is that rugged, mountainous areas—what he refers to as "non-state spaces"—are naturally resistant to state control. This is because such regions are more difficult for states to access and project their power. Other scholars have expanded on Scott's insights by examining how geographical ruggedness influences the delineation of state borders (Michalopoulos and Papaioannou, 2016). Rugged terrain often serves as a natural boundary for states. Historically, states have found it easier to establish and maintain borders along mountainous regions because the physical challenges of ruggedness naturally limit interactions and conflict. These areas often become buffer zones or marginal spaces, marking the edges of state influence.

We recognize that broad differences in geophysical environment between frontier and non-frontier areas might have influenced the application of differential institutional arrangements in FR areas. However, the precise placement of the FR border was not determined by sharp differences in geography. Colonial-era district gazetteers further support this by highlighting the variation in geophysical features within the frontier rule region, where hills and mountainous tracts co-existed with valleys, fertile plains, and barren tracts. The following quote from the Imperial Gazetteer of India (Imperial Gazetteer of India, 2005) highlights such variability:

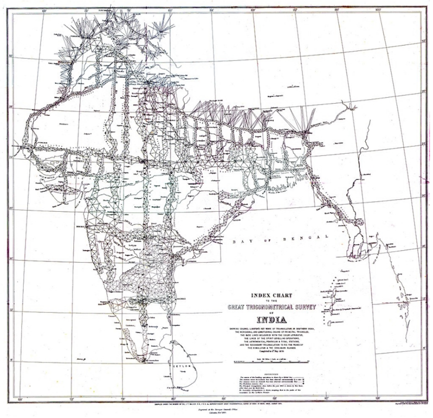
> "The regions between these Districts and the Afghan frontier are equally varied, but wilder and more rugged in character. The hills are loftier, often rising into ranges of great height, and the intervening valleys are narrower and more inaccessible. On the north, vast territories between the Hindu Kush and the border of Peshawar District form the Political Agency of Dir, Swat and Chitral. Of these territories, Chitral, the most northern, is a region of deep valleys and lofty ranges, for the most part bare and treeless. Farther south lie the thickly wooded hills of Dir and Bajaur, and the fertile valleys of the Panjkora and Swat rivers. South-west of this Agency are the Mohmand hills, a rough and rocky tract with little cultivation. Farther south comes the narrow gorge of the Khyber Pass, leading westwards from Jamrud on the Peshawar border into Afghanistan. South of the pass lies Tirah, the maze of mountains and valleys held by the Afridi and Orakzai tribes, and bordered on the western extremity of its northern border by the Safed Koh. Farther west this range

> still forms the border of the Province, and flanks the Kurram valley in the Political Agency of that name. This fertile valley stretches south-eastwards from the great peak of Sikaram, in which the Safed Koh culminates, and the Peiwar Kotal Pass to the western extremity of the Miranzai valley in Kohat. South of Kurram lies Waziristan, a confused mass of hills, intersected on the north by the Tochi valley and on the south by the gorges that descend to the Wana plain. The hills are for the most part barren and treeless, but on some of the higher ranges, such as Shawal and Pir Ghal, fine forests are found. The valleys also broaden out into plains, and form fertile and well-irrigated dales."

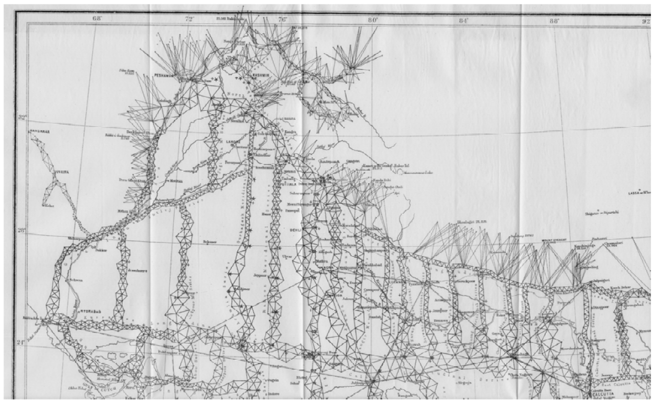
The above excerpt clearly shows that although frontier rule territories are generally more rugged, there is substantial variation in their geographic terrain. This geographic variability in FR areas is also reflected in other Imperial Gazetteers, supporting the idea that the frontier rule border was not simply a natural dividing line between contrasting geographies of neighbouring frontier and settled areas. In fact, the spatial RD plots, referenced in Section 3.2 of the main draft and shown in Figure C5 of this Online Appendix, demonstrate no significant discontinuity in relevant geophysical dimensions. Therefore, a simple explanation based on 'hills versus plains' distinction, or any other reasoning based on sharp geographic differences, for the precise placement of the FR border can be easily ruled out.

Figure B1: Trigonometrical Survey Maps of British India 1870–1907

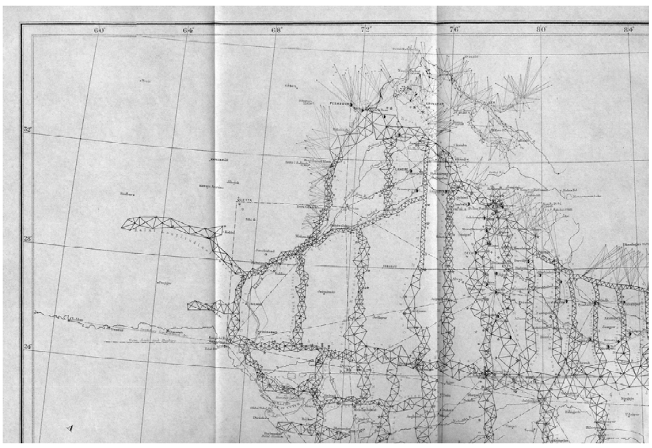
Panel A: 1870



Panel B: 1881



Panel C: 1907



Notes: This figure presents the trigonometrical survey maps of British India from 1870 (Panel A), 1881 (Panel B), and 1907 (Panel C). The maps highlight a stark contrast: the northwestern frontier is represented with elongated lines, indicating imprecise mapping, while the rest of British India is mapped precisely using triangles.

Source: General Report on the Operations of the Great Trigonometrical Survey of India, 1870–1907.

Appendix C: Statistical Validity

C.1 Social structure, ethnicity, and religion across FR border

In this section, we offer further support to our argument that social structure, ethnicity, and religion are evenly balanced across FR and non-FR regions. Such balance is important for the statistical validity of our research design, especially because past studies have linked these dimensions with conflict. For example, utilizing ethnic boundaries in sub-Saharan Africa, Moscona et al. (2020) empirically establish the impact of segmentary lineage organization on conflict across ethnic groups. As the authors show, ethnic groups organized around segmentary lineages are more likely to engage in violent conflict that is both larger in scale and more prolonged in duration (Moscona et al., 2020).

However, these dimensions are unlikely to be a concern in our context for two reasons. First, prior work in history and anthropology clearly suggests that, while segmentary lineage was prevalent among frontier tribes, it was a less predictable force for collective organization. Tribes could organize differently at different times and:

> "demonstrated an ability to coalesce and dissolve in a way that was extremely difficult to predict" (Beattie, 2013, p. 24).

Prior historical and ethnographic accounts of Pashtun society provide important clues on the relative importance of segmentary lineage as a form of social organization. Here, we present some relevant discussion based on Beattie (2013). Pervasive rivalry between patrilateral parallel male cousins (taburwali) offers an important reason why despite possessing some segmentary features, 'segmentary lineage theory is not in itself sufficient to explain political processes among the Mehsuds' (Beattie, 2013, p. 11).

Beattie (2013, p. 22) goes on to note that:

> "From the point of view of social organization, one of the critical features shared by all the tribes, but exemplified by the Mehsuds in particular, included the weakness or virtual absence of political authority, and the fact that although they all possessed the framework of a segmentary lineage organization, they often did not organize themselves politically on segmentary lines. Instead, the prevalence of tarburwali tended to lead, it appears, to the emergence of small factional groups or 'alliance networks', membership of which crossed agnatic boundaries."

He further highlights how colonial administration found segmentary lineage as a poor predictor of tribal organization:

> "the difficulty for the government officer was that both the segmentary lineage model and the factional model (and sometimes even the chiefly one) to some extent corresponded to reality [...] Sometimes tribal politics were shaped by clan and lineage membership, at other times they revolved around factional nuclei or even maliks; occasionally they expressed some kind of territorial identity" (Beattie, 2013, p. 24).

Second, tribes on both sides of the FR border predominantly belong to the same ethnic and religious group. Figure C1 compares sub-district (i.e. tehsil) level data on ethnicity and religion on both sides of the FR border. Panel A of the figure shows the percentage of the population that belongs to the major ethnicity in our area of study (Pashtuns). For most of the sub-districts either side of the FR border, between 75 and 100 per cent of the population belong to the major ethnic group. The remaining sub-districts are also quite evenly balanced in terms of their ethnic make-up, with the difference in the percentage of Pashtuns on either side of the border exceeding 25 percentage points in only a handful of cases. In panel B we show the almost perfect balance in the religious make-up of the population on either side of the FR border. Remarkably, for each of the sub-districts on either side of the FR border, the percentage of the population that belongs to the majority religion (Islam) is always between 75 and 100 per cent.

Third, residents on both sides of the FR border share not only a common Muslim faith but also a deeper religious homogeneity in terms of sect and doctrine. While most residents near the border are Sunni Muslims, one potential concern is that variations within Sunni Islam could foster differing ideological motivations for violence against the state. Extensive research in Islamic studies and international relations highlights the role of Deobandi Islam in the globalization of Jihad. Originating in India in the late 19th century, the Deobandi school represents a revivalist strain of Sunni Islam, characterized by its pan-Islamic perspective, strict interpretation of Sharia, and commitment to reviving traditional Islamic practices (Hilali, 2013; Hashmi, 2016).

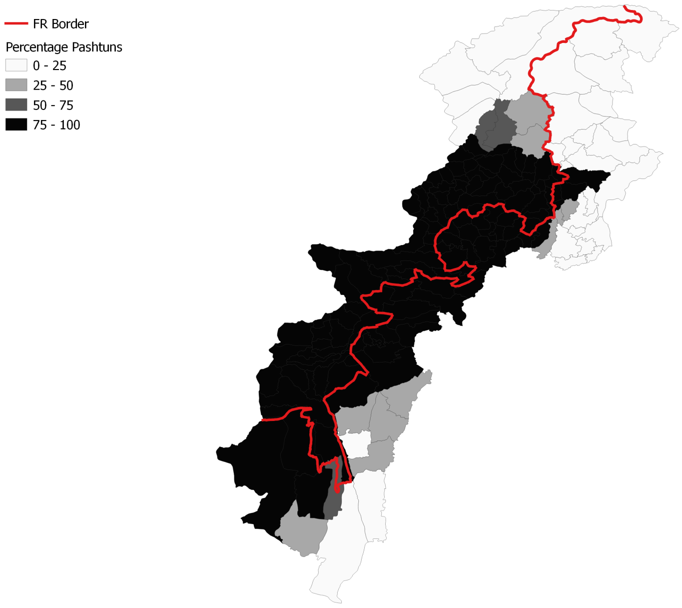
Deobandi ideology shares an affinity with Salafi and Wahhabi Islam and has been associated with the "spread of intolerance and extremism" (Takim, 2016). As Wazir (2011, p. 61) notes, Deobandi madrassahs (religious schools) "were particularly prominent in the rise of religious extremism in the Pashtun-majority borderlands" in Pakistan. Even if there is insufficient evidence to suggest that Deobandi religious schools directly contributed to the recruitment of militants, they may have propagated extremist ideologies and created conditions conducive to violence. If areas on either side of the FR border were exposed to differing levels of Deobandi influence, such differences could explain potential variations in conflict incidence between FR and non-FR areas.[2]

To investigate this, Figure C2 uses geo-coded data to map the spatial distribution of registered madrassahs across our study area. The figure categorizes madrassahs by religious doctrine, including Deobandi, Ahl-e-Hadith, Barelvi, and Shia, among others. It reveals that a clear majority of madrassahs on both sides of the FR border align with the Deobandi school, indicating that both regions are subject to similar ideological influences. This relative balance in exposure to Deobandi madrassahs across the border supports the statistical validity of our spatial regression discontinuity design, enabling us to assess the impact of FR rule on violence independently of religious motivations for conflict.

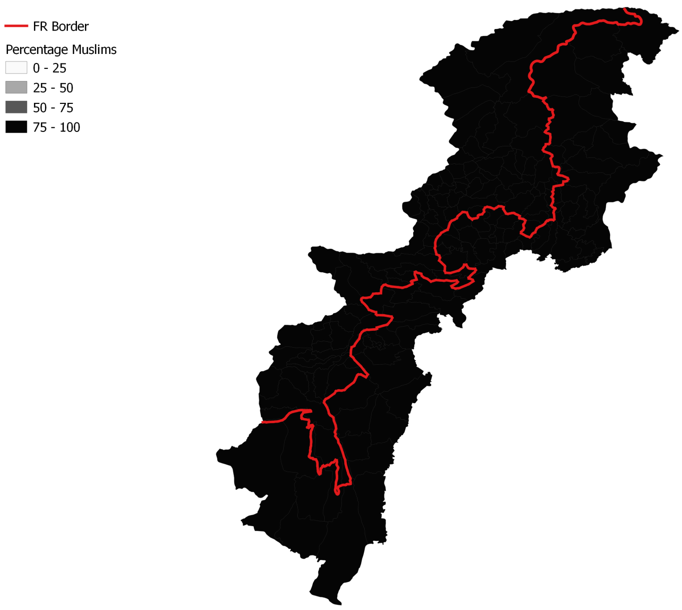
[2]See Christine Fair's anlysis on the subject, accessible at: https://christinefair.net/pubs/trip_report.pdf

Figure C1: Balance across FR border in Ethnicity & Religion

Panel A: Percentage of Pashtuns at sub-district level



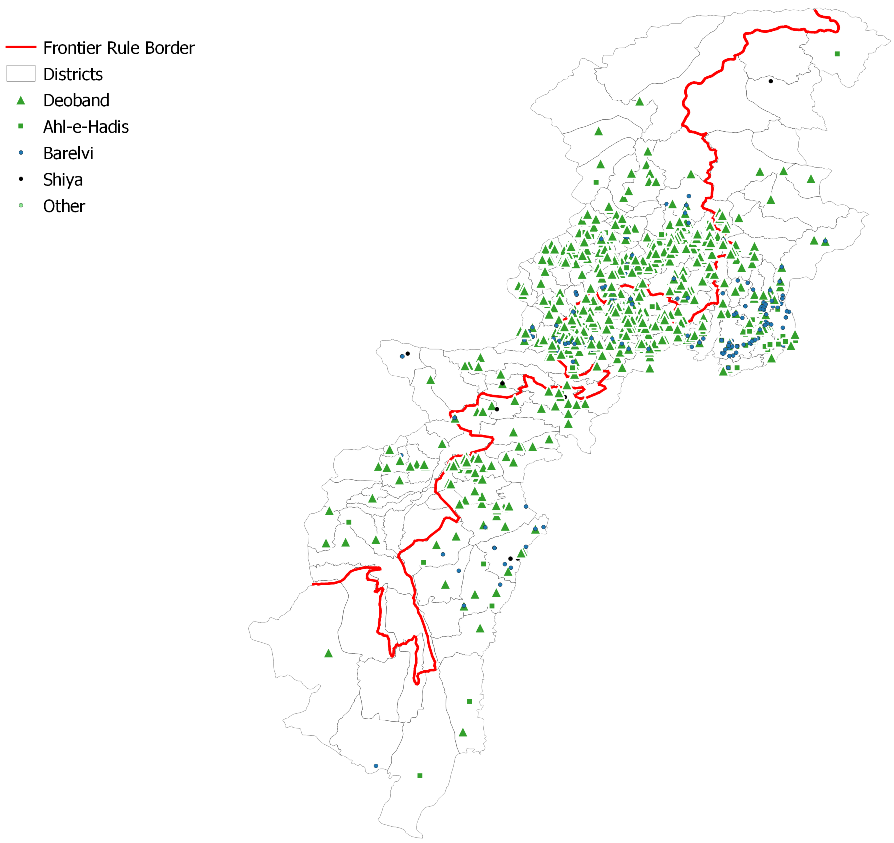
Panel B: Percentage of Muslims at sub-district level



Notes: This figure shows the distribution of the majority ethnic and religious groups on both sides of the FR border at the sub-district level in 2017. Panel A highlights the distribution of the majority ethnic group (Pashtuns) across the border, while Panel B presents the distribution of the majority religious group (Muslims).

Source: Authors' construction based on data from the 2017 Population Census of Pakistan.

Figure C2: Spatial distribution of Madrassahs (Religious Schools)



Note: This map provides a spatial distribution of madrassahs in our study area. The dark red line represents the FR border. Each label in the legend indicates a madrassah according to its school of thought (or doctrine).

Source: Authors' construction based on data from the Directorate of Religious Education in Ministry of Education, Government of Pakistan. Website: http://dgre.gov.pk/index.

C.2 Ruling out selective migration as an empirical concern

As outlined in Section 3.2 of the main draft, a key identification challenge is the potential for selective migration. If the establishment of the FR border prompted migration into or out of the FR areas based on characteristics correlated with violence, this could serve as an alternative explanation for our findings. In this subsection, we perform a variety of tests to rule out selective migration as a confounding factor driving our results.

To do so, we utilize both census-level data on population and the nationally representative PSLM (Pakistan Social and Living Standards Measurement) survey data. We offer systematic evidence to rule out any major population changes in FR (treatment) and neighbouring non-FR (control) regions relative to the rest of the country. We also rule out any noticeable patterns in inward or outward migration in treatment and control groups that might cast doubt on the statistical validity of our SRD design.

Low rates of net migration.—Our first piece of evidence comes from Pakistan's population census reports. Panels A and B of Figure C3 plot the cumulative distribution functions of population growth in the FR and neighboring non-FR regions across the two most recent census periods: 1981–1998 and 1998–2017. As shown in the panels, there are no visible differences in population growth between the two periods for either region. To further assess this, we test whether the distributions of population growth between the two census periods differ statistically in the FR and neighboring non-FR regions. Panels C and D of Figure C3 present the coefficients and standard errors of the estimated differences, showing them to be statistically indistinguishable from zero in most cases. Together, these findings provide indirect evidence that 'net migration' has been low across our treatment and control groups.[3]

Absence of differential migration across FR and non-FR areas.—Next, we utilize the PSLM survey data to analyse whether actual migration patterns differ between our treatment and control groups. Unfortunately, we can only investigate this for the post-9/11 year of 2019, which is when the PSLM survey data was collected. Our results, presented in Table C1, systematically rule out differences in patterns of in- and out-migration between FR and neighbouring non-FR regions. In columns 1–2 of the Table we systematically rule out the possibility of there being a difference in the likelihood of observing an in-migrant between FR and neighbouring non-FR regions, whether from within the area of study (column 1) or from the rest of the country into the area of study (column 2).

Finally, in column 3, we test for differences in patterns of out-migration between FR and neighbouring non-FR areas. To do so we focus on the sample for the rest of the country and make use of information in the PSLM dataset that identifies the district of origin for each in-migrant. We then investigate whether the likelihood of observing an in-migrant in the rest of the country differs based on whether the in-migrant originates from the FR or the neighbouring non-FR region; detecting a difference in the likelihood would indicate differential patterns of out-migration from the FR and neighbouring non-FR regions to the rest of the country. The results of our investigation, presented in column 3, show that the coefficients on both FR and neighbouring non-FR origin dummies are positive and statistically significant. This suggests that the likelihood of observing a

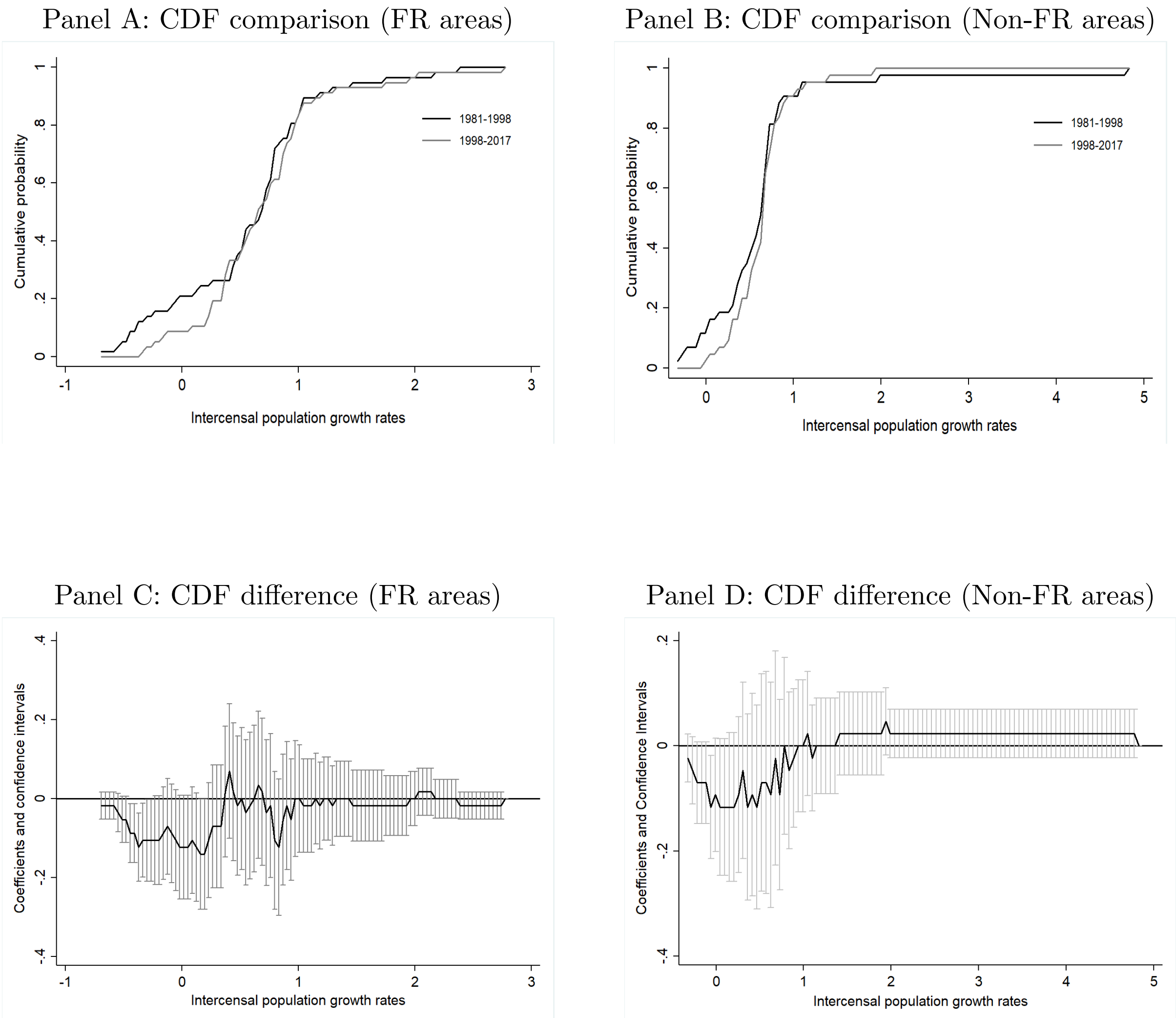
[3]Note here that a lack of difference in population growth between the two census periods is inferred as being evidence for low net migration.

respondent who is an in-migrant in the rest of the country increases with the respondent's origin being from FR and neighbouring non-FR regions. However, more importantly, this proclivity to out-migrate is not statistically significantly different between FR and non-FR areas (note the insignificant p-value of 0.2088 for the test of difference between the FR and neighbouring non-FR origin dummies in column 3). Together, these results provide reassuring evidence against the possibility that our treatment and control groups witnessed differential patterns of out-migration into the rest of the country.

Low in-migration in study area relative to rest of the country.—For our final piece of evidence, we again use the PSLM data to show that rates of in-migration in our area of study (FR and neighbouring non-FR regions) are very low compared to the rest of the country. To this end, Figure C4 Panel A compares the cumulative distribution function of the fraction of in-migrants between the FR region and the rest of the country (excluding the neighbouring non-FR region). As can be observed, the distribution for the FR region is more skewed towards very low fractions of in-migrants. Thus, relative to the rest of the country, the FR region (i.e., our treatment group) has a noticeably lower proportion of in-migrants. Similarly, Figure C4 Panel B compares the cumulative distribution function of proportion of in-migrants between the neighbouring non-FR region and the rest of the country (excluding the FR region). Again, we find noticeably lower prevalence of in-migrants in neighbouring non-frontier rule regions (i.e., the control group) relative to the rest of the country.

Finally, Panels C–D of Figure C4 plot the coefficients and confidence intervals of the estimated differences between the cumulative distributions of fraction in-migrants in both FR and non-FR regions from the rest of the country, respectively. As is evident, the distributions for the FR region and the rest of the country are statistically significantly different from each other at very low values of fraction of in-migrants (see Panel C). The same holds true for the neighbouring non-FR region (see Panel D). Thus, the prevalence of in-migrants on either side of the FR border is significantly lower than the rest of the country. This is also evident from the comparative histogram plots (dot plots) of the fraction of in-migrants in FR (Panel E) and neighbouring non-FR regions (Panel F).

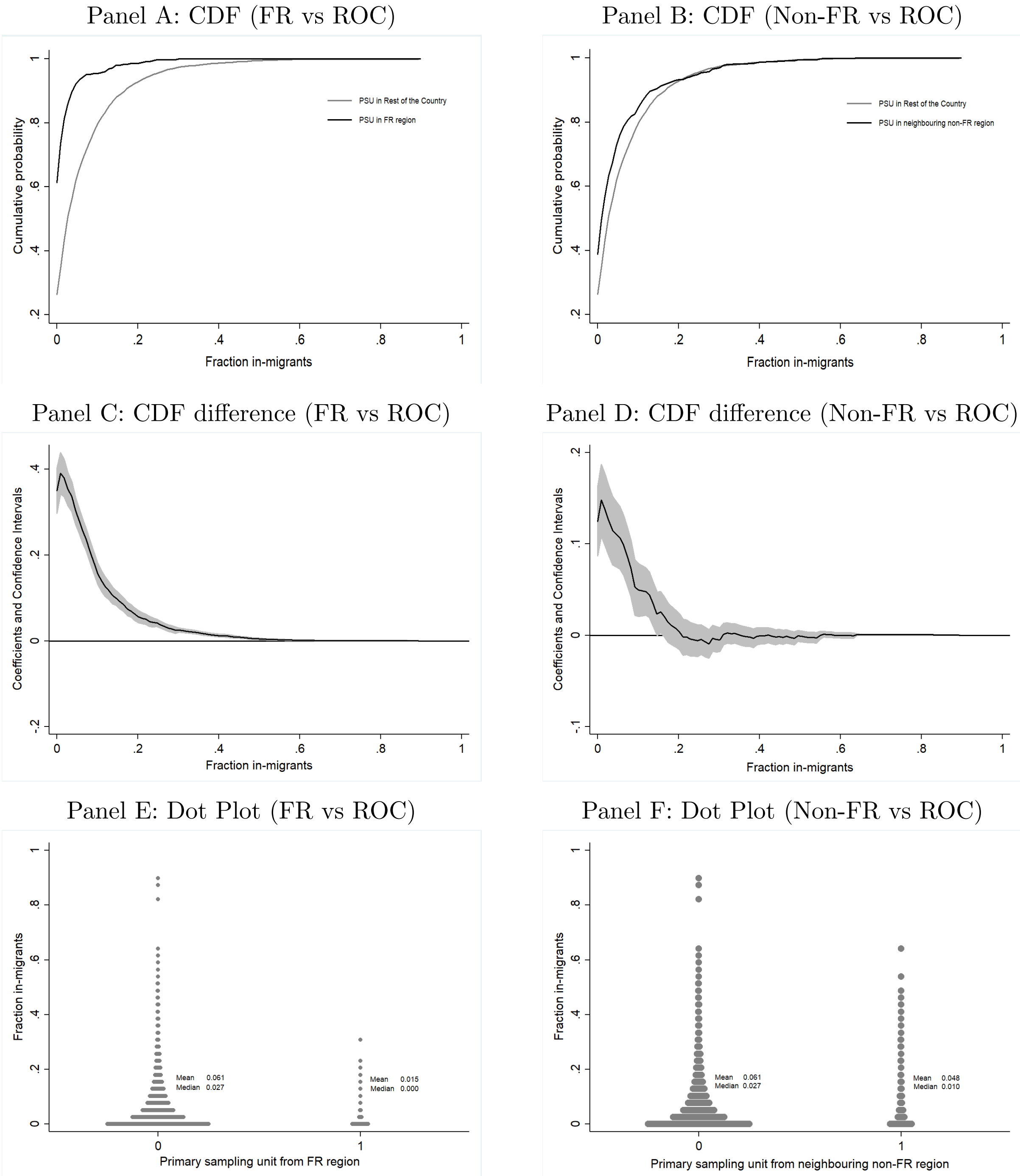
Figure C3: Intercensal population growth rates across FR border



Notes: This figure compares the cumulative distribution functions (CDFs) of population growth rates between the two most recent census periods for the study area (FR and neighboring non-FR regions). Panels A and B display the CDFs of population growth rates for the 1981-1998 and 1998-2017 census periods, respectively, for both regions. Panels C and D present the results of a statistical test comparing the CDFs, including the coefficients and 95% confidence intervals.

Source: Authors' construction based on data from the 2017 Population Census of Pakistan.

Figure C4: In-migration into study area versus rest of the country



Notes: This figure illustrates in-migration rates in the study area (FR and neighbouring non-FR regions) compared to the rest of the country. Panel A presents the cumulative distribution function (CDF) of in-migrants in the FR region, revealing a skewed distribution toward very low rates, indicating a lower proportion of in-migrants relative to the rest of the country. Similarly, Panel B shows the CDF for the neighbouring non-FR region, highlighting a noticeably lower prevalence of in-migrants compared to the national average. Panels C and D display coefficients and confidence intervals comparing the CDFs of in-migrants in the FR and neighbouring non-FR regions against the rest of the country, both demonstrating statistically significant differences at low in-migration fractions. Finally, Panels E and F consist of dot plots that visually reinforce the findings of lower in-migration rates in the FR and neighbouring non-FR regions.

Source: Authors' construction based on data from the 2019 Pakistan Social and Living Standards Measurement Survey.

Table C1: Linear probability models ruling out selective migration

	Pr(resp i is in-migrant from within study area)	Pr(resp i is in-migrant from rest of the country)	Pr(resp i is in-migrant into rest of the country)
	(1)	(2)	(3)
FR residence dummy	0.005	0.003	....
	(0.003)	(0.002)	....
FR origin dummy			0.873***
			(0.009)
Neighbouring Non-FR origin dummy			0.863***
			(0.007)
Coef. comp. p-value			*[0.2089]*
Observations	190,896	188,439	675,004
Adjusted R-squared	0.032	0.011	0.155
Mean Dep. Var	1.019	1.006	1.060
SD Dep. Var	0.135	0.076	0.237
Controls	Yes	Yes	Yes
District FE	Yes	Yes	Yes
Clustering	PSU ID	PSU ID	PSU ID

Notes: The unit of observation is a respondent in the PSLM 2019 dataset. The outcome in column 1 is the probability that the respondent is an in-migrant from within the area of study. In column 2, the outcome is the probability that the respondent is an in-migrant into the study area from the rest of the country. Finally, the outcome in column 3 is the probability that the respondent is an in-migrant anywhere in the rest of the country. The regressions include controls for the respondent being from an urbanized district, gender of the respondent, age of the respondent, marital status of the respondent, and district fixed effects. Standard errors, clustered at the primary sampling unit level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

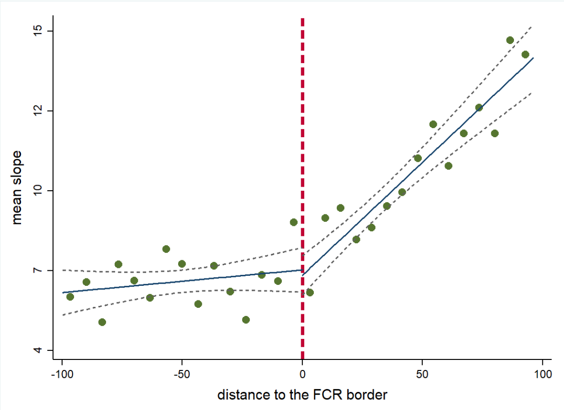
C.3 Visual lack of discontinuity in geophysical & historical factors

An important identification assumption for our spatial regression discontinuity (SRD) design is that unobservable features vary smoothly across the frontier rule border. The paragraph discusses the potential bias in studying frontier areas due to unobservable factors that could influence both violence and the emergence of frontier rule during the colonial era. These factors, related to history, geography, and climate, are hard to test directly but can be indirectly assessed by examining geographic, climatic, and historic correlates of conflict at the FR boundary. We follow prior literature connecting conflict with factors like rugged terrain, climate, topography, historical population density, and past conflicts, as these can act as proxies for conflict determinants that are difficult to observe, such as income levels, state authority, and capacity.

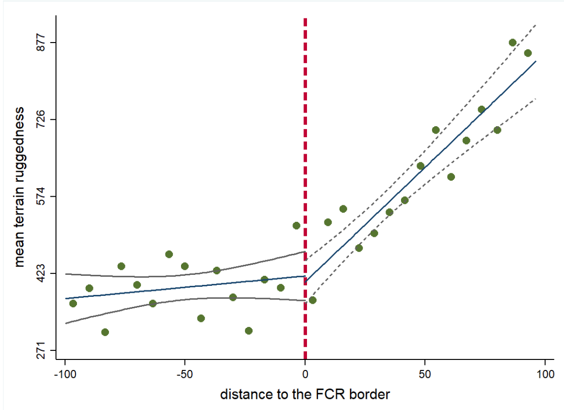
In Table 3 of the main draft, we empirically demonstrated the absence of any statistically significant discontinuity in these dimensions. In this section, we include the SRD plots for six of the main dimensions to aid visual inference. Moving from left to right, Figure C4 provides visual evidence using binscatter plots to illustrate the unconditional relationship between five key geophysical features and the distance to FR border: mean slope, terrain ruggedness, mean topography, mean precipitation (1970-2000), and mean temperature (1970-2000).The plots show no visible discontinuities in these factors as we move from just outside to just inside the FR border. Finally, the sixth panel on the lower right hand corner shows the unconditional binscatter plot for pre-colonial conflict incidence. As the plot shows, there is a substantial overlap of the 95% confidence intervals on both sides of the FR border cut-off, pointing to the absence of a statistically significant discontinuity.

Figure C5: Balance across FR border in Geophysical & Historical Factors

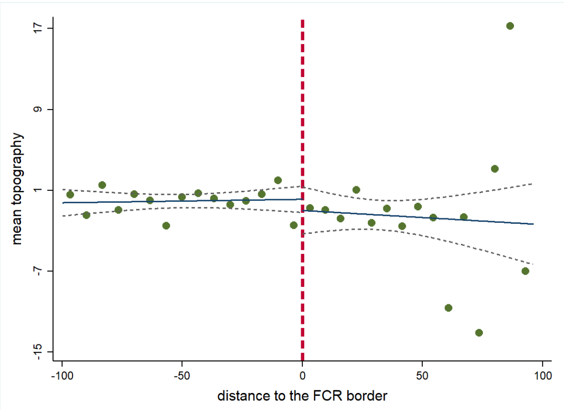
Panel A: Slope



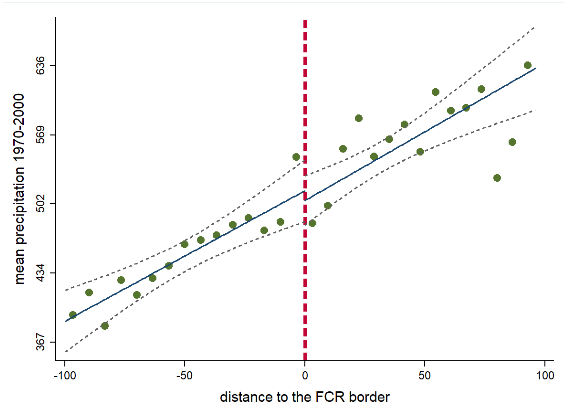
Panel B: Ruggedness



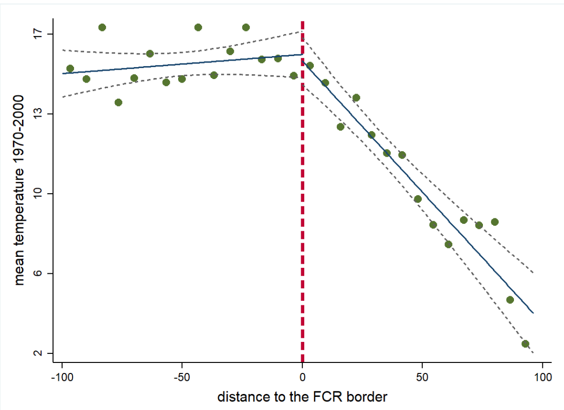
Panel C: Topography



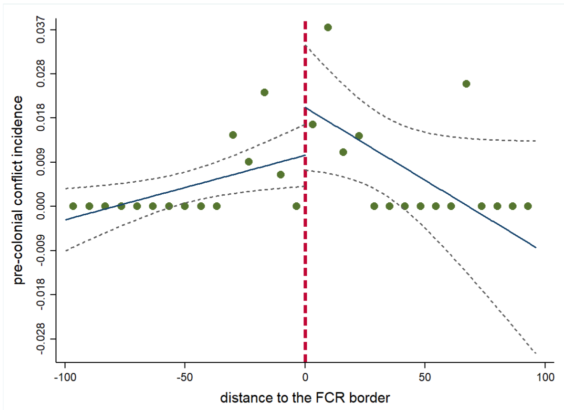
Panel D: Precipitation



Panel E: Temperature



Panel F: Pre-colonial conflict



Notes: This figure presents the SRD plots for six key dimensions, using binscatter plots to illustrate the unconditional relationship between various geophysical features and the distance to the FR border. Panels A–E depict mean slope, terrain ruggedness, mean topography, mean precipitation (1970-2000), and mean temperature (1970-2000), all showing no visible discontinuities as one transitions from just outside to just inside the FR border. Panel F displays the binscatter plot for pre-colonial conflict incidence, which indicates substantial overlap in the 95% confidence intervals on both sides of the FR border cut-off, suggesting no statistically significant discontinuity.

Source: Authors' construction.

Appendix D: Description of Tables

D.1 Robustness Tests

We check the robustness of our results by conducting a variety of additional empirical tests. Our main empirical results are based on a sample restricted to within 50km of the FR border. In Table E1 we present results using two alternative cut-offs for the buffer zone: 60km (Panel A) and 40km (Panel B). The overall empirical set-up remains as before. As the results show, grid-cells that fall just inside the FR border have significantly higher conflict on all three measures of conflict compared to grid-cells that just fall outside the FR border. Our results thus remain robust to restricting the sample to within 60km (Panel A) or 40km (Panel B) of the FR border. The estimated SRD effect is consistently positive and statistically significant in both models with controls (columns 2, 4, and 6) and without controls (columns 1, 3, and 5). Next, in Table E2, we report estimates for SRD specifications that use fixed effects for border segments of shorter length. As border segment fixed effects account for treatment effect heterogeneity along the FR border, this sensitivity analysis is important to the robustness of our findings. Accordingly, Panel A of Table E2 reports estimates for specifications with fixed effects of 18km long border segments, and Panel B provides estimates for border segments of 15km length. In both cases, our coefficient of interest that captures the effect of being just inside the FR border is consistently positive and statistically significant.

We also conduct a battery of standard robustness tests. We start with donut-hole analysis where observations very close to the FR border in either direction are excluded. Table E3 provides the corresponding results for this exercise, where we drop grid cells within 0.5km of the border, and show that our results remain robust.[4] Next, rather than using a linear polynomial in distance to the border we use a quadratic polynomial to assess the robustness of our results to the choice of a higher order polynomial.[5] The results, reported in Table E4, remain unchanged. We also test the robustness of our findings to using alternative running variable forms. Rather than the Euclidean distance, we follow Dell et al. (2018) and use latitude, longitude, and their interactions as the running variables. As emphasized in the main draft, this can help account more directly for features that vary over a two-dimensional space (Dell et al., 2018; Moscona et al., 2020). Akin to the empirical set-up in Dell et al. (2018), we also include fixed effects for four broadly defined segments of the frontier rule border and use Conley standard errors to account for spatial correlation. Table E5 reports the corresponding results for both the linear (Panel A) and quadratic polynomials (Panel B) in latitude and longitude. Conley standard errors are reported for all estimates in square brackets. As the results show, the SRD estimates remain consistently positive and statistically significant, indicating a significant discontinuity in conflict incidence as we move from just outside to just inside the FR border.

[4] As discussed in Section 3.4 of the main draft, the donut-hole analysis addresses two key concerns regarding our findings. First, it ensures that we are measuring the impact of institutional discontinuity caused by being inside the FR border, rather than simply capturing the effect of proximity to the border itself. This distinction is crucial, as recent studies demonstrate that violence tends to increase systematically near borders (Michalopoulos and Papaioannou, 2016; Depetris-Chauvin and Özak, 2020). Second, it ensures that grid cells very close to the FR border that have potential ambiguity in their treatment status are excluded from our analysis.

[5] As noted in Section 3.4 of the main draft, increasing the order of the polynomial of the running variable reduces the approximation error in estimating the RD effect (Cattaneo et al., 2019).

Our main estimations have so far been based on a data-driven optimal bandwidth selection. In Table E6 we assess whether our findings are robust to the use of manually chosen bandwidths. In this regard, we successively impose three bandwidths on either side of the FR border: 15km (Panel A), 12km (Panel B), and 10km (Panel C). Reassuringly, whether we impose a bandwidth of 15, 12, or 10km on either side of the FR border, our results remain unchanged. Finally, we test the robustness of our findings to the use of a different kernel weighting strategy for observations close to the FR border. Rather than using a triangular kernel, which assigns a linear decaying weight to observations as one gets further away from the border cut-off, we use an Epanechnikov kernel, which gives a quadratic decaying weight. Both kernels assign zero weight to observations that are strictly outside the bandwidth over which the SRD estimates are computed. Reassuringly, the results (reported in Table E7) are strongly consistent with our baseline estimates.

D.2 Complimentary tests for log transformations of zero-valued outcomes

Chen and Roth (2024) demonstrate that the interpretation of average treatment effects (ATE) in specifications with log-like transformations of the dependent variable can be sensitive to units of the outcome variable. With log transformations of zero-valued outcomes, the ATE cannot be interpreted as an average percentage effect. Specifically, they argue that the "arbitrary unit dependence arises because an individual-level percentage effect is not well-defined for individuals whose outcome changes from zero to nonzero when receiving treatment, and [because] the units of the outcome implicitly determine how much weight the ATE for a log-like transformation places on the extensive margin" (Chen and Roth, 2024, p. 891). To address this, we implement two alternative approaches proposed by Chen and Roth (2024). The first is to normalize the ATE in levels by expressing it as a percentage of the control group mean using Poisson regression of the following form:

$$Y_{i,j} = \exp\left(\beta_0 + \beta_1 D_i + \beta_2 \Phi_j + X_i^{/}\gamma\right) U_{i,j} \tag{1}$$

where D_i is the indicator variable for a grid cell being inside the FR border, $X_i^{/}$ are the baseline covariates, and Φ_j are border segment fixed effects. Chen and Roth (2024) argue that as long as D_i is randomly assigned, the quasi-maximum likelihood estimate of the above equation yields a consistent estimate of the population coefficient, β_1, and its scale invariant counterpart, $\theta_{\text{ATE\%}}$, which is equal to $\exp(\beta_1) - 1$. Essentially, it captures the ATE in levels as a percentage of the control group mean.

Table E8 presents the estimates for β_1 and its scale-invariant counterpart, $\theta_{\text{ATE\%}}$, using Poisson QMLE. Results are presented for all three measures of conflict and for specifications with and without controls. The first row of columns 1-4 show the estimates for β_1. Estimates for the scale-invariant frontier rule effect, $\theta_{\text{ATE\%}}$, are reported in the second row. Standard errors are clustered at the border segment ID level. As the results in the first row show, the coefficient estimate $\hat{\beta}_1$ is positive and statistically significant for all conflict measures and for both specifications with or without controls. Moreover, the scale-invariant estimates $\hat{\theta}_{\text{ATE\%}}$ in row 2 indicate that conflict incidence was between 1.76 to 2.85 times higher for the treated group (grid cells inside the FR border) relative to the control group (grid cells outside FR border).

Chen and Roth (2024) point out another issue with log-like transformations. Essentially, when using transformations of the form ln(1+Y) or arcsinh(Y) the weights given to the extensive and intensive margins are implicitly determined by the scaling of the outcome itself. This precludes the possibility of separating out the extensive and intensive margins of treatment. As a way around such implicit weighting of the margins, Chen and Roth (2024) propose a more transparent approach using a concave transformation, m(Y), that exactly specifies the value placed on the extensive relative to the intensive margin. Adapting the illustrative example on earnings set out in Table VII of their paper to our setting, if we were to value the extensive margin effect of moving from 0 to 1 conflict incident the same as a $100x\%$ increase in conflict incidence then we would set m(y) = ln(y) for y > 0 and m(y) = $-x$ for y = 0. For such a transformation, the ATE can be approximately interpreted as a percentage or log point effect where "the increase from 0 to 1 is valued at $100x$ log points" (see Chen and Roth (2024, p. 918)). Additionally, following Chen and Roth (2024), we normalize the outcome Y so that Y = 1 corresponds to the minimum non-zero value of the outcome in our dataset Y_{min}.

Accordingly, in Table E9, we present estimates of the frontier rule effect on various conflict measures using concave transformations of the type described above. Using such transformations, we can explicitly place different values on the extensive margin effect (i.e. change of conflict going from 0 to Y_{min}) by changing the value of x. We do this for four values of x going from 0 (no extensive margin effect) to 3 (high extensive margin effect). The corresponding estimates for these are presented in Panels A-D of Table E9. Columns 2, 4, and 6, report estimates for specifications with controls. As before, standard errors are clustered at the border segment ID level.

Two key observations emerge from the estimates: First, regardless of the conflict measure used or the weight placed on the extensive versus intensive margin, the coefficient estimates are consistently positive and statistically significant. Second, the coefficient estimates tend to rise with increasing values of x—the higher the chosen value for the extensive margin, the greater the observed effect of frontier rule on conflict.

D.3 Falsification test using a placebo border

We address the concern that our findings might not be attributable to the institutional differences captured by the frontier rule border, but instead could be reflecting structural differences along the centre-periphery dimension. To test this, we conduct a falsification test in Table E10, which involves shifting the original frontier rule border south-westward and examining whether our results still hold. Since Pakistan has a north-east to south-west orientation, this is equivalent to shifting the original FR border further inland into the country. Figure F8 displays both the original and the shifted FR borders. As shown in the table, there are no statistically significant differences in violence against the state between grid cells on either side of this placebo border, confirming that our results are not driven by structural variations along the centre-periphery dimension.

D.4 Alternative conflict data source and broader measure of conflict

Uppsala conflict data.—We replicate our findings using an alternative source of conflict data to address potential concerns about measurement error in our baseline estimates, which are based on conflict events recorded in the GTD (2021). While measurement error in the recording of conflict events—particularly in the earlier periods covered by the GTD—could be a concern, it is unlikely to be so in our case. The GTD draws on a variety of open media sources, all independently verified as credible. Additionally, the frontier areas of Pakistan are among the most closely studied border regions globally, making a systematic omission of conflict events highly improbable. Nevertheless, to further address any concerns about data sources, we re-estimate our baseline specification using an alternative dataset: the Uppsala Conflict Data Program (UCDP). The key advantage of the UCDP is that it is the "oldest ongoing data collection project for civil war, with a history of almost 40 years" (UCDP, 2023). However, unlike the GTD, the UCDP does not disaggregate conflict events by target type, preventing direct comparisons between the two datasets. Despite this limitation, Table E11 presents SRD estimates of frontier rule on two UCDP measures of *overall* conflict: the number of conflict incidents and the number of deaths in conflict incidents. For both measures, and regardless of whether controls are included in the specification (columns 2 and 4) or not (columns 1 and 3), the UCDP data strongly validate our baseline results.

Broader measure of conflict.— As argued in section 3.1, the choice of our outcome variable, attacks on military personnel and installations, is dictated by several considerations that make the military a primary target for sovereignty-contesting violence. The military symbolizes the core of state power in Pakistan and is the ultimate arbiter of the country's foreign policy, especially Afghan policy, which was the main reason for the rise in anti-state sentiment post-9/11. Furthermore, other state security actors, such as the police, levies, and *khassadars* are locally recruited and more integrated into local society, making them less likely to be perceived as external or adversarial forces. Nevertheless, for completeness sake, we test the robustness of our findings to a broader measure of conflict against the state that accounts for violence against both military and non-military state institutions. The broader measure includes the following additional state-affiliated targets: civil servants, teachers, doctors, judges, police, parliamentarians, educational institutions, healthcare facilities, courts, roads, bridges, airports, electricity grids, and gas installations. Table E12 extends our analysis and re-estimate's the baseline SRD specification represented by equation 1 in the main draft for this broader measure of violence against the state. able E12 shows that even if we were to use this broader measure of violence against the state that includes a whole range of state-affiliated institutions and infrastructure, our results essentially remain unchanged. Whether we consider models with controls (columns 2, 4, and 6) or without (columns 1, 3, and 5), the estimates show that frontier rule still leads to a discontinuous rise in violence against the state.

D.5 The 9/11 dimension and empirical support for mechanisms

Robustness of the 9/11 effect on conflict to a wider buffer zone.—In Section 3.5 of the main draft, we test the impact of the 9/11 shock on the rise in conflict against the state by estimating our baseline SRD specification separately for the pre- and post-2001 periods. The results, presented in Table 5 of the main draft, show no statistically significant discontinuity in conflict measures between FR and non-FR areas before 9/11. However, after 2001, there is a clear discontinuous rise in conflict when moving from just outside to just inside the FR areas. Table E13 demonstrates the robustness of this finding using a wider 60km buffer zone around the FR border. As shown in the table, regardless of the conflict measure or whether the model includes controls, the pattern attributing the rise in conflict against the state to the post-9/11 period remains unchanged.

Robustness of the 9/11 effect on conflict to alternative conflict data source.— Table E14 presents the pre and post-9/11 SRD estimates using alternative conflict data from the Uppsala Conflict Data Program (UCDP). Results are presented for two UCDP measures of *overall* conflict: the number of conflict incidents and the number of deaths in conflict incidents. Following Dell (2010) we implement a semiparametric SRD and use different functional forms for the running variable. These include linear polynomial in distance to the FR border, quadratic polynomial in distance to the FR border, linear polynomial in latitude and longitude and quadratic polynomial in latitude and longitude. For both measures, and regardless of whether controls are included in the specification or not, there is no significant discontinuity in conflict against the state between FR and non-FR areas in the pre-9/11 period. By contrast, the coefficient estimates on conflict measures are statistically significant in the post-9/11 period. Overall, the results in Table E14 validate our main empirical patterns regarding the salience of the post-9/11 period using an alternative conflict data source.

Ruling out conflict spillover from Afghanistan as an explanation.—A potential concern is that the post-9/11 uptick in violence in FR areas may be driven by conflict spillover from Afghanistan, rather than the institutional fragility of frontier rule. We address this in several ways, as discussed in Section 4.3 of the main draft. First, in Table E15, we control for the straight-line distance from each grid cell to the Pakistan–Afghanistan border (the Durand Line) in our baseline SRD specification, and our results remain unchanged. Second, in Table E16, we exclude all grid cells contiguous to the Durand Line—those most exposed to conflict spillover—and find that the results are robust. Finally, Table E17 shows that the majority of known attacks against the state (98.35%) are carried out by local insurgent groups, with only 1.65% attributed to foreign militant outfits. These tests effectively rule out spillover from Afghanistan as the main driver of the observed violence.

Ruling out drone strikes as a mechanism.—A key aspect of the U.S. War on Terror was the deployment of unmanned drones to target militants in North-West Pakistan, particularly in North and South Waziristan, from 2004 to 2018. While these strikes primarily focused on Taliban and Al-Qaeda members, they also resulted in significant civilian casualties. Mahmood and Jetter (2023) demonstrate that these strikes contributed to increased terrorist violence in the region. This raises the question of whether the post-9/11 rise in violence we document stems from drone strikes or, as we argue, from the institutional fragility of frontier rule following the 9/11 shock to anti-state sentiment. As discussed in Section 4.3 of the main draft, while drone strikes may have exacerbated the ongoing conflict in frontier regions, they were not the original cause of the violence. To address concerns about drone strikes as a causal factor, we re-estimate our baseline SRD specification, excluding grid cells that have ever experienced a drone strike from our regression sample. The estimates reported in Table E18 confirm that our results remain robust despite this exclusion.

Ruling out differential public infrastructure provision as a factor.—A potential competing explanation for the post-9/11 rise in conflict in FR areas is underinvestment in public infrastructure in border areas, which could affect economic outcomes and contribute to conflict. Lower investment in infrastructure, such as roads and health services, may shape trade costs, income disparities, and inter-regional price differences, all of which are known correlates of conflict (Donaldson, 2018; Dell and Olken, 2020). To investigate this, we analyzed both contemporary and historical measures of public infrastructure. Contemporary measures included health units (2017), roads (1992), and waterways (1992). Historical measures included colonial-era railroad coverage, distance to Mughal roads, and proximity to Islamic trade routes. As shown in Table E19, there is no statistically significant discontinuity in any of these measures, ruling out infrastructure disparities as a causal factor.

Appendix E: Tables

Table E1: Frontier rule & conflict against state using alternative buffer zones

	Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Observations Within 60 km From FR Border					
Inside FR	0.300***	0.329***	0.465***	0.310***	0.644***	0.600***
	(0.058)	(0.057)	(0.078)	(0.080)	(0.075)	(0.075)
Observations	1,288	1,271	1,288	1,271	1,288	1,271
Mean dep. var.	0.214	0.216	0.288	0.290	0.280	0.282
SD dep. var.	0.590	0.593	0.862	0.865	0.843	0.847
	Panel B: Observations Within 40 km From FR Border					
Inside FR	0.368***	0.387***	0.549***	0.570***	0.636***	0.679***
	(0.061)	(0.061)	(0.091)	(0.094)	(0.078)	(0.084)
Observations	933	924	933	924	933	924
Mean dep. var.	0.225	0.226	0.304	0.305	0.304	0.304
SD dep. var.	0.612	0.614	0.901	0.902	0.894	0.896
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. In Panel A the regression sample is restricted to within 60 km of the FR border. Panel B restricts the sample to within 40 km of the FR border. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E2: Frontier rule & conflict against state using alternative border segments

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: 18 km Border Segments			
Inside FR	0.255^{***}	0.315^{***}	0.522^{***}	0.571^{***}	0.541^{***}	0.613^{***}
	(0.065)	(0.061)	(0.094)	(0.093)	(0.089)	(0.096)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean dep. var.	0.223	0.224	0.299	0.300	0.295	0.296
SD dep. var.	0.607	0.609	0.880	0.882	0.873	0.875
			Panel B: 15 km Border Segments			
Inside FR	0.181^{***}	0.170^{***}	0.392^{***}	0.466^{***}	0.621^{***}	0.388^{***}
	(0.049)	(0.049)	(0.079)	(0.077)	(0.058)	(0.057)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean dep. var.	0.223	0.224	0.299	0.300	0.295	0.296
SD dep. var.	0.607	0.609	0.880	0.882	0.873	0.875
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. In Panel A the regressions use 18 km border segment fixed effects. The regressions in Panel B use 15 km border segment fixed effects. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as ln(1 + x). All regressions include a linear polynomial in distance to the border and border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E3: Donut hole analysis excluding grid cells very close to FR border

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.269^{***}	0.247^{***}	0.479^{***}	0.434^{***}	0.777^{***}	0.672^{***}
	(0.075)	(0.069)	(0.104)	(0.103)	(0.112)	(0.109)
Observations	1,099	1,086	1,099	1,086	1,099	1,086
Mean Dep. Var.	0.224	0.225	0.302	0.303	0.296	0.297
SD Dep. Var.	0.609	0.612	0.884	0.887	0.877	0.880
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. The regression sample for columns 1-6 drops grid cells that are very close (i.e. $<=$ 0.5 km) to the FR border. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E4: Frontier rule & conflict against state using quadratic running variable

	Sample: Observations Within 50 km From FR Border Quadratic Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.283***	0.294***	0.445***	0.452***	0.637***	0.640***
	(0.093)	(0.093)	(0.126)	(0.128)	(0.126)	(0.130)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean Dep. Var.	0.223	0.224	0.299	0.300	0.295	0.296
SD Dep. Var.	0.607	0.609	0.880	0.882	0.873	0.875
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a quadratic polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E5: Frontier rule & conflict against state using alternative running variable forms

	Sample: Observations Within 50 km From FR Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Linear Polynomial in Latitude and Longitude					
Inside FR	0.138	0.104	0.219	0.153	0.199	0.133
	(0.038)***	(0.044)**	(0.059)***	(0.066)**	(0.060)***	(0.066)**
	[0.061]**	[0.061]*	[0.089]**	[0.085]*	[0.086]**	[0.077]*
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean dep. var.	0.223	0.224	0.299	0.300	0.295	0.296
SD dep. var.	0.607	0.609	0.880	0.882	0.873	0.875
	Panel B: Quadratic Polynomial in Latitude and Longitude					
Inside FR	0.140	0.140	0.219	0.203	0.195	0.174
	(0.042)***	(0.047)***	(0.062)***	(0.069)***	(0.064)***	(0.070)**
	[0.064]**	[0.060]**	[0.091]**	[0.084]**	[0.087]**	[0.078]**
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean dep. var.	0.223	0.224	0.299	0.300	0.295	0.296
SD dep. var.	0.607	0.609	0.880	0.882	0.873	0.875
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. Panel A includes a linear polynomial in latitude and longitude as the running variable. Panel B includes a quadratic polynomial in latitude and longitude as the running variable. All regressions include border segment fixed effects that divide the FR border into **four equal size segments**. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat sutability, pre-FR major conflict incidence and pre-FR population density. **Robust** standard errors are in parentheses, and **conley** standard errors corrected for spatial dependence are in square brackets. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E6: Frontier rule & conflict against state using manually chosen bandwidths

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: 15 km bandwidth used for RD estimate					
Inside FR	0.255^{***}	0.315^{***}	0.522^{***}	0.571^{***}	0.541^{***}	0.613^{***}
	(0.065)	(0.061)	(0.094)	(0.093)	(0.089)	(0.096)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean dep. var.	0.223	0.224	0.299	0.300	0.295	0.296
SD dep. var.	0.607	0.609	0.880	0.882	0.873	0.875
	Panel B: 12 km bandwidth used for RD estimate					
Inside FR	0.181^{***}	0.170^{***}	0.392^{***}	0.466^{***}	0.621^{***}	0.388^{***}
	(0.049)	(0.049)	(0.079)	(0.077)	(0.058)	(0.057)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean dep. var.	0.223	0.224	0.299	0.300	0.295	0.296
SD dep. var.	0.607	0.609	0.880	0.882	0.873	0.875
	Panel C: 10 km bandwidth used for RD estimate					
Inside FR	0.181^{***}	0.170^{***}	0.392^{***}	0.466^{***}	0.621^{***}	0.388^{***}
	(0.049)	(0.049)	(0.079)	(0.077)	(0.058)	(0.057)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean dep. var.	0.223	0.224	0.299	0.300	0.295	0.296
SD dep. var.	0.607	0.609	0.880	0.882	0.873	0.875
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. Panel A manually imposes a bandwith of 15 km either side of the FR border for the RD estimate. Panel B uses a bandwidth of 12 km either side of the FR border for the RD estimate. Finally, Panel C imposes a bandwidth of 10 km either side of the FR border for the RD estimate. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1+x)$. All regressions include a linear polynomial in distance to the border and border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E7: Frontier rule & conflict against state using alternative kernel weights

	Sample: Observations Within 50 km From FR Border Quadratic Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.283***	0.294***	0.445***	0.452***	0.637***	0.640***
	(0.093)	(0.093)	(0.126)	(0.128)	(0.126)	(0.130)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean Dep. Var.	0.223	0.224	0.299	0.300	0.295	0.296
SD Dep. Var.	0.607	0.609	0.880	0.882	0.873	0.875
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as ln(1 + x). All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. They also use **Epanechikov** kernel weights (as opposed to Triangular kernel weights) for weighting observations closer to the running variable cutoff. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E8: Estimating scale-invariant FR effect using Poisson Regression

	Sample: Observations Within 25 km From FR Border Poisson QMLE estimation					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
$\hat{\boldsymbol{\beta}}_1$	1.016***	1.108***	1.168***	1.347***	0.907***	0.867***
	(0.101)	(0.136)	(0.300)	(0.112)	(0.245)	(0.032)
$\hat{\boldsymbol{\theta}}_{\text{ATE\%}}$	1.763	2.029	2.214	2.847	1.477	1.379
Observations	627	624	627	624	627	624
Pseudo-R^2	0.218	0.281	0.224	0.300	0.237	0.317
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: This table shows scale-invariant estimates of the Frontier Rule effects using Poisson Regression. Accordingly, the first row of columns 1-4 shows the estimate of the coefficient β_1 in an equation of the form $Y_{i,j} = \exp(\beta_0 + \beta_1 \cdot D_i + \beta_2 \cdot \phi_j + X_i^{/} \cdot \gamma)\, U_{i,j}$, estimated using Poisson QMLE, where Di is the indicator variable for a grid cell being inside the FR border, $X_i^{/}$ are the baseline covariates, and Φ_j are 400 km border segment fixed effects. Estimates of models with and without the baseline covariates are shown separately. The third row of columns 1-4 shows $\exp(\hat{\boldsymbol{\beta}}_1 - 1)$, which is the coefficient from the first row exponentiated minus 1. This is an estimate of the parameter $\boldsymbol{\theta}_{\text{ATE}}\%$, the ATE in levels as a percentage of the baseline mean. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E9: Estimating FR effect using concave outcome transformations

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	m(incidents)		m(deaths)		m(injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Extensive-margin value (x) = 0.000					
Inside FR	0.325***	0.323***	0.485***	0.309***	0.731***	0.668***
	(0.055)	(0.050)	(0.077)	(0.077)	(0.083)	(0.083)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
95% C.I.	[0.235;0.499]	[0.247;0.490]	[0.370;0.718]	[0.184;0.530]	[0.614;1.000]	[0.551;0.948]
	Panel B: Extensive-margin value (x) = 0.100					
Inside FR	0.337***	0.337***	0.499***	0.311***	0.757***	0.697***
	(0.056)	(0.052)	(0.080)	(0.080)	(0.086)	(0.086)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
95% C.I.	[0.247;0.518]	[0.260;0.514]	[0.380;0.740]	[0.180;0.540]	[0.636;1.034]	[0.577;0.985]
	Panel C: Extensive-margin value (x) = 1.000					
Inside FR	0.430***	0.458***	0.626***	0.394***	0.976***	0.943***
	(0.080)	(0.081)	(0.106)	(0.107)	(0.111)	(0.112)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
95% C.I.	[0.318;0.677]	[0.353;0.725]	[0.470;0.935]	[0.224;0.694]	[0.822;1.331]	[0.792;1.313]
	Panel D: Extensive-margin value (x) = 3.000					
Inside FR	0.594***	0.553***	0.945***	0.666***	1.394***	1.358***
	(0.153)	(0.153)	(0.169)	(0.165)	(0.171)	(0.172)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
95% C.I.	[0.359;1.019]	[0.320;0.997]	[0.689;1.427]	[0.405;1.136]	[1.160;1.936]	[1.126;1.909]
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Δ	Δ	Δ	Δ	Δ	Δ
Clustering	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID

Notes: This table shows estimates of the Frontier Rule effect using concave transformations of our outcome variables along the lines suggested in Chen and Roth (2024). Instead of using the transformation ln(1+Y) as the outcome we use the transformation m(Y), where m(Y) is defined to equal ln(Y) for Y > 0 and -x for Y = 0. Additionally, the outcome Y is normalized so that Y = 1 corresponds to the minimum nonzero value of the outcome in our dataset Y_{min}. Using such a transformation, we can deliberately place different values on the extensive margin effect (i.e. change of conflict going from 0 to Y_{min}) by changing the value of x. We do this for four values of x going from 0 (no extensive margin effect) to 3 (high extensive margin effect). Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E10: Falsification test based on moving FR border in a South West direction

	Sample: Observations Within 50 km From the **placebo** FR Border Linear Running Variable in Euclidean Distance to the **placebo** Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside placebo FR	−0.789	−0.839	−1.303	−1.257	−0.049	0.308
	(0.760)	(0.806)	(1.261)	(1.197)	(0.106)	(0.775)
Observations	1,216	1,216	1,216	1,216	1,216	1,216
Mean Dep. Var.	0.030	0.030	0.025	0.025	0.027	0.027
SD Dep. Var.	0.197	0.197	0.222	0.222	0.221	0.221
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: This table shows the results for a **placebo** FR border that is based on moving the original border 400km-by-550km in a South West direction. Since Pakistan has a North East to South West orientation, this is equivalent to shifting the original FR border further inland into the country. The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as ln(1 + x). All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Since there is ambiguity in the treatment status of grid cells very close to the placebo border, all regressions also exclude grid cells that are within a distance of 0.5km from it. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E11: Frontier rule & conflict against state using Uppsala Conflict Data

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border			
	ln(1+incidents)		ln(1+deaths)	
	(1)	(2)	(3)	(4)
Inside FR	0.337^{***}	0.358^{***}	0.494^{***}	0.310^{***}
	(0.059)	(0.059)	(0.081)	(0.080)
Observations	1,118	1,105	1,118	1,105
Mean Dep. Var.	0.223	0.224	0.299	0.300
SD Dep. Var.	0.607	0.609	0.880	0.882
Controls	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents; and in columns 3-4, the dependent variable is the number of deaths in conflict incidents, all parameterized as ln(1 + x). All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2 and 4 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E12: Frontier rule & conflict against state using broader definition of state targets

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.269^{***}	0.247^{***}	0.479^{***}	0.434^{***}	0.777^{***}	0.672^{***}
	(0.075)	(0.069)	(0.104)	(0.103)	(0.112)	(0.109)
Observations	1,099	1,086	1,099	1,086	1,099	1,086
Mean Dep. Var.	0.224	0.225	0.302	0.303	0.296	0.297
SD Dep. Var.	0.609	0.612	0.884	0.887	0.877	0.880
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: This table shows results using a measure of violence against the state that is based on a **broader definition** of state targets beyond military installations and personnel. The **broader definition** also includes the following list of additional state affiliated targets: civil servants, teachers, doctors, judges, police, military personnel, parliamentarians, educational institutions, healthcare facilities, courts, roads, bridges, airports, electricity grids, and gas installations. The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E13: Estimating FR effect in Pre- & Post-9/11 era (wider buffer)

	Sample: Observations Within **60 km** From FR Border Linear Running Variable in Euclidean Distance to the Border											
	Pre–911						Post–911					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)		ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Inside FR	0.269	0.247	0.479	0.434	0.777	0.672	0.269^{***}	0.247^{***}	0.479^{***}	0.434^{***}	0.777^{***}	0.672^{***}
	(0.075)	(0.069)	(0.104)	(0.103)	(0.112)	(0.109)	(0.075)	(0.069)	(0.104)	(0.103)	(0.112)	(0.109)
Observations	1,099	1,086	1,099	1,086	1,099	1,086	1,099	1,086	1,099	1,086	1,099	1,086
Mean Dep. Var.	0.224	0.225	0.302	0.303	0.296	0.297	0.224	0.225	0.302	0.303	0.296	0.297
SD Dep. Var.	0.609	0.612	0.884	0.887	0.877	0.880	0.609	0.612	0.884	0.887	0.877	0.880
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
Clustering	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID	Seg_ID

Notes: The unit of observation is a 10km-by-10km grid cell. Columns 1-6 restrict the sample to the period prior to 9/11 from 1970 to 2000 and columns 7-12 restrict the sample to the period after 9/11 from 2001 to 2018. In columns 1-2 and 7-8, the outcome variable is the number of conflict incidents against the state; in columns 3-4 and 9-10, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6 and 11-12, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4, 6, 8, 10 and 12 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E14: Estimating FR effect in Pre- & Post-9/11 era (Uppsala Conflict Data)

	Sample: Observations Within 50 km From FR Border							
	Pre–911				Post–911			
	ln(1+incidents)		ln(1+deaths)		ln(1+incidents)		ln(1+deaths)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Linear Polynomial in Distance to the FR Border								
Inside FR	−0.000	−0.001	0.009	0.006	0.738	0.756	1.226	1.249
	(0.002)	(0.002)	(0.009)	(0.006)	$(0.063)^{***}$	$(0.067)^{***}$	$(0.099)^{***}$	$(0.105)^{***}$
	[0.002]	[0.002]	[0.008]	[0.006]	$[0.146]^{***}$	$[0.152]^{***}$	$[0.236]^{***}$	$[0.243]^{***}$
R-squared	0.006	0.011	0.006	0.010	0.244	0.288	0.257	0.302
Panel B: Quadratic Polynomial in Distance to the FR Border								
Inside FR	−0.000	−0.001	0.009	0.006	0.750	0.765	1.245	1.263
	(0.002)	(0.002)	(0.009)	(0.006)	$(0.063)^{***}$	$(0.067)^{***}$	$(0.100)^{***}$	$(0.105)^{***}$
	[0.002]	[0.002]	[0.008]	[0.006]	$[0.147]^{***}$	$[0.151]^{***}$	$[0.237]^{***}$	$[0.242]^{***}$
R-squared	0.006	0.011	0.006	0.010	0.249	0.293	0.262	0.307
Panel C: Linear Polynomial in Latitude and Longitude								
Inside FR	−0.003	−0.003	−0.001	−0.004	0.530	0.405	0.917	0.706
	(0.002)	(0.003)	(0.001)	(0.004)	$(0.072)^{***}$	$(0.072)^{***}$	$(0.118)^{***}$	$(0.118)^{***}$
	[0.002]	[0.003]	[0.002]	[0.005]	$[0.151]^{***}$	$[0.124]^{***}$	$[0.250]^{***}$	$[0.201]^{***}$
R-squared	0.010	0.015	0.006	0.009	0.249	0.308	0.261	0.320
Panel D: Quadratic Polynomial in Latitude and Longitude								
Inside FR	−0.004	−0.003	−0.004	−0.002	0.546	0.446	0.942	0.779
	(0.003)	(0.003)	(0.005)	(0.003)	$(0.076)^{***}$	$(0.075)^{***}$	$(0.125)^{***}$	$(0.122)^{***}$
	[0.003]	[0.003]	[0.005]	[0.004]	$[0.142]^{***}$	$[0.125]^{***}$	$[0.230]^{***}$	$[0.204]^{***}$
R-squared	0.014	0.018	0.013	0.015	0.274	0.322	0.290	0.335
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,118	1,105	1,118	1,105	1,118	1,105	1,118	1,105

Notes: The unit of observation is a 10km-by-10km grid cell. Columns 1-4 cover the pre-9/11 period and columns 5-8 the post-9/11 period. The outcome is the number of conflict incidents in columns 1-2 and 5-6, and conflict deaths in columns 3-4 and 7-8, all parameterized as ln(1 + x). Panels A and B use linear and quadratic polynomials in distance to the FR border; Panels C and D use linear and quadratic polynomials in latitude and longitude. Columns 2, 4, 6 and 8 add controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR conflict, and pre-FR population density. **Robust** standard errors are in parentheses; **Conley** standard errors (spatial dependence) are in brackets. *, **, and *** denote significance at 10%, 5%, and 1% levels.

Table E15: Frontier rule & conflict against state (controlling for Durand Line distance)

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.337^{***}	0.349^{***}	0.494^{***}	0.317^{***}	0.775^{***}	0.715^{***}
	(0.059)	(0.058)	(0.081)	(0.081)	(0.086)	(0.084)
Observations	1,118	1,105	1,118	1,105	1,118	1,105
Mean Dep. Var.	0.223	0.224	0.299	0.300	0.295	0.296
SD Dep. Var.	0.607	0.609	0.880	0.882	0.873	0.875
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: **distance to the durand line**, ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E16: Frontier rule & conflict against state excl. contiguous Durand Line grid cells

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.293***	0.324***	0.426***	0.295***	0.655***	0.608***
	(0.058)	(0.057)	(0.077)	(0.081)	(0.075)	(0.076)
Observations	1,070	1,065	1,070	1,065	1,070	1,065
Mean Dep. Var.	0.214	0.215	0.286	0.287	0.283	0.284
SD Dep. Var.	0.596	0.597	0.868	0.870	0.865	0.866
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. The regression sample for columns 1-6 **drops grid cells that are contiguous to the Afghan Border (Durand Line)**. The sample, therefore, excludes areas where local spillovers of conflict from the Afghan side is most likely to have happened. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as $\ln(1 + x)$. All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence and pre-FR population density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Table E17: Conflict incidents against state by specific origin

Militant Outfit	1970–2018		1970–2000		2000–2018	
	Count	Percent	Count	Percent	Count	Percent
	Local					
Tehrik-i-Taliban Pakistan	326	17.87	0	0.00	326	18.26
Baloch Militants	216	11.84	0	0.00	216	12.18
Political Militant Wings	12	0.66	5	12.82	7	0.39
Lashkar-e-Jhangvi	9	0.49	0	0.00	9	0.50
Local Jihadi Groups	79	4.33	5	12.82	74	4.15
Other Militant Groups	27	1.48	2	5.13	25	1.40
Total	**669**	**36.68**	**12**	**30.77**	**657**	**36.81**
	Foreign					
Haqqani Network	0	0.00	0	0.00	0	0.00
Al-Qaida	11	0.60	0	0.00	11	0.62
Total	**11**	**0.60**	**0**	**0.00**	**11**	**0.62**
	Unknown					
Total	1144	**62.72**	27	**69.23**	1117	**62.58**

Notes: The Local Jihadi Groups category includes groups like the Sipah-e-Sahaba, Hizb-I-Islami, Tehrik-e-Nafaz-e-Shariat-e-Mohammadi, Lashkar-e-Islam, Ansarul Islam, Jaish-e-Islam, Jaish al-Umar, Jamaat-ul-Ahrar, Harkatul Jihad-e-Islami, and so forth. Similarly, the Other Militant Groups category includes outfits like Abdullah Azzam Brigades, Qari Kamran Group, Jundallah, Halqa-e-Mehsud, Hafiz Gul Bahadur Group, Khorasan, etc. Unknown includes those attacks that were not claimed by a known terrorist organization.

Table E18: Frontier rule & conflict against state excluding drone strike grid cells

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	ln(1+incidents)		ln(1+deaths)		ln(1+injuries)	
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	0.177^{***}	0.183^{***}	0.346^{***}	0.298^{***}	0.457^{***}	0.368^{***}
	(0.058)	(0.057)	(0.075)	(0.077)	(0.068)	(0.071)
Observations	1,059	1,046	1,059	1,046	1,059	1,046
Mean Dep. Var.	0.178	0.179	0.233	0.234	0.232	0.232
SD Dep. Var.	0.527	0.530	0.765	0.767	0.752	0.754
Controls	No	Yes	No	Yes	No	Yes
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. The regression sample for columns 1-6 **drops grid cells where there has ever been a drone strike**. In columns 1-2, the outcome variable is the number of conflict incidents against the state; in columns 3-4, the dependent variable is the number of deaths in conflict incidents against the state; and in columns 5-6, the dependent variable is the number of injuries in conflict incidents against the state, all parameterized as ln(1 + x). All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Columns 2, 4 and 6 also include the following set of controls: ruggedness, topography, slope, precipitation, temperature, wheat suitability, pre-FR major conflict incidence, pre-FR population density and road density. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

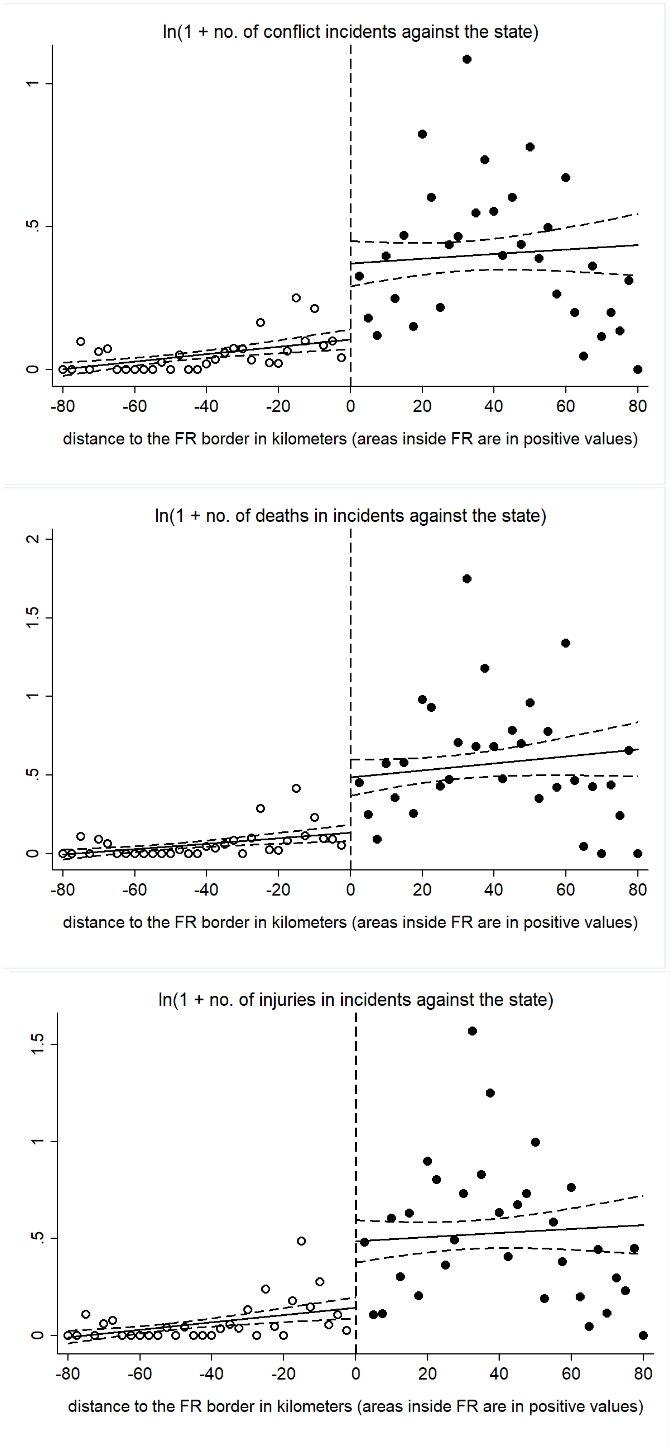
Table E19: Frontier rule & public infrastructure provision

	Sample: Observations Within 50 km From FR Border Linear Running Variable in Euclidean Distance to the Border					
	health sites per 10000 persons	ln(1+road length in km)	ln(1+waterway length in km)	ln(1+colonial rail length in km)	ln(1+distance to mughal roads in km)	ln(1+distance to islamic trade routes in km)
	(1)	(2)	(3)	(4)	(5)	(6)
Inside FR	−0.103	−0.073	−0.200	0.009	−0.026	0.020
	(0.168)	(0.141)	(0.130)	(0.038)	(0.017)	(0.022)
Observations	1,288	1,288	1,288	1,288	1,288	1,288
Mean Dep. Var.	0.697	1.263	1.880	0.158	4.762	4.676
SD Dep. Var.	1.549	1.218	1.123	0.582	0.947	0.918
Segment FE	Yes	Yes	Yes	Yes	Yes	Yes
BW-type	cerrd	cerrd	cerrd	cerrd	cerrd	cerrd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Clustering	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID	Segment_ID

Notes: The unit of observation is a 10km-by-10km grid cell. The outcome in column 1 is the number of health sites per 10,000 persons in a contemporary year (2017). In columns 2-3, the outcomes are the length of roads in km and the length of waterways in km, both measured in a pre-9/11 year (1992). Column 4 includes the length of colonial era railroads in km. Finally, in columns 5-6 we include historical (pre-FR rule) measures of underdevelopment: distance to major mughal era roads (1556—1707) and distance to islamic trade and pilgrimage routes (1300—1600). All regressions include a linear polynomial in distance to the border and 20 km border segment fixed effects. Standard errors, clustered at the border segment ID level, are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels.

Appendix F: Additional Figures

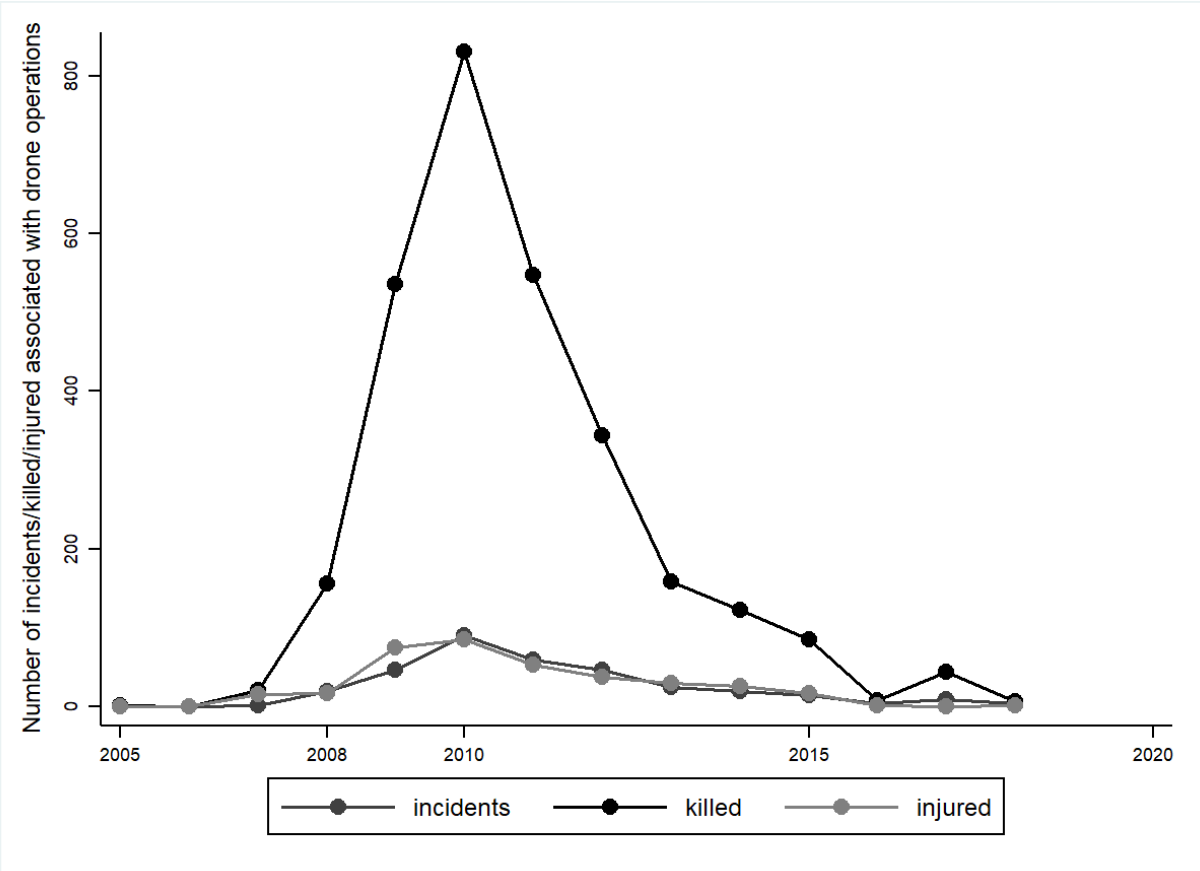
Figure F1: Conflict against state & FR border distance (small bins)



Notes: Binned scatterplots (32 bins of size 2.5km each) of the unconditional relationship between conflict against the state and distance to the FR border. The y-axis reports the natural log of 1 plus the incidence of conflict against the state for each of our three measures. The x-axis reports the distance (in km) from the FR border for areas under FR and non-FR. The border itself is at km 0 with positive values indicating km inside the FR territory.

Source: Authors' construction.

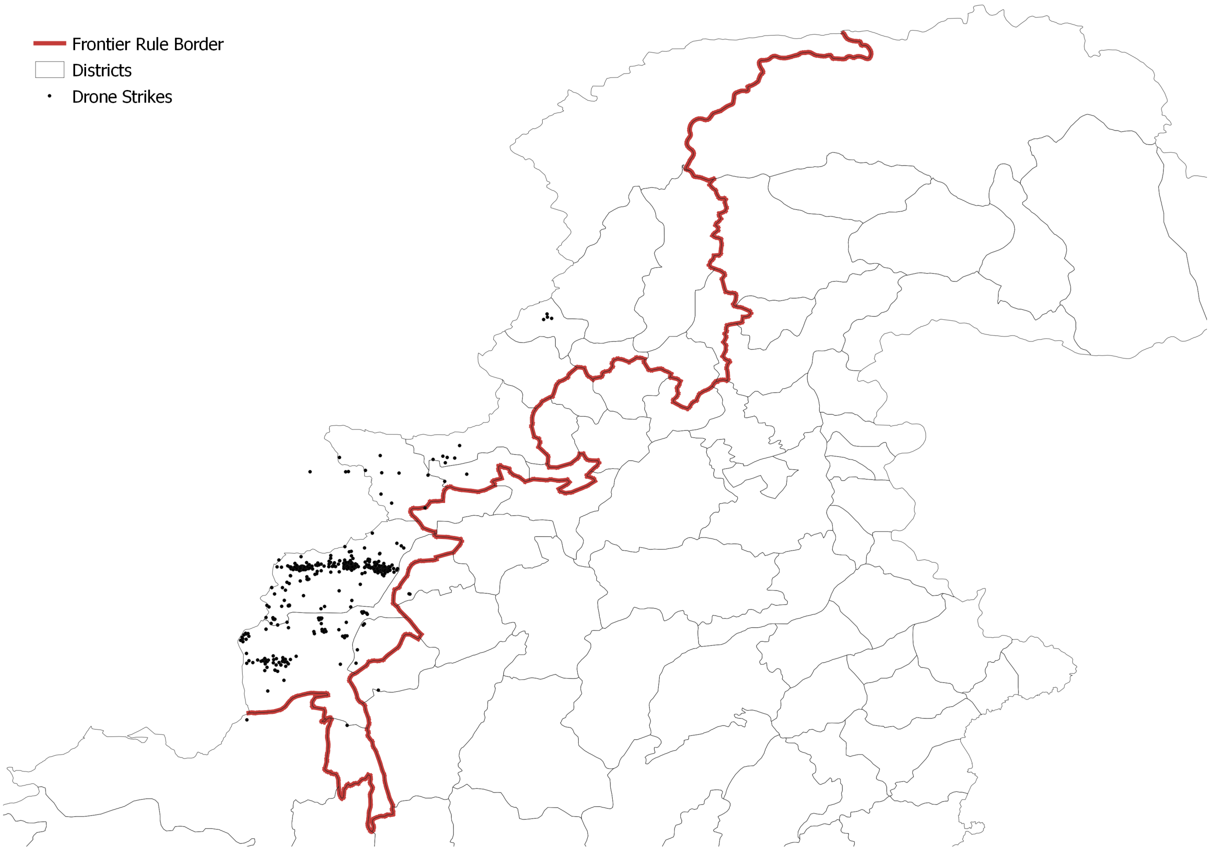
Figure F2: US drone strikes in Pakistan (2005–18)



Notes: This figure illustrates the evolution of drone strikes in Pakistan. Drone strikes began under the Bush administration in 2005, continued to increase, and reached a peak in 2010 before gradually phasing out under the Obama administration. The number of deaths and injuries resulting from these strikes closely follows this pattern, with both measures beginning to rise in 2005, peaking in 2010, and subsequently tapering off after that year.

Source: Authors' construction based on data from New America (2021).

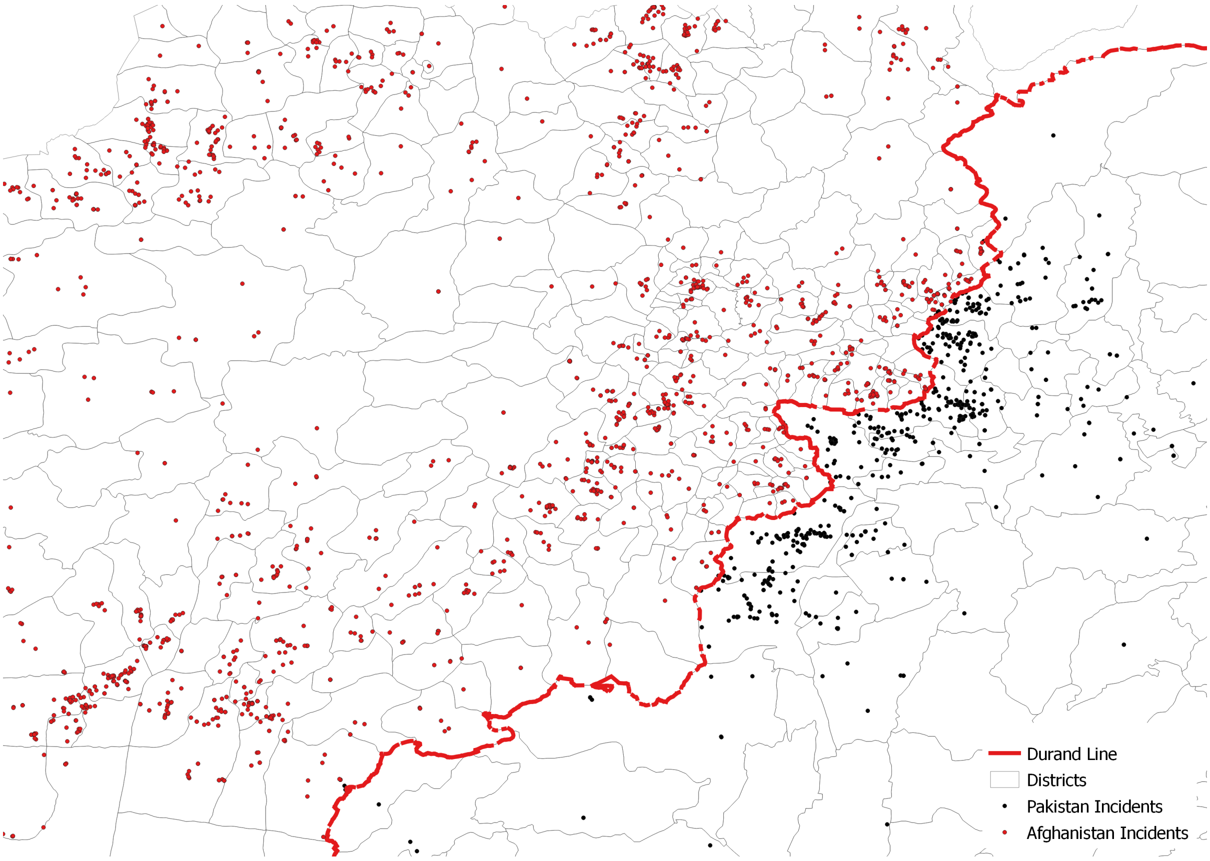
Figure F3: Spatial distribution of drone strikes



Notes: This map shows the distribution of drone attacks in Pakistan's northwestern frontier. The dark red line represents the FR border and each black dot represents a drone strike.

Source: Authors' construction based on data from Usmani (2017).

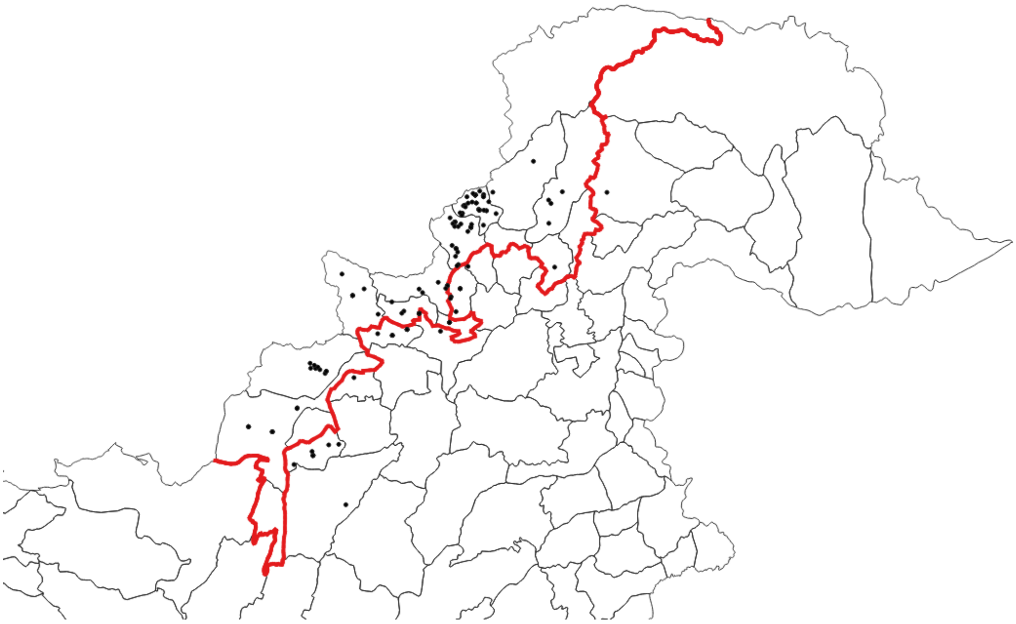
Figure F4: Post-9/11 conflict incidents in Afghanistan and Pakistan



Notes: This figure shows the distribution of conflict incidents in Afghanistan and Pakistan. The dark red line represents the *Durand Line*, the international border between Afghanistan and Pakistan. Each dot represents an attack against the state. The black dots (on the right of the border) are attacks against the state in Pakistan whereas the red dots on the left of the border denote similar attacks in Afghanisatn.

Source: Authors' construction based on data from GTD (2021).

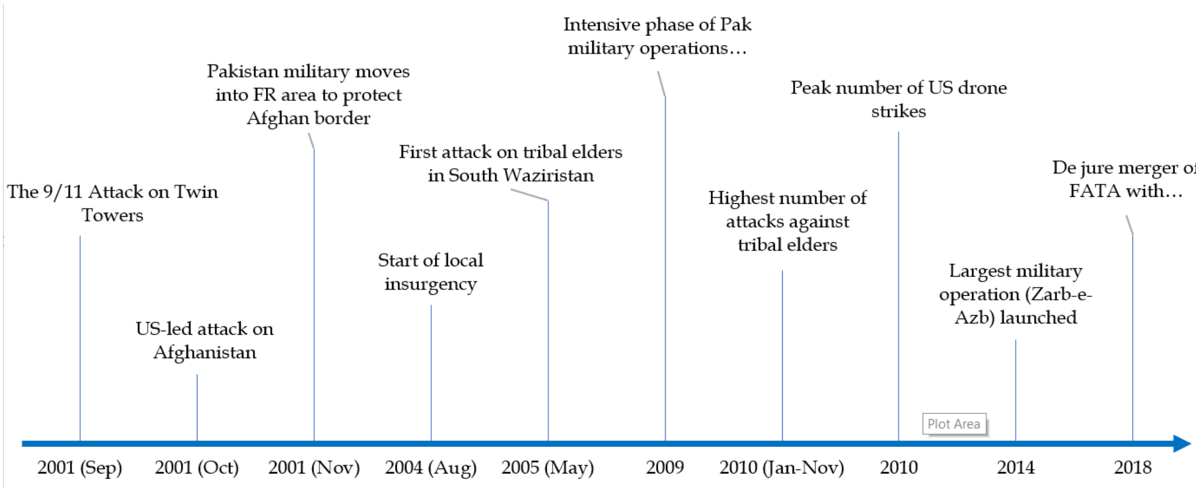
Figure F5: Targeted attacks against tribal elders (*Maliks*)



Notes: This map shows the spatial distribution of attacks targeting tribal elders for the post-9/11 period (2006–18). Black dots represent attacks against tribal elders and the red line denotes the FR border separating FR and non-FR areas.

Source: Authors' construction based on data from GTD (2021).

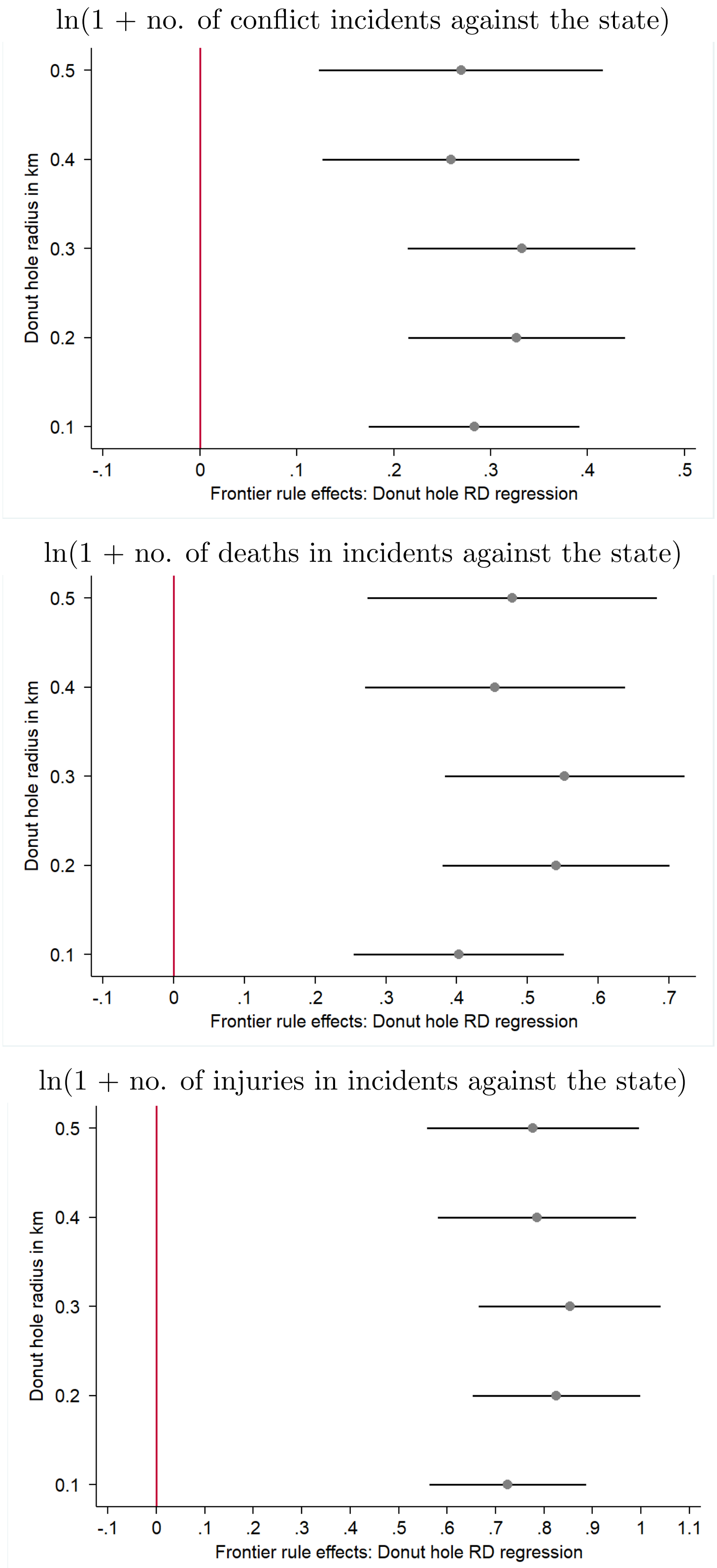
Figure F6: A timeline of major events in FR areas in the post-9/11 period



Notes: This timeline outlines major events in Pakistan's frontier rule areas from 2001 to 2018. After the September 2001 attacks in the U.S. and the subsequent invasion of Afghanistan, Pakistan increased its military presence in the FR areas to secure the Afghan border. A local insurgency emerged in 2004, followed by targeted attacks on tribal elders starting in 2005. An intensive phase of Pakistani military operations occurred around 2009, coinciding with a peak in U.S. drone strikes in 2010 and heightened attacks on tribal leaders. Pakistan's largest military operation, Zarb-e-Azb, was launched in 2014, culminating in the formal merger of the FR areas with the rest of Pakistan in 2018.

Source: Authors' construction

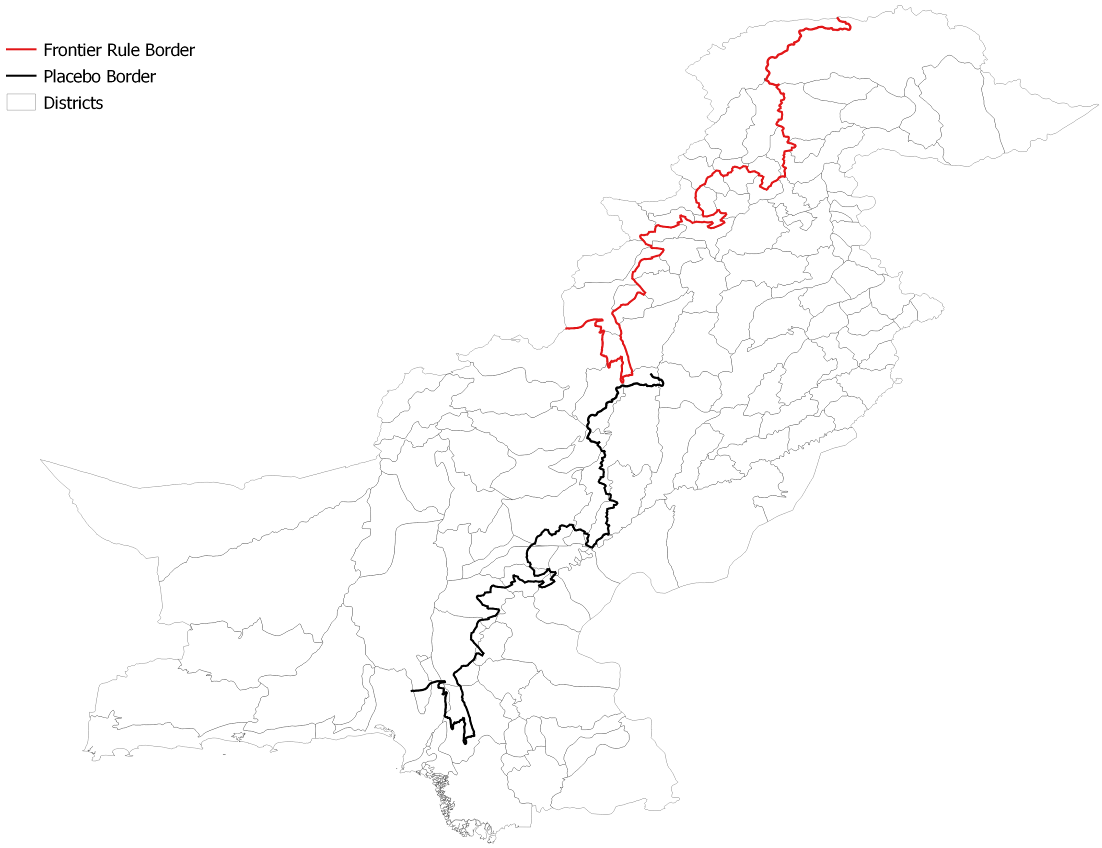
Figure F7: SRD estimates after excluding spatial units close to FR border



Notes: This figure shows that the donut hole results remain robust across all conflict measures, with coefficients and confidence intervals for the frontier rule effect remaining positive and highly significant as the donut hole radius increases from 0.1km to 0.5km.

Source: Authors' construction

Figure F8: Falsification test based on moving FR border southwestward



Notes: This figure shows the placebo border (black line) that is based on moving the original FR border (red line) 400km-by-550km in a southwest direction. Since Pakistan has a northeast-to-southwest orientation, this is equivalent to shifting the original FR border further inland into the country.

Source: Authors' construction.

Appendix G: Additional Discussion Items

G.1 The post-2001 rise of MMA

The 9/11 served as a universal shock that intensified grievances against the state in Pakistan. However, the ability to channel such grievances differed sharply between FR and non-FR areas due to their distinct political and institutional landscapes. The FR districts, constrained by restrictive political structures and non-party-based electoral systems, largely excluded the local population from formal avenues of political participation. In contrast, adjacent non-FR districts benefited from greater institutional access, enabling party-based electoral politics to serve as a channel for expressing public discontent.

This difference became particularly evident during the 2002 general elections, held within a year of the 9/11 attacks. The alliance of Islamist religious parties, known as the Muttahidda Majlis-e-Amal (MMA), emerged as a political force in response to grievances fuelled by the attack of the world's dominant superpower against a neighbouring Islamic state. As Misra (2003) observes, the electoral strength of MMA was enabled by a strong opposition to "the US war in Afghanistan; its increasing interference in Pakistan's domestic affairs; and its 'anti-Islam' posture" (p. 192). This stance resonated deeply in the non-FR districts, where the MMA secured a landslide victory, winning nearly all provincial and national assembly seats. By contrast, the FR districts, where electoral politics were limited to tribal elites and non-party-based arrangements, remained disconnected from mainstream politics that could have helped to channelize local grievances.

The MMA's success was unprecedented in Pakistan's political history. For the first time, different Islamic political parties united under a single platform, shedding their differences to contest elections for national and provincial legislatures. Nazar (2016) highlights how the coalition "capitalized on public resentment fueled by civilian casualties" and secured 11% of the vote, emerging as the third largest force in the National Assembly with 59 seats (p. 260). Their campaign, framed as a "referendum between the US agents and Islamic forces" (Khan, 2011, p.98), effectively mobilized anti-US sentiment, especially in the then North-West Frontier Province.

This political mobilization may not have been entirely organic. Akhtar et al. (2006) suggest that "the MMA's victory represented an effort on the part of some elements within the state to dissent against Musharraf's overtures to the United States and the War on Terror" (p. 393). Regardless of these dynamics, the rise of the MMA demonstrated the potency of anti-Americanism as a unifying and mobilizing force. As Zafar and Ali (2018) note, "The US invasion in Afghanistan was another dominant factor that powered anti-US sentiments in the Pakistani society, and MMA emerged as the sound voice against the United States" (p. 651).

The stark contrast between FR and non-FR areas underscores the critical role that institutional access to electoral politics played in channeling grievances. While non-FR districts facilitated the political expression of public resentment through formal mechanisms, the FR districts, constrained by structural limitations, remained excluded from this process.

G.2 The potential role of natural resources

There is a well-established literature on the relationship between natural resources and conflict (Bazzi and Blattman, 2014; Dube and Vargas, 2013; Humphreys, 2005; Nillesen and Bulte, 2014). Depending on the type of commodity and contextual factors, resource abundance and associated booms or busts can either exacerbate or mitigate conflict. If natural resource intensity or commodity shocks influence conflict incidence, they could potentially serve as a competing explanation for our empirical results. However, such concerns are easily dismissed in the context of Pakistan's Northwest for two reasons: first, the region is not historically recognized as resource-rich; and second, the limited resources that do exist are relatively evenly distributed. We address both aspects below.

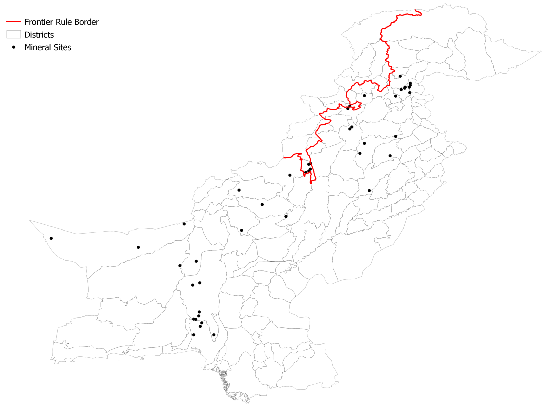
Pakistan's Northwestern regions are significantly less resource-rich than other provinces such as Baluchistan and Sindh. These provinces boast a higher intensity of natural resources and a more developed extraction infrastructure. Baluchistan and Sindh have long been the backbone of Pakistan's oil and gas industry. Baluchistan's historic Sui Gas Field, discovered in 1952, initiated the country's natural gas sector, while Sindh hosts prolific fields such as Qadirpur, Mari, and Badin, which are critical to Pakistan's energy landscape. In contrast, Khyber-Pakhtunkhwa (KP), the northwestern region examined in this study, has only recently reported discoveries, which are relatively minor by global standards and remain still unexploited.[6] The natural resources in our study area are primarily minerals. Key minerals include manganese, aluminum, gypsum, marble, chromium, and copper, among others. However, these resources generate minimal economic surplus by both national and global standards. For instance, in the 2018–19 fiscal year mineral revenues contributed a mere 0.41 percent (Rs. 2.1 billion out of Rs. 513.9 billion) to KP's total revenue. Despite their limited economic significance, we also show balance in the spatial distribution of these mineral sites.

Panel A in Figure G1 illustrates the distribution of mineral sites across Pakistan, including our study area. To assess whether these sites are disproportionately concentrated in areas under frontier rule, we apply our primary spatial regression discontinuity (SRD) framework. Using the distance to mineral sites as the dependent variable, we estimate the specification separately for three buffer zones around the FR border (i.e., 40, 50, and 60km, respectively). Panel B of Figure G1 presents the coefficients and confidence intervals for the SRD estimate of frontier rule effect across the three buffer zones, demonstrating no statistically significant discontinuity in proximity to mineral sites when moving from just outside to just inside the FR border. These findings strongly suggest that differential natural resource distribution is an unlikely explanation for the empirical patterns observed in our analysis.

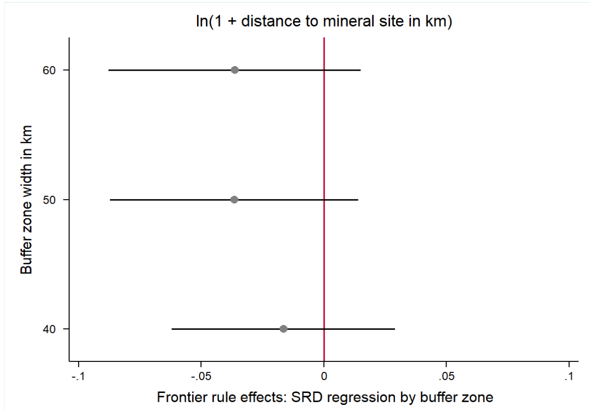
[6] Recent assessments have indicated the presence of some gas deposits in Kohat, Karak, and Hangu. But these are extremely recent (post-2022) and preliminary assessments. These deposits were neither exploited nor anticipated during our sample period.

Figure G1: Frontier Rule and Mineral Resources

Panel A: Distribution of mineral sites



Panel B: Coefficient plot



Notes: Panel A of this figure uses geocoded data from the United States Geological Survey (USGS) to map the major mineral sites of Pakistan. It provides a visual illustration of the presence of mineral resources across the FR border which is depicted by the red line. Panel B shows the coefficient plot for the estimated SRD effect of frontier rule separately for three different buffer zones around the FR border (i.e., 40, 50, and 60km, respectively).

Source: Authors' construction based on data from the Mineral Resource Data System (MRDS) of the USGS.

G.3 Cross-border smuggling

The 2001 U.S. invasion of Afghanistan might have potentially disrupted the local smuggling economy, creating a significant income shock with implications for local conflict. This disruption could have stemmed from heightened security concerns following the invasion. However, we argue that there is no substantial evidence to suggest that the invasion caused a dramatic or sustained interruption to smuggling activities. On the contrary, available evidence indicates that cross-border smuggling between Afghanistan and Pakistan continued largely unabated after 2001.

Context.—Smuggling is a routine and integral feature of the border economies of Afghanistan and Pakistan, providing critical livelihoods for many in the region. The porous border facilitates this informal trade. Afghanistan, as a landlocked country, has long depended on Pakistan's ports for its imports, governed by the Afghanistan-Pakistan Transit Trade Agreement (APTTA). This institutional framework enables Afghan importers to bring in key goods—such as spare parts, electronics, and unregistered vehicles—for re-export to Pakistan. The agreement has become a lucrative source of rents for actors on both sides of the border, widely recognized as a front for disguised smuggling activities (ICRG, 2014). Outside the purview of the APTTA, there is also an informal trade of licit goods from Pakistan into Afghanistan. These include, among others, flour, edible oil, lentils, dried vegetables, contraband cigarettes, and meat. In terms of trade of illicit goods, Afghanistan has historically remained an important source of opium trade, which is usually smuggled out of Pakistan, Central Asian states, and Iran.

Resilience of Smuggling Networks Post-2001.—Qualitative studies underscore the continuity and resilience of smuggling networks after the U.S. invasion (Grawert et al., 2017; Schetter, 2013; Threlkeld and Easterly, 2021). The smuggling routes between Afghanistan and Pakistan are well-established and resistant to extended disruption. Despite post-9/11 security measures—including increased military presence and attempts to erect border fences—smuggling persisted for several reasons.

The Afghan Transit Trade, a key enabler of local smuggling, remained operational post-2001. Another reason for the persistence of smuggling is the reliance of NATO supply lines on roads, highways, and informal networks that are also crucial for smuggling economy. The NATO war effort relied on transporting supplies from Karachi to Afghanistan, averaging 250 large containers daily. To maintain these supply lines, NATO often collaborated with local brokers, warlords, and patrons controlling critical roads and highways—described as the "prime real estate" of the regional economy (Tierney, 2010). Many of these brokers were directly involved in smuggling or worked closely with smugglers, ensuring the roads remained open and functional for both military and smuggling operations. Additionally, opium trafficking persisted (and even increased) after the invasion (Aggarwal, 2010).

The persistence of smuggling networks despite a changing security environment is not surprising. Informal trade networks—encompassing both licit and illicit goods—are inherently complex, involving a wide array of actors and beneficiaries. These include not only local brokers and smugglers but also transporters, customs officials, politicians, border police, military personnel, and paramilitary institutions (Goodhand et al., 2022). This diverse chain of stakeholders creates strong vested interests in maintaining the uninterrupted flow of smuggled goods. Smugglers also possess significant advantages over security forces, such as superior knowledge of local geography and well-established networks.[7] The adaptability of smuggling operations in response to geopolitical shocks is not unique to the Afghanistan-Pakistan corridor. Similar patterns of resilience have been documented in other developing regions, where smuggling networks adapt, transform, and reconfigure in the face of "moments of rupture" caused by domestic and global shocks, as well as changes in the security and enforcement environment (Malik and Gallien, 2020; Andersen and Prokkola, 2021; Gallien and Weigand, 2022).

In light of this evidence, it is clear that the U.S. invasion of Afghanistan did not result in a sustained shock to cross-border informality and smuggling in Pakistan's Northwest. Smuggling networks demonstrated remarkable resilience, continuing to thrive despite heightened security concerns and geopolitical upheaval.

[7]As a smuggler on the Afghanistan-Pakistan reportedly noted to a news website, GlobalPost: "Borders mean nothing to us. We have been crossing in and out for centuries".

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