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ON THE ENDS OF THE STATE: STATIONARY BANDITS AND THE TIME HORIZON IN EASTERN CONGO

Soeren J. Henn
Christian Mastaki Mugaruka
Miguel Ortiz
Raúl Sánchez de la Sierra
David Qihang Wu

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ABSTRACT

We show that armed actors refrain from using their power to arbitrarily steal from an economy if, and only if, the armed actors' property rights over stealing from that economy are secure. By 2009, armed actors taxed, administered, and protected various villages in Democratic Republic of the Congo. We exploit the timing and targeting of an international military operation that permanently made taxing these villages impossible. Following the operation, these armed actors turned to violently expropriating the same villages. The findings suggest that the security of property rights over stealing, hence the stealing horizon, can sustain, or destroy, economic growth.

Soeren J. Henn
Innovations for Poverty Action &
Harris School of Public Policy
University of Chicago
1307 E 60th St.
Chicago, IL 60637
soeren.henn@gmail.com

Raúl Sánchez de la Sierra
Harris School of Public Policy
University of Chicago
1307 E. 60th Street
Chicago, IL 60637
and NBER
raul@uchicago.edu

Christian Mastaki Mugaruka
Marakuja Kivu Research
Goma
Democratic Republic of the Congo
christian999mastaki@gmail.com

David Qihang Wu
Department of Economics
University of California, Berkeley
qihangwu@berkeley.edu

Miguel Ortiz
Haas School of Business
University of California, Berkeley
m.ortiz@berkeley.edu

1. INTRODUCTION

The power of states, armed actors who can enforce property rights, is a precursor of economic growth (Besley and Persson, 2008). However, a state with sufficient power to protect also has the power to withhold protection or expropriate wealth. Historically, those threats were often realized, destroying the foundations of markets (Greif et al., 1994). Without restrain, the role of state power as a precursor for economic growth is rather limited.

In this paper, we study why armed actors restrain their power to arbitrarily expropriate wealth. There are various explanations for why they do so.

One possibility is that the state is well-intentioned. Various scholars in philosophy have analyzed the state as emerging from a social contract (Hobbes, 1651, Rousseau, 1762). Another possibility is that protecting markets could sometimes benefit those who control violence. For instance, according to Olson (1993), if those who control violence have a long horizon of stealing in an economy, they will, at least partially, internalize the the effect of stealing from that economy today at diminishing future growth. If they can securely steal in the future, this incentivizes to reduce and announce stealing, leading to taxation and promoting growth. Although Olson (1993) provided anecdotes of warlords, there is little empirical evidence that indicates the importance of the time horizon to restrain state power.

We analyze the incentives to restrain from violence and arbitrary theft by an armed group in eastern Democratic Republic of the Congo (DRC), the Front de Liberation du Rwanda (FDLR). Using data presented in Sánchez de la Sierra (2020), we first show that the FDLR provided state functions in a large Chiefdom until 2009. We then exploit the timing and targeting of a military operation in 2009 (Kimia II), by 30,000 Congolese and UN soldiers, which dismantled the FDLR in that Chiefdom. We compare the change of FDLR's expropriation in the Chiefdom's villages to the change in the rest.

A number of characteristics in eastern DRC make the environment particularly well-suited to elicit the role of armed actors' secure property rights to steal, and thus their stealing time horizon. First, the central state struggles to control most rural areas, enabling the FDLR to perform state functions, like 122 other armed groups in DRC today (KST, 2021).

Second, the FDLR, descends from Rwanda and has weak ties with the Congolese population. This helps isolate the role of the time horizon from simple benevolence.

We first show that, by 2009, the FDLR controlled most villages in the Chiefdom of Basile (henceforth, the FDLR state), an area as large as Rhode Island, in South Kivu province. We document that they used their power to collect taxes, provide protection, and run fiscal and judicial administrations in villages of the FDLR state. In contrast, despite their tendency to use violence in the period in the region overall, they almost never attacked the villages they controlled. Sexual violence, a practice often perpetrated by the FDLR, was also rare.

One possibility for why they used their power to perform state functions instead of arbitrary expropriation could be that, over time, they began to care for the population. Another possibility, supported by our ethnographic work, is that they had secured a property right over their revenues from theft over a long horizon in these villages, leading them to tax instead of arbitrarily expropriate these villages, which potentially destroy growth. This interpretation is supported by descriptions for the response to Kimia II that we gathered in qualitative interviews: in response to Kimia II, the FDLR lost the ability to permanently tax in the FDLR state villages and found refuge in the neighboring forest of Itombwe. From there, they performed violent attacks aimed at stealing wealth and food, presumably because they no longer internalized the effect of these operations on village growth.

To isolate the role of a long stealing time horizon, we exploit the timing and targeting of Kimia II. Using both an event study and a differences-in-differences framework, we compare the FDLR state villages to the rest of the sample before and after Kimia II. Compared to before Kimia II, violent expropriation operations (henceforth, pillaging) by the FDLR increased by 350% in FDLR state villages. They were unchanged in the rest. This is consistent with the interpretation that a long stealing horizon before Kimia II incentivized taxation over arbitrary expropriations, and that Kimia II destroyed this incentive.

We then examine the merit of potential confounds that could threaten the validity of this causal interpretation: intra-Chiefdom correlation, spatial spillovers, aggregate coincidental shocks, differential time-trends, time-varying divergence of constant characteristics, migra-

tion, mis-measurement, and mis-specification. Using detailed migration data, and publicly available data on infrastructure and on violence, we find no evidence of confounding.

Our analysis then turns to alternative causal channels. We consider whether the result reflects fighting with the Congolese army, a change in the FDLR's organization-wide strategy across DRC, or retaliation. Using our information on the perpetrators, motives, and actions of attacks, and publicly available data, we rule out these leading alternative channels.

Our study complements the literature on state origins. We provide the first empirical test of the effect of the time horizon on the incentives to refrain from the power to arbitrarily expropriate wealth, a theoretically established "possibility result" (Olson, 1993, Bates et al., 2002). In economics, Sánchez de la Sierra (2020) showed that state functions emerge when potential revenues from taxation can be large enough. However, that study falls short of testing Olson (1993)'s main insight about the time horizon. Our finding also complements the literature on rebel governance in political science, which has emphasized the incentives to govern (Arjona and Mamphilly, 2015, Arjona, 2016, Reno, 2011).

Our study also complements the study of violence and civil war. Scholars have analyzed various causes for violence (Wood, 2006, Blattman and Miguel, 2010, Balcells, 2012), but the role of the time horizon of stealing as a deterrent of violence remains unexplored.

By emphasizing the role of the time horizon, our study also complements the literature on term limits. Scholars have analyzed the role of the time horizon for choices of state agents in institutionalized democracies (Dal Bó and Rossi, 2007, Berdejó and Yuchtman, 2010, Yamasaki, 2020). We show that the time horizon can explain the permanence of state functions, or their collapse into arbitrary expropriations of civilians, one of the most important institutions governing transaction costs that destroy markets (North, 1990).

Finally, our study introduces a new way in which classic policies against crime can backfire. Some scholars have shown that crackdowns can lead crime to move to other locations (Blattman et al., 2018). We show that they lead crime to switch to a socially costlier activity, in the same location, and show that armed actors' stealing horizon protects civilians.

We now turn to a description of the institutional context and, specifically, the FDLR.

2. CONTEXT

The FDLR offers an informative case to isolate the incentives to use violence. They are a foreign armed group created from former Rwandan armed forces and militia members that perpetrated the 1994 Rwandan genocide. They are known as one of the most brutal among the 122 armed groups in eastern DRC today (KST, 2021). They often engaged in violence, sexual violence, torture, and pillages.[1]

Yet, despite their tendency to use violence arbitrarily, by 2009, the FDLR was settled in various areas. They had created state functions, collected taxes, and protected the villages they taxed. They created markets that they taxed, blocked villages to impose transit fees, and raised poll and mining taxes. Arbitrary violence was kept low. By 2009, the heartland of their territory was the Chiefdom of Basile (in the province of South Kivu), an area of 3,113 km^2. The FDLR controlled it almost entirely.

This apparent stability was disrupted by a military operation, Kimia II, which undermined their ability to permanently tax villages. The Congolese army launched the Kimia II operation in March 2009 with support by the United Nations, with a spatially clear target: the FDLR state. Kimia II aimed to fight the FDLR in South Kivu, by attacking the FLDR state. Twenty-two thousand Congolese soldiers, and 8,000 MONUC soldiers participated in the operation. In contrast, the FDLR as a whole was believed to have around 6,000 soldiers. From March to December 2009, Congolese and UN forces advanced from north to south and made it impossible for the FDLR to tax most villages of the FDLR state.

However, lacking resources, the Congolese army was unable to permanently defeat the FDLR in the region. In response to Kimia II, the FDLR forces regrouped in the nearby Itombwe forest. The control of the Congolese army made it impossible for the FDLR to permanently tax the villages they formerly taxed, but the security provided by the Congolese army was also limited. This allowed the FDLR to launch sporadic violent expropriations in the former FLDR state to expropriate wealth (Sawyer and Van Woudenberg, 2009). One possible explanation for why they were not already doing this is that they had a long steal-

[1] Appendix A provides more details on the origins of the FDLR.

ing horizon, which Kimia II shrank (Verweijen, 2015, 25): *"In need of resources due to the disruption of their sources of income, the FDLR began to attack civilians."*

Why did they attack civilians? It is important to emphasize the logic of pillaging. A pillage is an operation in which armed men enter the village and use violence to confiscate all the wealth they can (typically food, cattle, and household goods). Often, they need labor to transport the goods they steal; hence, they abduct villagers to transport those goods. Pillages are generally conducted at night to avoid detection by relevant security forces, and typically last 30 to 60 minutes. The following quotes from our qualitative interviews with former members of armed groups illustrate the role of the time horizon to explain pillaging:

> "If really an armed actor knows he has to stay in a village, he needs the population for his survival. Those who prefer to pillage, it is because they know they cannot stay."
>
> "Armed groups who do not control the village for a long period do all they can to pillage the village before leaving. They know they are not secure, thus there is nothing to save."
>
> "It is normal. Anyone who takes a village, they develop their own strategies to maximize the revenues in that village. When we know that we are going to be displaced from a village, we make sure to steal as much as possible. This is why, the bandit is only your friend if he gets something out of it."

Pillages are often violent in order to ensure compliance of villagers in a short interval:

> "In the case of quick pillages such as those by the FDLR, it is just 30 minutes, and certain goods cannot be pillaged in that time (the heavy ones: cows, beans, heavy minerals), the members of the household. It is when the pillager is sure there is no threat that he can take all and use certain villagers for the transport."[2]

Displaced, the FDLR also began conducting violent expropriations in the neighboring district of Bakisi, where they were fought back by a local militia, the Raia Mutomboki (Mahtani et al., 2009). In the next section, we discuss a simple model that illustrates how secure property rights over stealing matter for the decision to arbitrarily expropriate.

3. THEORETICAL FRAMEWORK

We present a simple model in Appendix B. This section presents its insight in words.

1. *Setup*—Time runs forever. A village has a stock of wealth, which reproduces at a constant rate. There is no uncertainty. A single bandit can choose how much to expropriate

[2]Source: Interviews with armed actors in South Kivu.

from the stock each period, discounting the future. The bandit sets the level of expropriation for all periods to maximize present discounted expropriation, anticipating that, each period, the bandit may lose the ability to expropriate in this village forever with some probability. This captures the security of the bandit's property rights over the village.

2. *Insight*—Through its effect on the time horizon, a larger probability of losing control increases the optimal level of expropriation today. If it is one, the bandit expropriates everything. In reality, when he attempts to take all, villagers will resist, thus complete expropriation is generally violent to induce compliance. A similar argument shows that, if, and only if, the probability to secure the village is high, the bandit takes actions that increase the stock of wealth and his ability to expropriate it in the future (i.e., state functions).

4. ECONOMETRIC STRATEGY

We use the data presented in Sánchez de la Sierra (2020). The data include 239 villages in North and South Kivu.[3] It is a panel dataset of village-year observations between 1990 and 2013. The data include the following indicator variables, for each village-year, and for all armed actors: whether the actor controlled the village (monopoly of violence), raised taxes (taxation), provided security that was perceived to be effective (security), and maintained a fiscal and a judiciary administration (administration, justice), as well as the value taxed through poll taxes, the most prevalent form of taxation.

The data also include a detailed description of the main violent operations on the villages since 1990. This includes information about the perpetrators of the operation, the purpose of the operation, whether the security forces were present, and the actions the perpetrator took during the operation, including the value of stolen goods per household. We analyze whether there was an FDLR-led violent operation with the *intention* of stealing (pillage), with the *action* of stealing, or forced labor. Using the stolen goods per household, and the survey estimates for the prices of those goods, we also construct a measure for the value of stolen goods in the village. For robustness, we complement our data on violence with publicly available data of violent events (ACLED, 2020), covering 1997–2013. We also use

[3]Appendix C describes the data collection. Appendix D describes the variables and the sampling strategy. Sánchez de la Sierra (2020) includes a detailed discussion.

publicly available data (RGC, 2010) to construct geographical variables such as distance to the closest road, Rwanda, the closest river, and the closest forest.

Table 1 presents the mean of the main variables for all villages (*All*), decomposed by FDLR state villages (*FDLR state*) and the rest (*Rest*).

Panel A presents basic characteristics.[4] The villages in the FDLR state were particularly remote. Column *FDLR State* shows that none of them had a road. They were 23 pp. less likely to have phone network. The closest road was 1.14 km farther away, and the closest river was 1.59 km farther away. They were 38 pp. more likely to have a coltan mine and 15 pp. more likely to have gold. Remoteness could have made it harder for state forces to repress the FDLR from stealing in those villages over a long horizon.

Prior to Kimia II, the FDLR rarely pillaged the villages in the FDLR state. In those villages, the frequency of FDLR operations motivated by pillage, in which pillaging took place, or with forced labor was, respectively, 0%, 6%, and 3% (Panel B). As a result, the yearly revenue from pillage per village for the FDLR was low: USD 83.5.

Instead, the FDLR derived most of its revenue from regularly taxing the village. While their taxes consisted of market taxes, transit taxes, mill taxes, mining taxes, and poll taxes, we report the value of the poll tax, which is the main source of revenue in that period. It is also straightforward to estimate. This reduces concerns about measurement error, since it is per household, and thus, we only needed to gather the information about its frequency and its level per household for each year. In each FDLR state village, the FDLR made USD 500.26 yearly in poll taxes, 6 times more than in pillaging.

Supporting tax collection, the FDLR performed state functions in the FDLR state villages. Panel C shows the state functions performed by the FDLR. In the FDLR state villages, they held a monopoly of violence (i.e., secured from expropriation by other actors) in 100% of the villages. They ran a fiscal administration in 83% of those villages, and a justice administration in 94%. They took these actions in only 1% of the rest of villages. In 22% of the villages in the FDLR state, villagers perceived that security provision was effective. This compares to 38% in the rest of villages. The frequency of attacks by any

[4]Variables labeled "Distance" are constant, thus standard errors estimation uses only one year.

Table 1: Descriptive Statistics

	All	Mean outcomes				P-value
		FDLR State		Rest		
Observations		36		442		
Panel A: Pre-characteristics						
Access to road	0.14	0.00	(0.00)	0.16	(0.36)	0.07
Access to motorcycle	0.33	0.22	(0.43)	0.34	(0.48)	0.31
Access to phone network	0.38	0.17	(0.38)	0.40	(0.49)	0.05
Distance to Rwanda (km)	103.23	75.59	(8.09)	105.48	(60.74)	0.04
Distance to river (km)	4.34	5.81	(1.91)	4.22	(4.03)	0.10
Distance to road (km)	1.44	2.49	(3.66)	1.35	(2.70)	0.10
Distance to airport (km)	18.41	13.28	(4.00)	18.82	(11.94)	0.05
Endowed with coltan mine	0.15	0.50	(0.51)	0.12	(0.32)	0.00
Endowed with gold	0.30	0.44	(0.51)	0.29	(0.45)	0.16
Number of immigrants	26.40	2.00	(6.76)	28.69	(154.43)	0.47
Number of emigrants	30.09	10.24	(28.87)	31.91	(205.11)	0.66
% of subjects working in agriculture primarily	0.50	0.42	(0.31)	0.51	(0.28)	0.22
% of subjects working in mining primarily	0.16	0.15	(0.19)	0.16	(0.23)	0.88
% of subjects working in govt primarily	0.07	0.11	(0.16)	0.07	(0.11)	0.17
% of subjects in school primarily	0.06	0.06	(0.08)	0.06	(0.10)	0.89
% of subjects unemployed	0.20	0.26	(0.18)	0.20	(0.19)	0.22
Panel B: FDLR mode and level of expropriation						
Attack with expropriation by FDLR	0.04	0.06	(0.23)	0.04	(0.20)	0.67
Intention: Pillage	0.04	0.00	(0.00)	0.04	(0.20)	0.22
Attack with theft	0.04	0.06	(0.23)	0.03	(0.18)	0.50
Attack with forced labor	0.03	0.03	(0.17)	0.03	(0.17)	0.96
Value expropriated by FDLR (USD)	139.44	83.49	(408.42)	143.99	(890.30)	0.69
Taxes	0.08	1.00	(0.00)	0.00	(0.07)	0.00
Value of poll tax per village yearly (USD)	37.68	500.26	(867.83)	0.00	(0.00)	0.00
Panel C: FDLR state functions						
Monopoly of violence	0.08	1.00	(0.00)	0.01	(0.08)	0.00
Fiscal administration	0.06	0.83	(0.38)	0.00	(0.05)	0.00
Justice administration	0.07	0.94	(0.23)	0.00	(0.05)	0.00
Panel D: Security outcomes						
Effective security provision	0.37	0.22	(0.35)	0.38	(0.47)	0.05
Attack by any actor	0.12	0.06	(0.23)	0.12	(0.33)	0.25
Attack with expropriation by any actor	0.11	0.06	(0.23)	0.12	(0.32)	0.26
Panel E: Alternative channels of FDLR violence						
FDLR violent operation with deaths	0.03	0.03	(0.17)	0.03	(0.16)	0.98
FDLR violent operation with sexual violence	0.02	0.00	(0.00)	0.02	(0.16)	0.34
FDLR violent operation with intention: Conquest	0.00	0.03	(0.17)	0.00	(0.00)	0.00
FDLR violent operation with intention: Punishment	0.00	0.03	(0.17)	0.00	(0.05)	0.02

Notes: This table shows the mean of the main outcome variables in the years 2007, 2008 as well as the mean of geographical variables. Columns FDLR State and Rest show the means for the sample of villages of the FDLR State and for villages outside the FDLR State, respectively. Panel A shows the pre-characteristics in terms of access and mineral endowments. Panel B shows the state functions performed by the FDLR. Panel C shows the violent actions by the FDLR. Panel D shows violent actions by non-FDLR armed actors. All variables, unless otherwise noted, are binary indicators. Standard deviation of the variables are in parenthesis. P-value reports the p-value of the test for whether the mean in column FDLR State and Rest is different.

armed actor (5.5%) was half the level of that in the rest of villages (12%), suggesting that actual security was better than in the rest of villages. Panel E shows that other types of attacks by the FDLR (with perpetration of sexual violence, motivated by conquest, or by punishment) were very rare. In sum, by the end of the FDLR state period, the FDLR was performing the functions of a state in the FDLR state villages and violence was kept low.

Figure 1 shows the location of the FDLR (red triangles) and of the Congolese army (blue squares) across the survey villages.

Since Kimia II mechanically made it impossible for the FDLR to tax, our analysis focuses on the effect of the time horizon on FDLR's violent expropriation in FDLR state villages. We estimate the following equation:

$$Y_{i,t} = \alpha_i + \alpha_t + \beta \times \text{FDLR state}_i \times I(t > 2009) + \epsilon_{i,t} \tag{1}$$

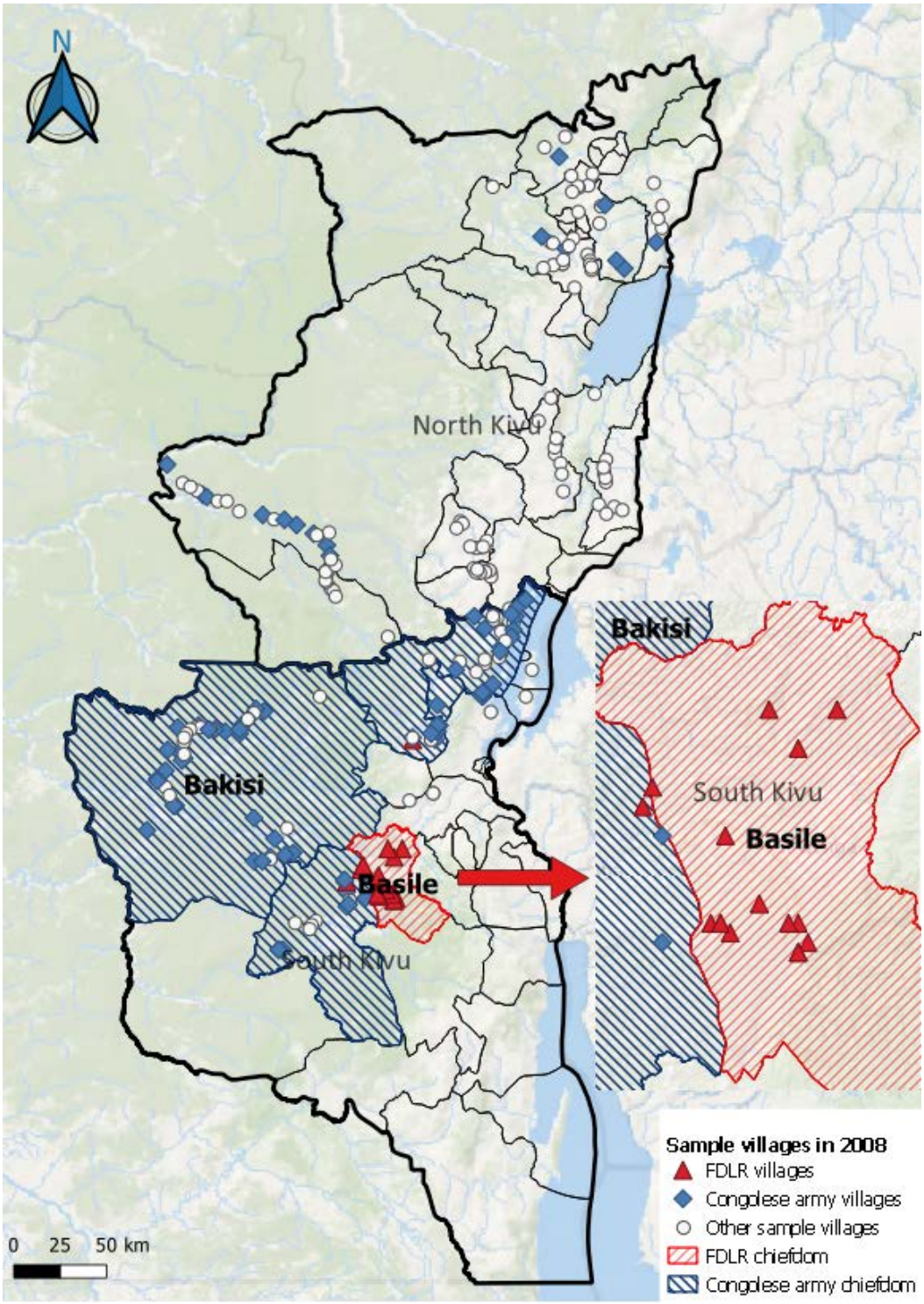
where α_i, α_t are respectively village and year fixed effects *FDLR state*$_i$ indicates whether village i is in either in Basile and was controlled by the FDLR in 2008.[5] $I(t > 2009)$ is an indicator for whether the year is after 2009.[6] The dependent variable $Y_{i,t}$ is an indicator for pillaging by FDLR in village i in year t. To analyze pillaging, we use indicators, respectively, for whether we record an FDLR violent operation: with intention to pillage, in which theft occurred, in which they forced villagers to work, and with any of the three previous characteristics (which we denote "any pillage").

This specification amounts to a differences-in-differences estimation. To test whether Kimia II increased FDLR pillaging, we seek to test whether $\beta > 0$. Where indicated, we use an indicator for taxation for $Y_{i,t}$, in that case we refer it as the "mechanical effect." Where indicated, we replace $I(t > 2009)$ with yearly indicators, and present the yearly coefficients with 2009 as the omitted category, that is, we present the event-study version.

[5] As can be seen in Figure 1, the FDLR controlled all villages in the Chiefdom of Basile plus one village in the neighboring Chiefdom of Wamuzimu. In our main specification, *FDLR statei* also takes value 1 for that village. However, excluding that village from *FDLR state*$_i$ leaves the results unaffected.

[6] We exclude the year 2009 from the "post" Kimia II period to shield against the military activities of the operation from confounding our analysis, but also show in the appendix that the result is preserved if we include 2009.

Figure 1.: Sample villages in 2008: the FDLR state and the rest



Notes: This figure shows the map of the survey villages in our sample, covering the provinces of North Kivu and South Kivu. Red triangles are the villages where FDLR had control in 2008, blue squares are those where the Congolese army had control in 2008. Red striped area indicate the Chiefdoms of the FDLR state. Blue striped areas indicate Chiefdoms in which more than 50% of the villages were controlled by the Congolese army in 2008.

We present the results with standard errors clustered at the village level to account for serial correlation and, to account that the FDLR state villages are spatially clustered in Basile, we show the results with standard errors clustered at the level of the Chiefdom. Since there are 21 Chiefdoms, to compute the p-value when allowing for intra-Chiefdom correlated errors, we perform the estimation using wild bootstrap.

Our analysis tackles spatial spillovers as follows. First, to shield the non-FDLR state comparison group from contamination arising from spillovers, in our main analysis, we exclude the villages of Bakisi Chiefdom. These are the villages, as we discussed in Section 2, to which some FDLR factions were displaced. We refer to those as the spillover villages. Second, for robustness, we show that the result is unaffected by the inclusion of Bakisi.

5. RESULTS

5.1. *Descriptive analysis of the effect of the time horizon*

Figure 2 presents the FDLR actions in FDLR state villages (left), and in the rest (right).

Panel A shows FDLR taxation and Congolese army territorial control. We find that, by 2008, the FDLR controlled the FDLR state villages (right), and was absent elsewhere (left). Then, the Congolese army drastically gained territorial control over the FDLR state villages between 2008 and 2012, confirming that Kimia II was militarily successful. As a result, the FDLR lost its ability to tax: while it taxed 100% of the FDLR state villages in 2008, that decreased to 40% in 2010, and 10% in 2011. Reflecting that they lost their tax base, the yearly per village poll tax revenues of the FDLR dropped from about USD 500 in 2008 to negligible in 2011. In sum, Kimia II shut down the FDLR's horizon of taxation.

Panel B shows FDLR's pillaging. We first find that the frequency of pillages (using "any pillages") and the revenue from pillage decreased steadily between 2005 and 2009 in FDLR state villages. This is consistent with the FDLR progressively securing a long horizon of control. We also find that, after Kimia II, the FDLR's pillages skyrocketed in FDLR state villages. The portion of villages pillaged by the FDLR in FDLR state villages rose from 5% to 34%, and the per village yearly revenue in pillaging rose from almost zero to about USD 800 in 2011. This effect is absent in the rest of villages. We also find that neither the FDLR state villages nor the rest have pre-trends in the direction of the effect.

If the Congolese army controlled most villages, how could the FDLR engage in pillage operations, but not tax them? The qualitative evidence we presented in Section 2 showed that the Congolese army did not maintain an effective control over the territory, making the villages vulnerable to short operations. However, its presence made taxation impossible. Panel C supports this interpretation. We find that about one third of the pillages occur in villages controlled by the Congolese army, during which time the Congolese army was absent during the attack. According to our qualitative data this occurs when the Congolese army has set a base *near* the village, making taxation impossible, but not *in* the village, making short operations sometimes possible. Another third takes place in villages not controlled by the army, and thus long army response time permits pillaging, but not taxation. A remaining third takes place in villages controlled by the army. This is possible, since pillages typically occur at night and are very brief, as documented in Section 2.[7]

Having shown the result qualitatively, we now formally establish this result.

5.2. *Baseline event study*

Figure 3 reports the event study coefficients. Panel A shows that per village FDLR pillage yearly revenue increases permanently after 2009 in the FDLR state villages. The difference is statistically significant at the 1% significance level for 2010 and 2011. Panel B shows that FDLR pillages increase permanently all years in the sample after 2009 in FDLR state villages compared to the rest. The increase is statistically significant at the 1% level for all years after 2009. Panel C shows that ACLED data produce the same conclusions.

In sum, Kimia II led to a permanent rise in FDLR pillaging in the FDLR state villages—the very same villages that the FDLR previously protected. We now discuss these effects in differences-in-differences, their robustness, and their interpretation.

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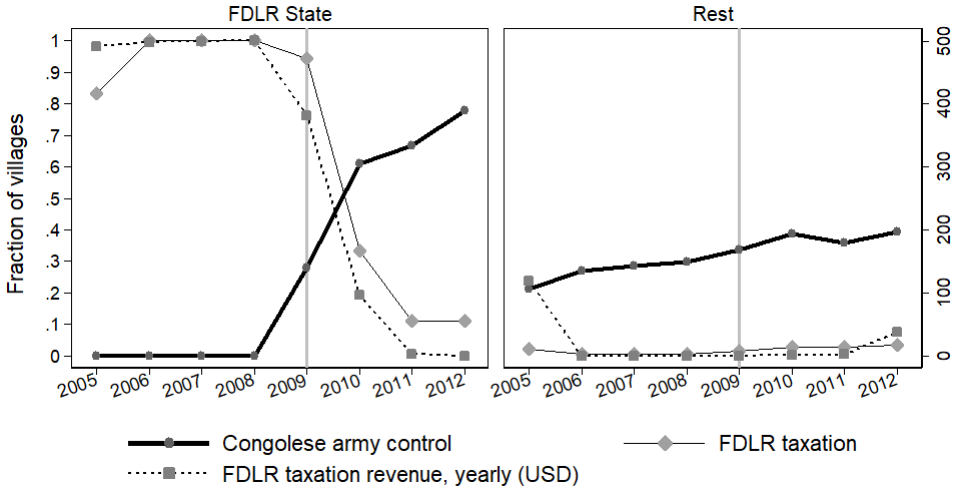
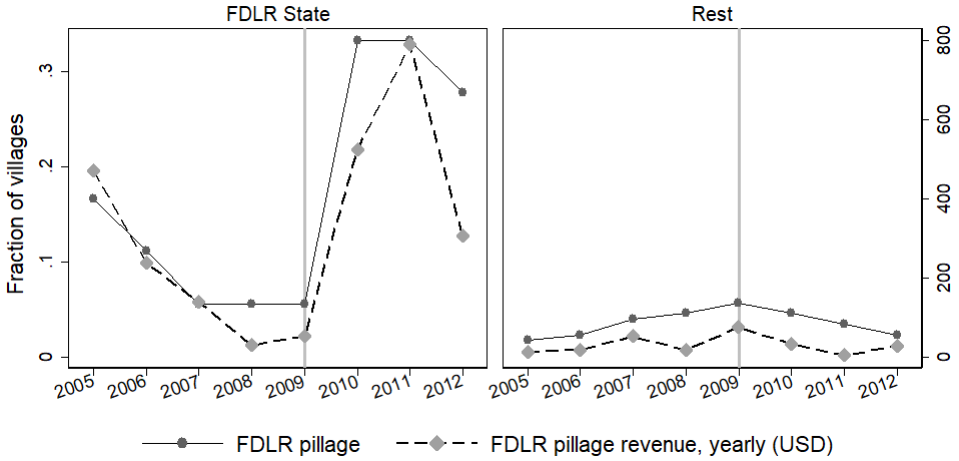
[7] Indeed, our attack data show that attacks that take place when the village security force is present are 84% at night, against 64% if not. Furthermore, as hinted in Section 2, the FDLR engaged in forced labor with the purpose of transporting goods disproportionately when the force securing the village was absent from the village—as it otherwise would be a faster pillage with lower value pillaged. Our data indicate that forced labor occurs in 78% of attacks in Basile by the FDLR. In 77% of those events, the use of forced labor was reported to be used for transporting goods. We find that, while forced labor for transporting goods was used by the FDLR in Basile in 80% of attacks in which the security force was absent, it was only used in 41% of cases in which it was present.

Figure 2.: Descriptive analysis of taxation, and pillage outcome

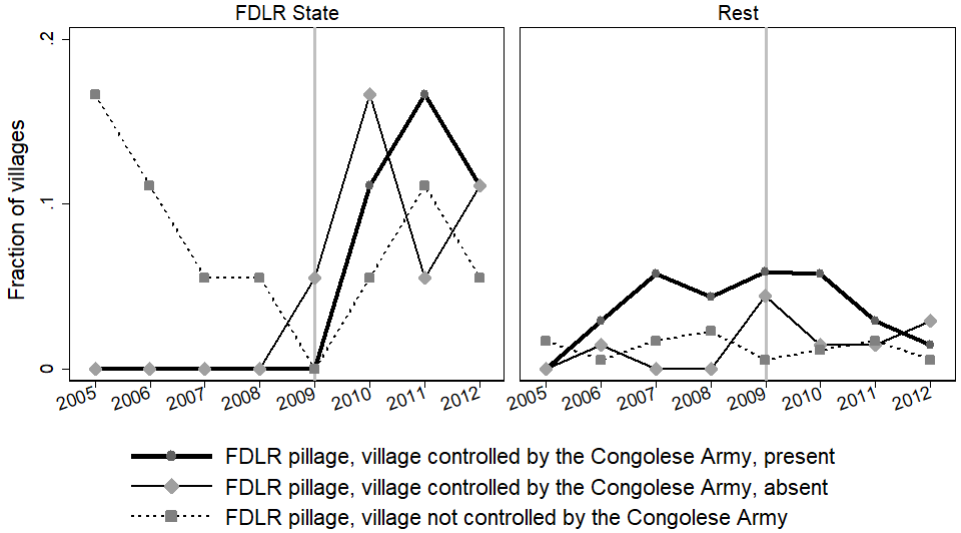
A. Mechanical effect: FDLR taxation



B. Reduced form effect on outcomes: FDLR pillage



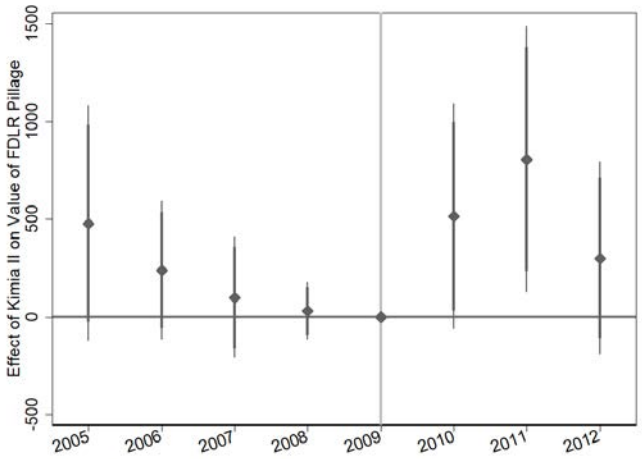
C. Reduced form effect on outcomes: Decomposing FDLR pillages by Congolese army control



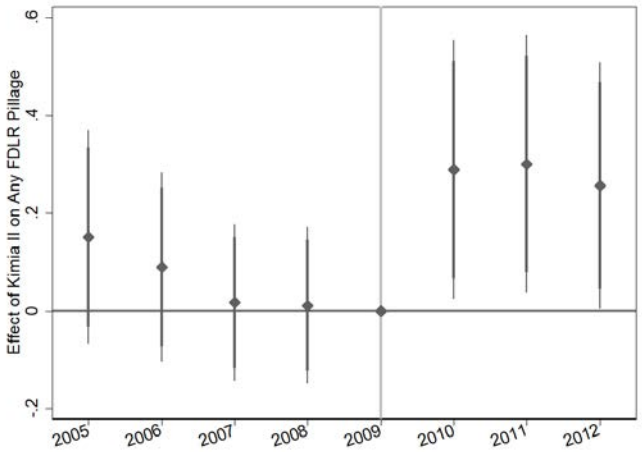
Notes: Panel A shows the incidence and value of FDLR taxation (per village per year). Panel B shows the incidence of pillages by the FDLR and the value of goods pillaged. The value of goods confiscated during pillages excludes the top 1% of outliers (above $6,000). Spillover villages are removed. Panel C shows the incidence of FDLR pillages separately for whether the Congolese army controlled the village and whether the Congolese army was present in the village at the time of the attack.

Figure 3.: Reduced form effect on outcomes: event study result

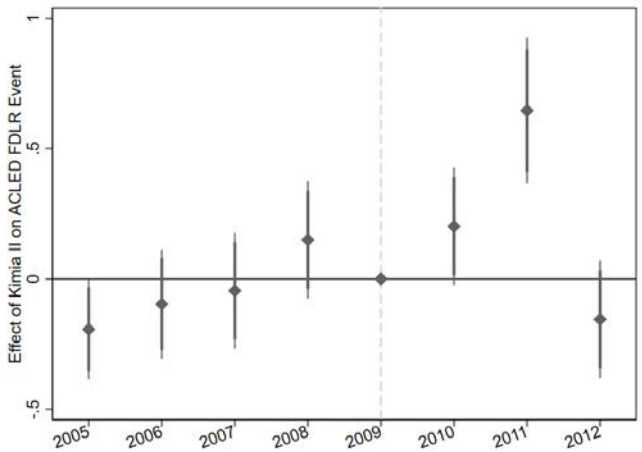
A. Yearly coefficients, pillage revenue yearly



B. Yearly coefficients, pillage dummy



C. Yearly coefficients, pillage dummy (ACLED data replication)



Notes: This figure shows the coefficient on year indicators estimated from equation 1. The year 2009 is the omitted category. The sample excludes spillover villages. Panel A shows the coefficients for the estimation using the value of goods pillaged by the FDLR per village per year as dependent variable. The value of goods confiscated during pillages excludes the top 1% of outliers (above $6,000). Panel B shows the coefficients for the estimation using an indicator for FDLR pillages as dependent variable. Panel C shows the coefficients for the estimation using an indicator for violent event recorded in ACLED involving the FDLR within 25 km of the village as dependent variable. In all panels, thick lines represent 90% confidence intervals and thin lines represent 95% confidence intervals. Standard errors are clustered everywhere at the village level. Figure E.3 shows the main differences-in-differences coefficient using ACLED data at distances from 1 km to 50 km at 5 km increments.

5.3. *Baseline differences-in-differences*

Table 2, Panel A, presents the estimates from equation 1. The sample in (1)–(7) is composed of the 1,544 village*year observations in 2005–2012, excluding spillover villages. The table notes in each column also report the p-value for the test of whether the coefficient in each respective column differs from zero, clustering the standard errors at the Chiefdom level. There are 21 Chiefdoms, we thus estimate the standard errors using wild bootstrap. Columns (1) and (2) first report the estimates of the "mechanical effect." We find, as expected, that Kimia II leads the yearly FDLR poll tax revenue per village to decrease significantly from USD 475 to USD 44. Similarly, the probability that the FDLR taxes in the village shrinks from 96% to 17%, and the decrease is statistically significant. Columns (3)–(7) show the main reduced form relationship. Column (3) shows that the yearly value stolen in pillages by the FDLR in FDLR state villages increases from USD 185 to USD 645 and the effect is statistically significant. In Column (4), the outcome ("Any pillage") is an indicator for pillage. Kimia II led to a 23 pp. increase significant at the 5% level, from a mean of 9%, that is, an increase of 260%. Columns (5)–(7) decompose the baseline specification. They respectively show that Kimia II is associated with a 21 pp. increase in operations motivated by pillage, a 19 pp. increase in those in which they perpetrate theft, and a 23 pp. increase in those in which they force people to work. All of the coefficients are significant at the 5% or the 1% level. In percentage terms, this is an increase by 350% of FDLR pillages, 100% of FDLR operations with theft, and 383% of FDLR operations with forced labor. Finally, across all columns, the p-value accounting for intra-Chiefdom correlation leaves significance unchanged. Thus, spatial clustering cannot explain our result.

5.4. *Threats to inference*

Panel B examines the threats to inference. First, the selection of spillover villages may be endogenous. Column (1) estimates equation 1, including spillover villages. We find no evidence that excluding them biased the coefficient. Second, since the FDLR state villages belong to a higher-level district—namely, Mwenga—coincidental shocks in Mwenga could generate the result. Column (2) includes indicators for each district interacted with indica-

Table 2: Differences-in-Differences Analysis

Panel A: Baseline Specification

	Mechanical effect		*Reduced form effect on FDLR pillaging*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Poll Tax (USD)	Any Tax	Pillage (USD)	Any Pillage	*Intention* Pillage	*Action* Theft	*Action* Kidnap
FDLR State$_i$ x PostKimia$_t$	-431.08	-0.79	371.41	0.23	0.21	0.19	0.23
	(188.74)	(0.08)	(264.57)	(0.09)	(0.08)	(0.09)	(0.08)
Observations	1,543	1,544	1,433	1,544	1,544	1,544	1,544
R^2	0.25	0.80	0.20	0.29	0.27	0.25	0.25
Bootstrapped P-value	0.02	0.01	0.00	0.02	0.06	0.03	0.50
Mean (Treated-Pre)	474.48	0.96	185.05	0.09	0.06	0.09	0.06

Panel B: Threats to Inference

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Any Pillage	Any Pillage	Any Pillage	Any Pillage	Number Emigrants	Number Immigrants	Any Pillage	Any Pillage
FDLR state$_i$ x PostKimia$_t$	0.20	0.24	0.37	0.21	5.55	19.98	0.23	
	(0.09)	(0.10)	(0.13)	(0.10)	(24.61)	(10.17)	(0.09)	
Mwenga$_i$ x PostKimia$_t$								0.11
								(0.05)
Observations	1,912	1,528	1,544	1,376	1,363	1,337	1,246	1,544
R^2	0.25	0.31	0.29	0.29	0.24	0.34	0.32	0.28
Specification	incl. Bakisi	Chiefdom × Year FE	T. Trends	Sel. on obs.	Baseline	Baseline	Migrants	Baseline
Mean (Treated-Pre)	0.09	0.09	0.09	0.09	43.56	4.17	0.09	0.08

Panel C: Alternative causal channels

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Territorial Conquest	Any Pillage	Any Pillage	Any Pillage	Punish	Any Pillage	Attack by Other Group
FDLR state$_i$ x PostKimia$_t$	-0.00	0.20		0.18	0.04	0.20	0.04
	(0.02)	(0.09)		(0.08)	(0.03)	(0.08)	(0.03)
FDLR2009-non-Basile$_i$ x PostKimia$_t$			0.05				
			(0.04)				
FLDR2009$_i$ x PostKimia$_t$				0.05			
				(0.04)			
Observations	1,544	1,544	1,544	1,544	1,544	1,544	1,544
R^2	0.12	0.29	0.27	0.29	0.15	0.37	0.15
Controls	None	Congolese army	None	FDLR2009$_i$	None	Punish	None
Mean (Treated-Pre)	0.02	0.09	0.20	0.09	0.01	0.09	0.01

Notes: This table reports the coefficient estimates from equation 1. Except when otherwise noted, spillover villages from the Chiefdom Bakisi are dropped. All regressions include village and year fixed effects. Standard errors, clustered at the village level are in parentheses. Panel A, notes "bootstrapped p-value" also includes the p-value using wild bootstrapping with 10,000 iterations and clustering at the Chiefdom level. There are 21 Chiefdoms. Panel A is the baseline specification for different dependent variables: the mechanical effect of Kimia II (taxation), and the reduced form effect on FDLR choice to pillage. Panel B implements 8 alternative specifications, variations on equation 1, to test whether the reduced form relationship is causal. Table notes "Specification" indicates the changes to the baseline specification. Specification "Migrants" reports the baseline specification in which we control for the number of immigrants and emigrants to the village. Panel C implements 7 alternative specifications to examine alternative causal channels. Table notes "Controls" specifies what additional controls are added.

tors for years as controls in equation 1. We find that the result does not capture coincidental shocks. Third, the estimated coefficient could simply reflect differential time trends. While Figure 2 showa that time trends are absent, Column (3) estimates equation 1 including, as control, a linear time trend. We find no evidence that time trends can explain the result. Fourth, the FDLR state villages may be systematically different in a way that they differentially respond to time-varying macroeconomic shocks for reasons unrelated to Kimia II. To account for this, we estimated a probit model for an indicator for whether the village is in the FDLR state on all variables presented in Table 1. Column (4) estimates equation 1 but includes, as control, the predicted probability of FDLR state interacted with indicators for years. We find no evidence that observable constant heterogeneity of FDLR state villages can explain their divergence after Kimia II.[8] Fifth, our estimate could be affected by migration, which would change the composition and size of the tax base. Columns (5) and (6) use as dependent variables respectively the number of emigrating and immigrating households. We find no evidence that Kimia II affected emigration although it mildly increased immigration. Column (7) estimates equation 1 but includes as controls the number of immigrants and emigrants. We find that migration cannot explain the result. Finally, in reality, the FDLR was also present in villages outside our sample in the Chiefdom of Wamuzimu. Column (8) presents the estimates from equation 1, where we re-code FDLR state$_i$ to take value 1 for any village in Basile or Wamuzimu.[9] We find that the result is unchanged.[10] In sum, the analysis in this section suggests that the effect in Panel A is causal.

[8]Table E.1 shows the regressions for each variable interacted with year dummies included as control.

[9]In Figure E.4 in the Appendix, we implement the same analysis using ACLED.

[10]In addition, we implemented the following checks, reported in Appendix E. We run placebo regressions using each year of 2005–2011 as cutoff for $I(t > 2009)$ (Figure E.1, Panel A), placebo regressions using each of the other Chiefdoms as alternative indicator for FDLR state (Figure E.1, Panel B), and we replicate equation 1 in Table E.2, Panel A: instead of village and year fixed effects, indicators for $I(t > 2009)$ and for *FDLR state*$_i$ (column 1), excluding the only Chiefdom that produces a negative effect (column 2), clustering the standard errors at a higher level, first at the subdistrict level, called Groupements (column 3), then at the level of each of the 21 Chiefdoms interacted with year indicators (column 4), controlling for the price of coltan interacted with an indicator for coltan endowment (column 5), controlling for the price of gold interacted with an indicator for gold endowment (column 6). We also replicate equation 1 without village fixed effects but with a lagged dependent variable as control (Table E.2, Panel B), and implement placebo version of equation 1 for attacks by non-FDLR armed actors (Table E.2, Panel C). In addition, we also present the coefficients of the baseline specification estimated using the publicly available data on violent events (ACLED, 2020), in Figures E.2 and E.3. The results remain.

5.5. *Ruling out alternative causal channels*

The rise in attacks could reflect other causal channels than the time horizon emphasized in our qualitative interviews. Panel C presents the analysis of possible alternative channels.

We first consider whether increase in pillages reflects that the FDLR was at war with the Congolese army after Kimia II. We examine this causal channel in two ways. First, in Column (1), we estimate equation 1 and use, as dependent variable, an indicator variable for whether the FDLR attempted to gain territorial control. We find that, in contrast to its effect on FDLR pillages, Kimia II led to no change in FDLR conquests. Second, in Column (2), we analyze whether the rise in violent expropriations is driven by proximity to the Congolese army. Targeting the enemy's territory is indeed a common strategy used by armed actors in the DRC. Column (2) includes controls for whether the Congolese army controls the village being attacked. We find that presence of the Congolese army does not predict the rise in FDLR pillages. In sum, war is unlikely to explain why FDLR pillages increase in response to Kimia II.

We then consider whether Kimia II could have led violence to rise across all FDLR battalions in DRC, beyond the FDLR state. Kimia II could have led the leadership of the FDLR to attempt to destabilize the region in response, and obtain retribution (Sawyer and Van Woudenberg, 2009). It may also have disrupted the FDLR structure of command.[11]

If Kimia II affected the FDLR organization as a whole, we should see FDLR pillages rising across the board. Column (3) estimates equation 1 but, instead of using *FDLR state*$_i$ as an indicator for the location of the FDLR state, it uses an indicator for whether the village was outside the FDLR state but was held by the FDLR.[12] The coefficient is indistinguishable from zero, suggesting that the effect does not arise in FDLR villages outside the FDLR state. Column (4) then estimates equation 1, including as controls an indicator for control by the FDLR in 2009 interacted with indicators for year. The baseline coefficient, and sig-

[11] A standard specification is that leadership dislikes violence against civilians, but combatants benefit from it, creating an agency problem. In this framework, a weakening of the structure of command would increase opportunities for lower-level combatants to engage in looting for private benefit. Journalists have suggested that Kimia II weakened regional structures of command for the FDLR (Florquin and Dabelle, 2015).

[12] Since only one other village in our sample is held by the FDLR in 2008, we use 2009 for FDLR control.

nificance, are almost unchanged.[13] This suggests that the effect of Kimia II on the whole organization of the FDLR across the region cannot explain our baseline estimate.

A remaining possible explanation is that the FDLR may have turned to violently expropriating the households they formerly protected as a form of punishment for their alleged cooperation with the Congolese army during Kimia II.[14] Column (5) estimates equation 1 and uses as dependent variable an indicator for whether the FDLR perpetrated an attack with the perceived intention to punish the villagers. We find that the coefficient is only 4 pp. and statistically insignificant. This rules out that Kimia II led the FDLR to punish villagers. In Column (6) we estimate equation 1, including an indicator for whether the FDLR engages in punishment as control. Significance is preserved.

Finally, we examine whether Kimia II led to a rise in attacks by all armed groups. Column (7) estimates equation 1, but uses as dependent variable an indicator for whether the village experienced an attack by any other armed group, that is, it is akin to a placebo estimation. We find that Kimia II had no effect in attacks by other groups.

In sum, we find no merits in alternative explanations, other than the FDLR's horizon.

6. CONCLUSION

We showed that being able to permanently steal disciplines the use of violence by armed actors, and incentivizes state functions. Our interpretation is contained in the words of one of our armed actor informants when talking about that episode: "the bandit is only your friend if he gets something out of it." This finding offers a new insight into the economic logic of violence: the disciplining effect of the time horizon of stealing. It provides an explanation for the creation, or collapse, of state functions. This mechanism also creates a new form of backfiring of policies against crime: they undermine intertemporal tradeoffs that otherwise lead armed actors to partially internalize the externality that arbitrary expropriations today create on society. This is especially important in weak states where criminals can develop horizons of expropriation, reducing their incentives to use violence.

[13] Including the spillover villages in these two columns, the results are qualitatively similar.

[14] Journalistic reports often mentioned the time horizon, but also punishment (Florquin and Dabelle, 2015).

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APPENDIX A: ADDITIONAL DETAILS ON THE ORIGINS OF THE FDLR

The armed group known as the Front de Liberation du Rwanda (FDLR) is an ethnic Hutu group; in 2009, it was composed of approximately 6,000 combatants. To understand the logic of the FDLR, it is necessary to trace back its origins in Rwanda.

In July 1994, a rebel movement took power in Rwanda, ending the genocide that had been perpetrated by government supported militias, the Interahamwe, and the government forces. In response, two million Rwandans, mostly Hutus, fled into eastern DRC, specifically North Kivu. Among them were the Interahamwe, but also former Rwandan state bureaucrats and armed forces. They formed the Armée de Libération du Rwanda (AliR), the predecessor of the FDLR. They opposed the government in Kigali and used North and South Kivu as a base for rebel activity against Rwanda.

In 1996, the Rwandan government launched a military campaign that started the First Congo War (1996–1997). One of the goals was to eliminate the insurgent threat coming from the Kivus. While the Rwandan coalition succeeded in defeating Congolese government forces, installing a new president, and occupying large parts of the country, they failed to completely defeat Rwandan rebel activity in eastern DRC.

Conflicts between the new Congolese government and its Rwandan and Ugandan backers in 1998 plunged the DRC into the Second Congo War (1998–2004). During this war, Rwanda backed a rebel group, the Rassemblement Congolais pour la Democratie (RCD), that quickly controlled the eastern half of the country, where it overtook the apparatus of the state and all urban areas. In the countryside, resistance militia had formed, which the RCD fiercely fought through counterinsurgency campaigns. The Congolese state had no formal control over the east in this period (Verweijen and Vlassenroot, 2015, Clark, 2002, Ngonzola-Ntalaja, 2002).

Instead, the Congolese government supported various armed groups and provided them with funds and ammunition to fight the RCD. Among them were the former Rwandan government forces and militia members, AliR, who in 2000 formed the FDLR. The FDLR is, in most areas of DRC, a foreign-armed group. By 2004, all major armed groups, except the FDLR, vacated the east in exchange for benefits precluded in a peace agreement (Sun City peace agreement). Yet, due to a lack of state capacity and foreign interference, the Congolese state struggled to regain control over the Eastern provinces, creating a security vacuum. The FDLR took advantage, and expanded their territory in North and South Kivu.

Between 2004 and 2008, the FDLR became notorious as one of the most violent groups among a host of armed actors in the eastern DRC. The Rwandan government continued to support armed groups who fought against the FDLR, while the Congolese state alternatively tolerated or actively supplied the FDLR. A rapprochement between the governments of Kinshasa and Kigali at the end of 2008 led to an end of Congolese backing of the FDLR. Instead, the Congolese armed forces coordinated with the Rwandan army to launch Umoja Wetu in January of 2009, an operation against the FDLR in North Kivu. While Rwandan forces withdrew, the Congolese army expanded the fight against the FDLR, and with support of the UN peacekeeping forces launched Kimia II in March of 2009. The operation succeeded in dislodging the FDLR from its bases, but failed to eliminate the movement. Instead, the FDLR escaped to the forest from which it organized brutal attacks.

Illustrating the brutality of the FDLR response to the Kimia II operations, the UN Group of Experts documented 1,199 human rights violations committed by the FDLR between

February and October 2009, including 384 killings, 135 cases of sexual violence, 521 abductions, 38 cases of torture, and 5 cases of mutilation (UNSC, 2009, paras. 345, 347). The International Criminal Court issued an arrest warrant against FDLR-FOCA Maj. Gen. Sylvestre Mudacumura on July 13, 2012, for allegedly committing "nine counts of war crimes, from 20 January 2009 to the end of September 2010 [. . .] including: attacking civilians, murder, mutilation, cruel treatment, rape, torture, destruction of property, pillaging and outrages against personal dignity." (Florquin and Dabelle, 2015, 198. The following quote describes the effect: "A number of the victims of abuses had clearly been able to identify their attackers as FDLR since they knew them by name and had lived side-by-side with them for many years" (International Criminal Court 2012).

APPENDIX B: MODEL

Time, indexed by t, is discrete and runs forever. The economy is populated by a bandit, who controls a village. Each period, the bandit may lose control of the village forever with exogenous probability p. The village yields expropriable wealth $a_t \in \mathbb{R}$, with law of motion $a_{t+1} = R(a_t - \tau_t)\theta(s_t)$, where $R > 0$ is an exogenous rate of wealth reproduction, τ_t is the bandit's expropriation in period t, $\theta(s_t)$ is state functions, with $\theta'(s_t) > 0$, $\theta''(s_t) < 0$.

Expropriable wealth in period $t+1$ is a function of state functions in period $t+1$, $\theta(s_{t+1})$, which the bandit can invest in through actions s_{t+1} that increase wealth in period $t+1$, such as protection and courts, and actions that increase ability to expropriate in period $t+1$, such as fiscal administration. Taking those actions is costly to the bandit. The bandit consumes τ_t net of the cost of investing in state functions, yielding $u(\tau_t - s_t)$, where $u'(\tau_t - s_t) > 0$, $u''(\tau_t - s_t) < 0$. He chooses $\{\tau_t, s_t\}_{t=0}^{T=\infty}$, to maximize $\sum_{t=0}^{\infty} \delta^t p^t u(\tau_t - s_t)$, where $\delta \in (0,1)$ is time preferences. $p\delta$ is the effective discount rate. Recursively,

$$V(a_t) = \max_{\tau_t, s_{t+1}} \{u(\tau_t - s_t) + \delta V(a_{t+1})\}, \tag{2}$$

with $a_{t+1} = R(a_t - \tau_t)\theta(s_{t+1})$. This leads to the following two equations:[15]

$$\frac{u'(\tau_t)}{u'(\tau_{t+1})} = \delta p R \theta(s_{t+1}) \tag{3}$$

$$\frac{\theta'(s_{t+1})}{\theta(s_{t+1})} = (a_t - \tau_t). \tag{4}$$

Equation 3 is the Euler equation for τ_t. They imply that through its effect on the time horizon, p decreases the rate of expropriation, τ_t^*, and increases the investment in state functions, s_{t+1}^*. If $p = 0$, $\tau_t^* = a_t$, the bandit expropriates everything. It is intuitive that, in reality, when he attempts to take all, villagers will resist, thus expropriation is violent. The time horizon restrains bandit's expropriation and sustains state functions. With no time horizon, this unravels to arbitrary expropriation, violence, and no state functions.

This quote describes one example: "They came at night when we were in our houses. They made us get out of our homes, and then they looted all our goods ... . When they finished the operation, they made the youth transport all their looted goods to their camp in the forest" (Sawyer and Van Woudenberg, 2009).

APPENDIX C: DATA COLLECTION

The data were collected between June 2012 and September 2013 in South Kivu, and between June 2015 and June 2016 in North Kivu. Because no census has been conducted in recent years, in a first data-gathering round, we sent teams of surveyors to spend weeks in the district capitals (so-called Chiefdoms) and the lower-level districts (so-called groupements) to draw lists of all villages in each district with the help of state and customary administration. In those lists, we identified the villages that had a valuable resource—the rest typically had less armed group activity. In North Kivu, valuable resources included minerals, cofree, beans, and cacao. In South Kivu, they included only minerals. From that list, we randomly sampled 133 villages in South Kivu and 106 villages in North Kivu.

[15] *Proof*: envelope theorem and first order condition applied to the Bellman equation and some algebra.

Then, teams of two surveyors visited each village. In each village, the team worked for one week, reconstructing the history of the village. The surveyors lived with the community during one week. In that week, they built ties with the community, collected vast qualitative information about the history of conflict in the village, and worked every day with the history experts of the village to reconstruct and verify the village history.

The team surveyed households, village elders, and history specialist to establish the villages' history since 1995. The survey included detailed questions on each incident of armed group governance (dates, group involved, modes of governance, etc.), attacks (dates, perpetrator, type of attack, etc.), and the economic development of the villages (yearly prices, production, and taxation). For more details, see Sánchez de la Sierra (2020).

APPENDIX D: DETAILED DESCRIPTION OF VARIABLES

Variable	Explanation
Access to road	Whether village j can be accessed through paved road in year t
Access to moto	Whether village j can be accessed by motorcycle in year t
Access to phone network	Whether village j is connected to phone network in year t
Endowed with coltan mine	Whether village j is engaged in coltan mining in year t
Endowed with gold	Whether village j is engaged in gold mining in year t
Number of immigrants	Number of villagers who migrated into village j in year t
Number of emigrants	Number of villagers who migrated out of village j in year t
% of subjects working in ag primarily	% of sampled respondents in village j who primarily work in agriculture in year t
% of subjects working in mining primarily	% of sampled respondents in village j who primarily work in mining sector in year t
% of subjects working in govt primarily	% of sampled respondents in village j who primarily work as civil servant in year t
% of subjects in school primarily	% of sampled respondents in village j who still go to school in year t
% of subjects unemployed	% of sampled respondents in village j who are unemployed or do not go to school in year t
Intention: Pillage	Whether village j has reported an attack by FDLR in year t whose intention is to pillage villagers
Intention: Punishment	Whether village j has reported an attack by FDLR in year t whose intention is to punish villagers
Intention: Conquest	Whether village j has reported an attack by FDLR in year t whose intention is to conquest other armed forces
Value Expropriated by FDLR (USD)	The estimated value of farm animals lost during the FDLR attack (including cows, goats, and pigs)
Attack with Deaths	Whether village j has reported an attack by FDLR in year t with any fatality
Attack with Forced Labor	Whether village j has reported an attack by FDLR in year t where FDLR forced or kidnapped any villagers for labor
Attack with Theft	Whether village j has reported an attack by FDLR in year t with any reported looting of farm animals
Attack with Sexual Violence	Whether village j has reported an attack by FDLR in year t with any reported sexual victimization on women
Attack: non-FDLR	Whether village j has reported an attack by non-FDLR armed group in year t
Monopoly of Violence	Whether FDLR has occupied village j in year t and has established monopoly of violence as a stationary bandit
Taxes	Whether FDLR has imposed any taxes on village j in year t (including poll tax, toll tax, sales tax, mill tax)
Value of Poll Tax per village yearly (USD)	The estimated value of yearly poll tax per household on village j in year t
Fiscal administration	Whether FDLR has administered any fiscal administration on village j in year t
Justice administration	Whether FDLR has administered any justice administration on village j in year t
Security provision	Whether FDLR has provided any effective security for village j in year t

APPENDIX E: ADDITIONAL FIGURES AND TABLES

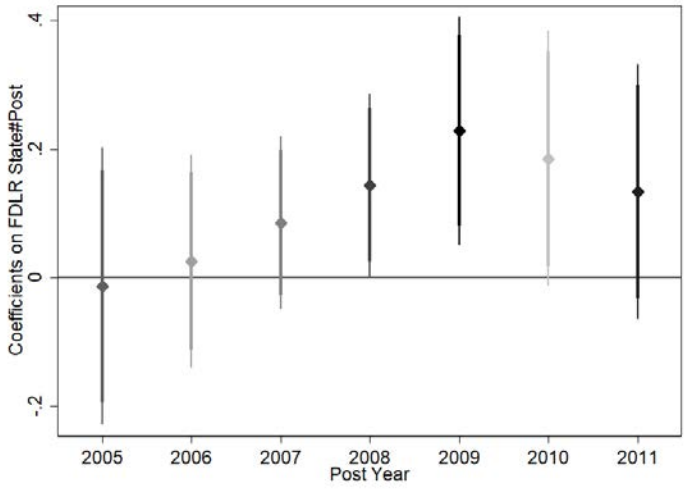
Table E.1: Effect of Kimia II on Any FDLR Pillage Including Covariate × Year Dummies

	(1) Any Pillage	(2) Any Pillage	(3) Any Pillage	(4) Any Pillage	(5) Any Pillage	(6) Any Pillage	(7) Any Pillage	(8) Any Pillage	(9) Any Pillage
FDLR state$_i$ x PostKimia$_t$	0.23	0.22	0.22	0.23	0.23	0.23	0.23	0.25	0.21
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Observations	1,352	1,352	1,351	1,544	1,544	1,352	1,544	1,544	1,544
R^2	0.29	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Control × Year	Access Road	Access Moto	Access Network	Dist RWA	Dist River	Dist Road	Dist Airport	Coltan	Gold

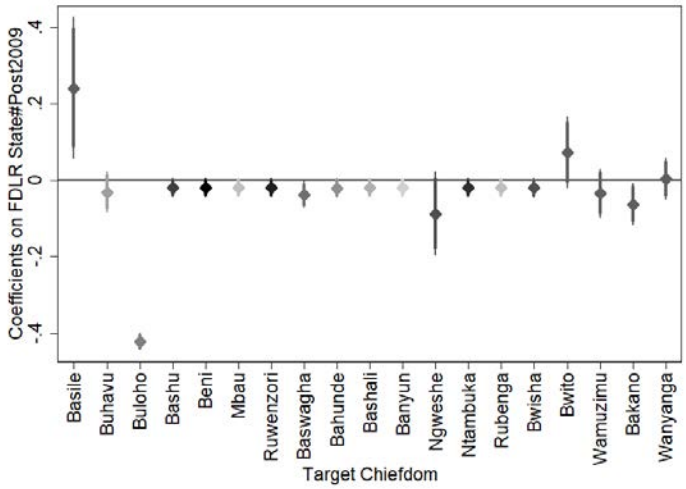
Notes: This table presents the coefficient estimates from equation 1. In each column, we present the coefficient estimate, including, as control, the time-invariant variable indicated in table row "Control x Year" multiplied with indicator variables for each year in the sample.

Figure E.1.: Alternative treatment definitions

Panel A: Re-coding the cutoff year for Kimia II operation, one at a time



Panel B: Re-coding FDLR state by each other Chiefdom, one at a time



Notes: Panel A replicates equation 1 for each possible cutoff year in defining the variable Post. The cutoff years for $I(t > 2009)$ are reported in the x axes, while the y axes are the magnitude of each coefficient and standard errors. Panel B does the same for each administrative division called Chiefdom. Since the FDLR state controlled an entire Chiefdom, we re-estimate equation 1 for each Chiefdom in our sample. Since the Chiefdom of Buloho produces a negative coefficient, Table E.2 estimates equation 1 excluding Buloho, the results are unchanged. In all panels, thick lines represent 90% confidence intervals and thin lines represent 95% confidence intervals. Standard errors are clustered everywhere at the village level.

Table E.2: Additional robustness checks

Panel A: Alternative specifications

VARIABLES	(1) Any Pillage	(2) Any Pillage	(3) Any Pillage	(4) Any Pillage	(5) Any Pillage	(6) Any Pillage
FDLR state$_i$ x PostKimia$_t$	0.23	0.23	0.25	0.23	0.24	0.22
	(0.09)	(0.09)	(0.08)	(0.03)	(0.09)	(0.09)
Observations	1,544	1,536	880	1,536	1,544	1,544
R^2	0.06	0.29	0.31	0.29	0.29	0.29
Specification	Post and FDLR state FE	No Buloho	Cluster Groupement	Cluster Chiefdom×Year	Control Coltan Price	Control Gold Price
Mean (Treated-Pre)	0.09	0.09	0.09	0.09	0.09	0.09

Panel B: Specifications with lagged dependent variables (no village fixed effects)

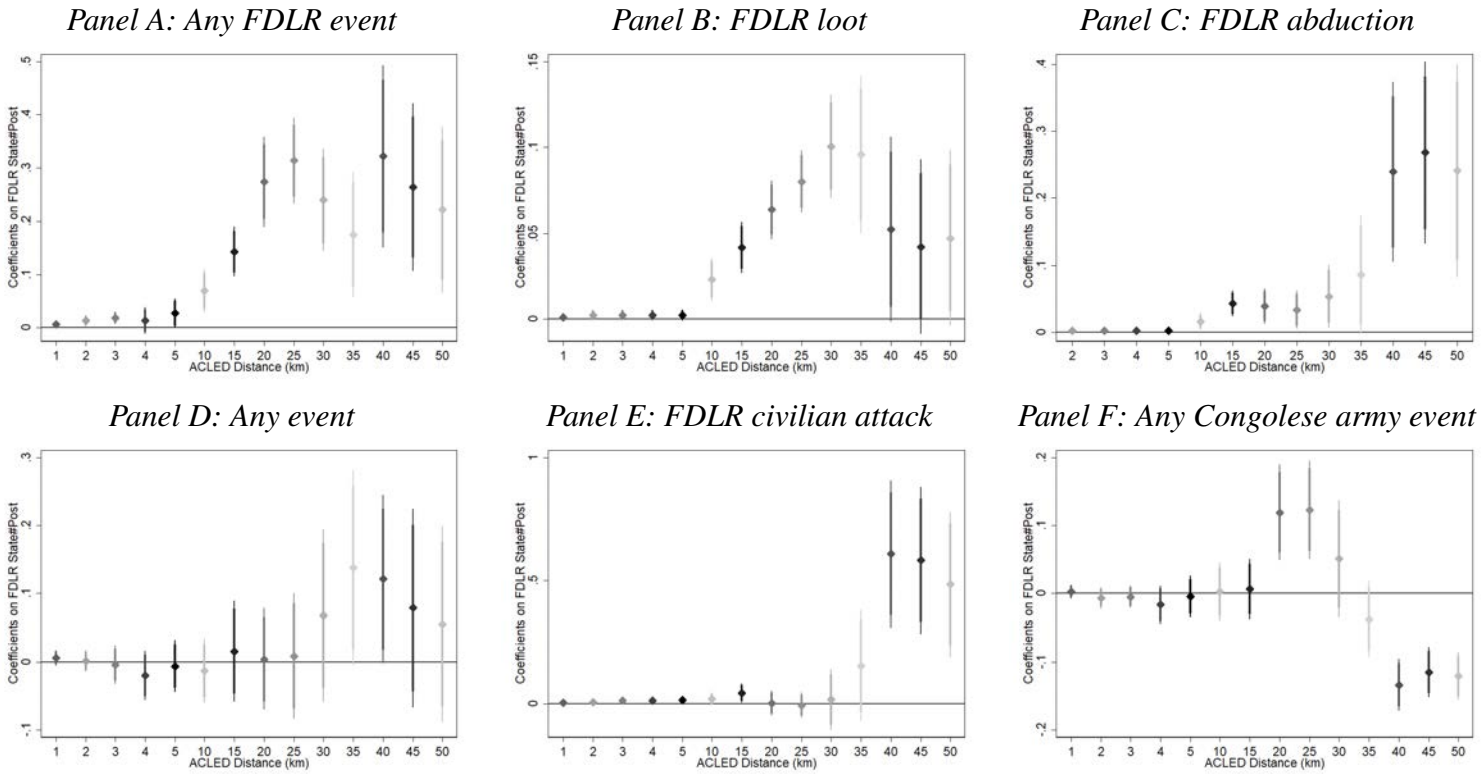
VARIABLES	(1) Any Pillage	(2) Intention Pillage	(3) Action Theft	(4) Action Forced Labor
FDLR state$_i$ x PostKimia$_t$	0.26	0.24	0.23	0.25
	(0.09)	(0.08)	(0.08)	(0.07)
Observations	1,351	1,351	1,351	1,351
R^2	0.34	0.33	0.31	0.29
Mean (Treated-Pre)	0.09	0.06	0.09	0.06

Panel C: Stationary Bandits

VARIABLES	(1) Any Attack	(2) Any Attack	(3) Any Non-FDLR Attack
FDLR state$_i$ x PostKimia$_t$	0.01	-0.06	-0.01
	(0.03)	(0.03)	(0.02)
Observations	1,544	1,544	1,544
R^2	0.18	0.18	0.15
FDLR state Definition	Any Stationary Bandit	Any Non-FDLR SB	Any Non-FDLR SB
Mean (Treated-Pre)	0.11	0.11	0.02

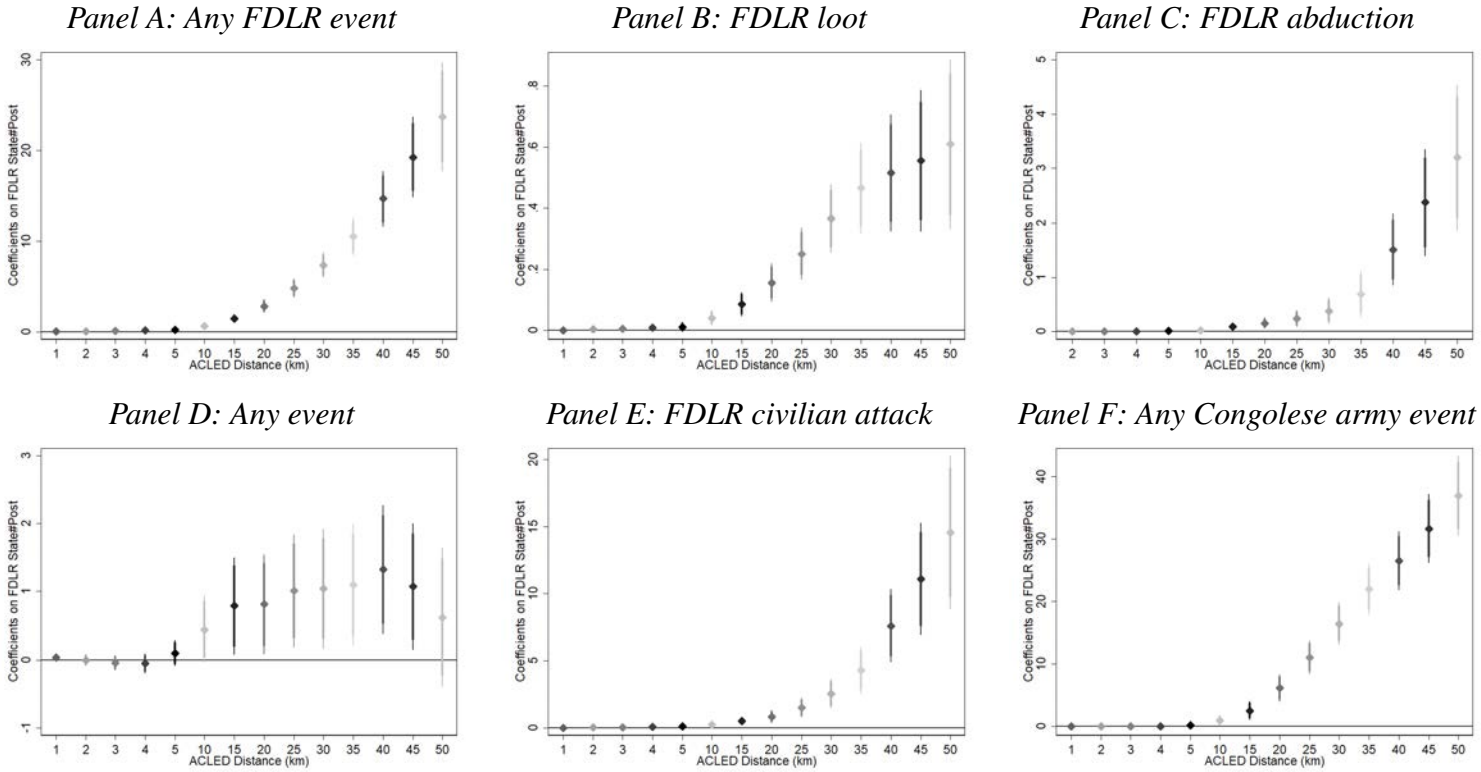
Notes: Panel A provides additional robustness checks for our main result: including Post and FDLR state fixed effects (1); excluding the Chiefdom of Buloho (2); clustering at the groupment level (3); clustering at the Chiefdom times year level (4); including the yearly world coltan price (5) and gold price (6) interacted with whether the village has coltan/gold. Panel B controls for the lagged dependent variable. Panel C shows the effect of Kimia 2 on attacks by any actor in villages with a stationary bandit (1); in villages without a stationary bandit other than the FDLR (2); and the effect on any attack by a non-FDLR perpetrator on a village controlled by a stationary bandit other than the FDLR (3).

Figure E.2.: ACLED, binary variable, any event within X km



Notes: This figure shows the effect of Kimia II in the FDLR state on different types of events in the ACLED data by the radius around the villages. In all panels, thick lines represent 90% confidence intervals and thin lines represent 95% confidence intervals. Standard errors are clustered everywhere at the village level.

Figure E.3.: ACLED, continuous variable, number of events within X km



Notes: This figure shows the effect of Kimia II in the FDLR state on different types of events in the ACLED data by the radius around the villages. In contrast to Figure E.2 this figure uses a continuous variable of the number of events within a specific radius around the village. In all panels, thick lines represent 90% confidence intervals and thin lines represent 95% confidence intervals. Standard errors are clustered everywhere at the village level.

APPENDIX F: BIBLIOGRAPHY

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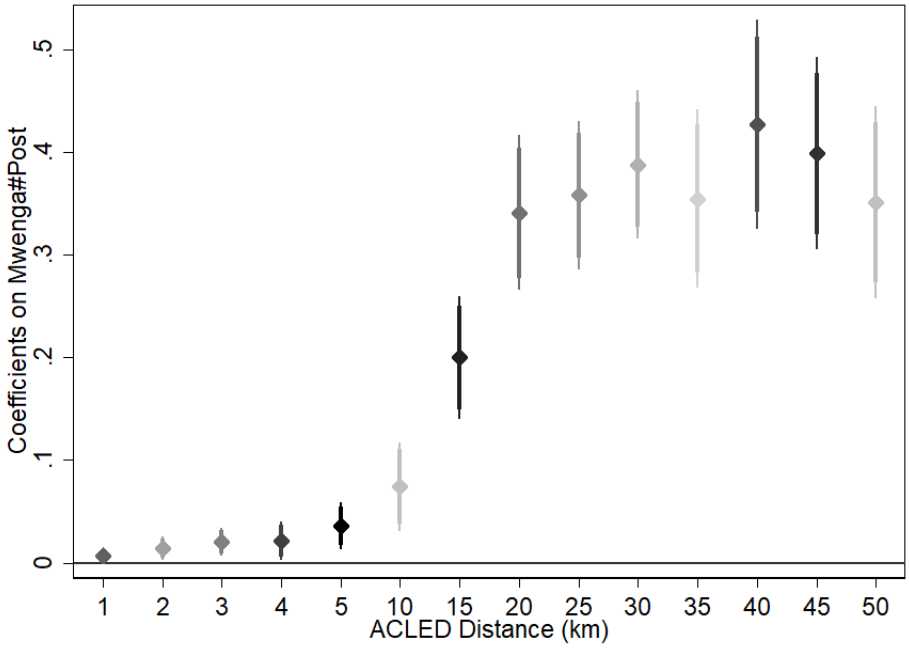
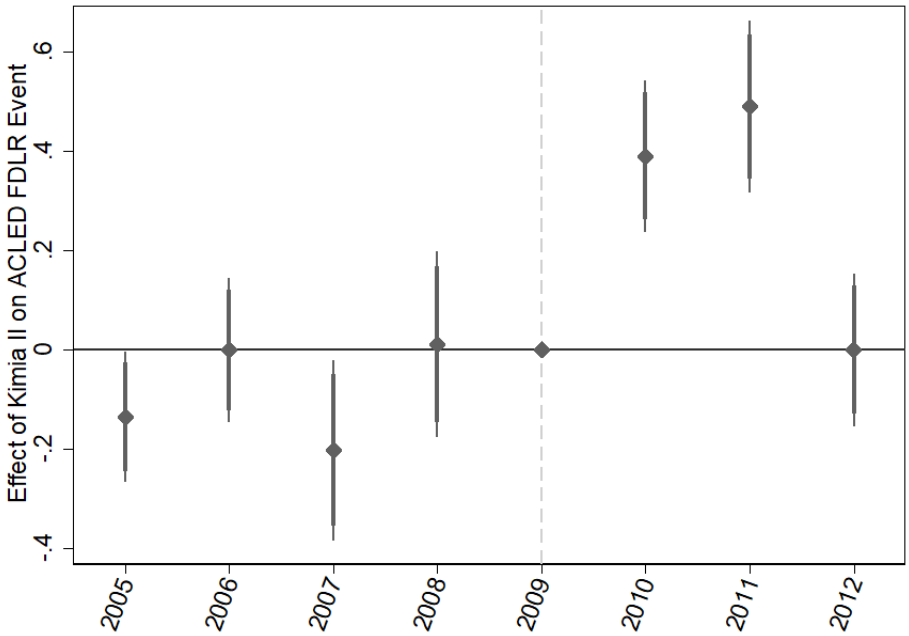
Figure E.4.: ACLED, with all of the district Mwenga as treatment

Panel A: Coefficient on any ACLED FDLR event by bandwidth



Panel B: Yearly coefficients on any ACLED FDLR event



Notes: This figure shows the effect of Kimia II in the FDLR state on whether the ACLED reported a violent event involving the FDLR. It uses a different definition of the FDLR state—namely, the district of Mwenga. Panel A shows the effect using different bandwidths around the FDLR state villages. Panel B shows yearly coefficients using a 25 km radius. The year 2009 is the omitted category. Standard errors are clustered everywhere at the village level.

Table E.3: State like behavior by FDLR

Panel A: State like behavior by FDLR

VARIABLES	(1) Monopoly of Violence	(2) Taxation	(3) Financial Admin.	(4) Justice Admin.	(5) Security Provision
FDLR state$_i$ x PostKimia$_t$	-0.79	-0.79	-0.73	-0.75	-0.17
	(0.08)	(0.08)	(0.09)	(0.08)	(0.07)
Observations	1,544	1,544	1,544	1,544	1,544
R^2	0.78	0.80	0.75	0.77	0.50
Mean (Treated-Pre)	0.96	0.96	0.79	0.87	0.24

Panel B: Pillages by FDLR in Bakisi

VARIABLES	(1) Any Pillage	(2) Intention Pillage	(3) Action Theft	(4) Action Forced Labor
Spillover$_i$ x PostKimia$_t$	0.13	0.11	0.12	0.10
	(0.04)	(0.04)	(0.04)	(0.03)
Observations	1,768	1,768	1,768	1,768
R^2	0.25	0.25	0.21	0.22
Mean (Treated-Pre)	0.04	0.04	0.03	0.03

Panel C: State like behavior by FDLR in Spillover

VARIABLES	(1) Monopoly of Violence	(2) Taxation	(3) Financial Admin.	(4) Justice Admin.	(5) Security Provision
Spillover$_i$ x PostKimia$_t$	0.16	0.09	0.00	0.01	-0.00
	(0.04)	(0.03)	(0.02)	(0.02)	(0.02)
Observations	1,912	1,768	1,768	1,768	1,768
R^2	0.57	0.40	0.31	0.29	0.30
Mean (Treated-Pre)	0.01	0.01	0.00	0.00	0.00

Notes: Panel A shows the effect of Kimia II on FDLR state behavior in the FDLR state using indicators for whether the FDLR had the monopoly of violence (1), taxed the population (2), organized a fiscal administration (3), provided justice (4), and provided effective security (5). Panel B shows the effect of Kimia II on pillages by the FDLR in the spillover area of Bakisi. Panel C shows the effect of Kimia II on state behavior by the FDLR in the spillover area of Bakisi. All regressions include village and year fixed effects. Standard errors, clustered at the village level are in parentheses.