Rebel governance, conflict, and educational outcomes

Nicole Stoelinga*

European University Institute†

August, 2022

- WORKING PAPER: THE LATEST VERSION CAN BE FOUND HERE -

Abstract

This paper studies the immediate and long-term effect of living in occupied territory and subsequent exposure to rebel governance on educational outcomes in the short and long run. This is done by focusing on the Boko Harams insurgency and the groups' temporary occupation of territory in North East Nigeria. The estimation relies on rich individual-level panel data and detailed information on occupation of territory by the rebel group. This paper finds that children subjected to Boko Haram's governance accumulated 0.66 years of education less throughout the occupation. The immediate effect is especially strong for children from Muslim households and those that were exposed to heightened levels of social pressure and violent enforcement of Boko Harams' anti-educational rule. In the long-run, after the occupation has ended, children are 26 percent less likely to attend school on average with especially girls and children from Muslim households being more likely to stay out of school. Various well-documented mechanisms affecting the demand and supply of education do not seem to explain the results, reinforcing the notion that the effects are driven by social identity and pressure, fear and intimidation.

JEL classification: I24, D74, O10
Keywords: conflict, rebel governance, education, development

*I am grateful for comments and insights of David Levine and Thomas Crossley, conversations with Belinda Archibong, Alessandro Tarozzi, James Fearon, Dominic Rohner, Michael Thoenig, Raphael Lalive, David Laitin and Saumitra Jha, and feedback from participants of the EUI working group, the ALde, IAES, CEA, GLAD, MPSA and ASFE conferences, the Max Planck Summer School on the Political Economy of Conflict and Redistribution, the Households in Conflict Network, and seminar participants at the University of Lausanne and Stanford University.

†Contact: European University Institute, Department of Economics, Via delle Fontanelle 18, 50014 San Domenico di Fiesole (FI), Italy. E-mail: nicole.stoelinga@eui.eu.

1. Introduction

The occupation and governing of civilians by rebel groups is common: between one-fourth to one-third of all insurgents occupy territory at some point (Huang, 2016; Stewart, 2018) often subsequently exposing civilians to their governance (Arjona, 2016; Rubin, 2020; Stewart, 2018; Wood, 2008). Moreover, the last decade has seen an increasing trend in the occupation territory by rebel groups.[1] Though conflict and violence in general have been studied extensively, the impact of occupation – and subsequent exposure to rebel governance – in a conflict setting has received little to no attention to date. The majority of existing work focuses on the strategic value of governance for rebels, ignoring the impact on civilians. This study addresses this matter. First, the effect of conflict is disentangled from the effect of exposure to occupation. Second, it examines whether those experiencing occupation adjust their behavior to adhere to the rebels' rule, providing an in-depth discussion of channels and mechanisms that drive these effects.

This is done by focusing on the case of Boko Haram, an Islamic insurgent group. The group occupied various areas in North East Nigeria in 2014, and subsequently exercised governance and rule in these areas.[2] The situation is provides a quasi-natural experiment, allowing to compare those who solely experienced conflict to those who experienced conflict as well as faced occupation by insurgents. The fact that Boko Harams' strong anti-educational stance was central to their governance provides a clear measure for the effect of occupation on individual behavior. Additionally, as Boko Harams' occupation was temporary, it is possible to study the immediate and long-term effects of exposure to the groups' occupation on educational outcomes.
More precisely, this research first considers what happened *during* the occupation, i.e., when Boko Haram actively exerted its' rebel governance upon the local population. How did being exposed to Boko Harams' governance impact an individuals' behavior with respect to education? Did they adhere to the groups' anti-educational rule? Second, the post-occupation time period is examined. What happened *after* the rebel group retreated and the government took over again? What are the long-term impacts of having been exposed to Boko Harams' occupation and rebel rule? By considering the immediate effect of experiencing Boko Harams' occupation on schooling as well as the long-term effects, this article provides a detailed picture of an inherently complex and multi-layered environment.

This paper builds upon (frame)works of Arjona et al. (2015), Olson (1993), and others. Conceptually, individuals confronted with rebel governance face a choice between cooperation or resistance (Arjona et al., 2015). There are various determinants that might make an individual more likely to cooperate with insurgents or comply with their rules when directly exposed to their occupation

[1] See figure A.5.

[2] The territorial control of Boko Haram, proclamation of its caliphate in these areas, and the groups' actions towards civilians under their rule are considered the 'occupation' or 'rebel governance' that this paper focuses on. These two concepts will be used interchangeably throughout the study – Boko Haram *occupied* areas in which individuals lived which were then exposed to the groups' *rebel governance* as a consequence.

and governance. Such determinants are (pre-existing) positive sentiment towards, or support for the rebels (Arjona et al., 2015; Brechenmacher, 2019), having social identity markers in common (Stets & Burke, 2000), social pressure to conform (Bursztyn & Jensen, 2017; Panagopoulos, 2014) and experiencing violent enforcement of rule (Arjona et al., 2015; Olson, 1993). These potential drivers of cooperation with Boko Haram, causing lower educational outcomes, are examined in this study.

Moreover, throughout the time period individuals in both the occupied and other areas were confronted with conflict. Additionally, after the occupation, "regular" civil war or conflict dynamics might have affected educational outcomes. To account for these matters, various well-documented mechanisms through which conflict can effect educational outcomes are examined. These are economic shocks causing a lower household income, leading to children working instead of going to school (Bundervoet et al., 2009; Duryea et al., 2007; Jacoby & Skoufias, 1997; Thomas et al., 2004), decreasing health statuses of children (Allison, Attisha, et al., 2019), child marriage (Mazurana et al., 2019; Mourtada et al., 2017; Walker, 2013), school supply (Akbulut-Yuksel, 2014; Glewwe & Jacoby, 1994; Jayachandran et al., 2002), and changes to labor market outcomes and education premiums (Chamarbagwala & Morán, 2011; Shemyakina, 2011).[3]

This study relies on rich and detailed individual-level panel data for a sample of children of school-going age, and estimates the immediate and long-term effects through a difference-in-differences (DiD) approach. The treatment is defined as living in an area that was occupied by Boko Haram, and thereby having been exposed to the occupation and subsequent rebel governance. The occupied areas are identified using maps from the IOM (2015) that identify the precise Local Government Areas (LGAs) that Boko Haram controlled in 2014 - 2015. This information is cross-referenced with data from ALCED (Raleigh et al., 2010) on the overtaking of territory. Those living in the areas that were directly bordering Boko Harams' self-proclaimed caliphate form the control group. There are two schooling outcomes considered in this study, both measured at various points in time prior to the start of the occupation and once after the occupation ended. The first outcome studied is the increase in the total number of years of education (YoE). By estimating the effect of the occupation on this outcome, the result captures whether or not - and how long - children attended school while exposed to the occupation (the immediate effect). Second, school attendance rates, measured after the occupation had ended, capture whether responses to the occupation were permanent, or changed again when the government regained control (the long-term effect). The heterogeneity of the effect of occupation by the determinants of cooperation on both outcomes is investigated. Moreover, the mechanisms through which conflict can affect educational outcomes are examined to account for the context – one of active conflict – in which the occupation took place.

Considering the occupation of Boko Haram as a quasi-natural experiment, the identification strategy is at the heart of this study. Aside from the assumptions related to DiD estimation such as

[3]For an excellent overview, see Justino (2011).

the parallel trends assumption (pre-event study), attrition rates, and comparability of the treatment and control group, an extensive discussion on the occupation of territory by Boko Haram is provided in this article. To support the identification strategy, it is shown that the areas that were occupied did not differ significantly from those that remained under government control in terms of infrastructure, public good provision, and so forth. Moreover, to address why Boko Haram might have (been able to) occupied specific villages or areas and not others, historical evidence for rejection of the secular state and fundamentalist conflict in the region is discussed. It is shown that these matters do not threaten the identification of the effect.

The results indicate that the occupation of Boko Haram, and subsequent exposure to rebel governance, lead to decreasing educational outcomes for children of mandatory school-going age relative to those who were not exposed to the occupation. Consider the immediate effect – capturing what happened *during* the occupation – first. On average, those in the treatment group accumulated 0.66 YoE less than their counterparts. Putting this in perspective, the average adult in the region has about 4.90 YoE - hence the set-back of roughly 8 months due to the occupation corresponds to about 14%.

The heterogeneity of this effect is considered in order to gain more insight into who might have been more likely to comply with Boko Harams' anti-educational rule. As mentioned above, those who share an identity with the governing rebel group might be more likely to comply. According to social identity theory (Knott & Lee, 2020; Stets & Burke, 2000), those who feel a stronger sense of belonging to a certain group are more likely to display similar behavior. When considering religion as such an identity marker (Seul, 1999), there is evidence that having a shared identity leads to heightened levels of compliance and rejection of education: children from Muslim households increase their YoE with 0.87 years less relative to those who were exposed to rebel governance but did not have an identity in common. Moreover, experiencing social pressure to conform to the rules of Boko Haram - operationalized by living in an area with heightened levels of support for the rebel group - also leads to a decrease in a childs' accumulation of YoE.

Additionally, throughout the occupation Boko Haram used violence targeted at schools in order to instill fear in the population and enforce their anti-educational rule. Considering whether exposure to such violence – as well as exposure to non-targeted violence – affected compliance, there are various interesting findings. First, those who were more likely to have a higher total YoE were exposed to higher levels violence targeted at schools as well as 'general' violence. This implies that Boko Haram targeted those who were least compliant. Second, being exposed to Boko Harams' governance and violent enforcement of their anti-educational rule lead to higher compliance and cooperation among individuals: those children have significantly lower educational outcomes than others. Interestingly, exposure to governance and non-targeted violence did not have such an effect. Finally, examining two common sources of heterogeneity – gender and birth cohort – there only seems to be a difference with respect to the age of a child, with younger children having lower educational outcomes.

Turning to the long-term impact of exposure to occupation, school attendance in the school-year *after* Boko Haram was driven from the occupied areas and the region was back under government control is studied. First and foremost, children from households that faced the occupation and governance of Boko Haram are 26% less likely to attend school than those from the control group. Those who shared an identity with Boko Haram – children from Muslim households, who showed higher rates of compliance with the groups' rule during the occupation – are more likely to continue this behavior after the occupation has ended: these children are significantly less likely to be attending school. However, when controlling for having faced the occupation and sharing an identity with Boko Haram, children from the treatment group that experienced social pressure to conform are more likely to be attending school. Having experienced enforcement of the anti-educational rule seems to have lead to intimidation and fear: those who have been exposed to such violence are significantly less likely to be returning to school. Additionally, especially female children are likely to drop out of school. There are no differences between children's school attendance rates with respect to birth cohort.
In order to account for these findings being driven by the general context of conflict, and not occupation, this study considers a variety of well-documented mechanisms affecting demand for and supply of schooling from the conflict literature. These are mentioned above: child labor, children's health status, marriage, deteriorating returns to education and employment prospects, as well as school supply – measured by the number of schools and teachers. There are a few findings. First, children are more likely to cite being busy with childcare or other household tasks as a reason for not attending school. Second, though wages and employment have decreased mildly in response to the occupation, there are significant premiums for those who have at least a primary school education. Moreover, there is no indication that there are significant shifts in the number of schools.

This paper contributes to the literature in various ways. First, this study relates to the growing body of work on rebel governance (Arjona, 2014, 2016, 2017; Arjona et al., 2015; Barter, 2015a, 2015b; March & Revkin, 2015). The majority of this literature focuses on the insurgents and their strategic governance, whereas this paper examines the impact of said governance on civilians' behavior. It thereby contributes to the work on the impact of occupation on civilians (Humphreys & Weinstein, 2006; Kalyvas, 2006; Mampilly, 2012; Rubin, 2020, among others). By estimating the effect of occupation in a quasi-experimental setting, it presents a novel way of approaching the matter and allows to disentangle effects of conflict from governance and occupation.
Moreover, to my knowledge, this paper is one of the first that estimates the impact of rebel occupation on civilians' behavior showing evidence that suggests that social identity and social pressure (Hogg, 2020; Stets & Burke, 2000) are key in explaining why certain people change their behavior in response to occupation and others do not. This paper thereby also contributes to the debate concerned with ideology and attitudes during civil war as mentioned in Hirose et al. (2017).
Finally, by studying the relationship between insurgents' rebel governance and occupation on educational outcomes during conflict this study presents a novel approach that is not yet present the

literature. It thereby adds to the large literature that examines the effect of conflict educational outcomes (Justino, 2011, for an overview) such as governments' expenditure (Lai & Thyne, 2007), educational attainment (Akresh & De Walque, 2008; Chamarbagwala & Morán, 2011; Parlow, 2011; Singh & Shemyakina, 2016; Swee, 2015; Verwimp & Van Bavel, 2014) and school drop-out rates, school attendance and enrollment (Bertoni et al., 2019; Khan & Seltzer, 2016; Shemyakina, 2011; Valente, 2014).

The paper is structured as follows. Section 2 contains background information on Boko Haram. This section provides a discussion of Boko Haram and its occupation of territory, as well as evidence that the groups' rule can be defined as rebel governance. Following, section 3 contains a discussion of the literature upon which a framework is build and hypothesis and mechanisms are drawn from. The data, sample, treatment and control group are discussed in section 4. Section 5 describes the empirical approach, and 6 discusses the identification strategy. Section 7 contains the results and discusses mechanisms behind the effects. Section 9 concludes.

2. Institutional background

This study focuses on the effect of being temporarily exposed to rebel governance on individuals' behavior with respect to education and schooling. It examines the case of the Boko Haram insurgency, that started in 2009 and has been affecting large areas in North East Nigeria. The conflict is ongoing, and Boko Haram is currently one of the largest militant groups in Africa (CFR, 2022). Boko Haram rejects all secular aspects of Nigerian society and strives to establish an Islamic state in Nigeria (Anugwom, 2018; Center for International Security and Cooperation, 2018; Omenma et al., 2020; Thurston, 2016) with Shari'a criminal courts (CFR, 2018). It asserts the right to rebel against allegedly infidel states, use force to impose a strict interpretation of Islamic law on civilians (Thurston, 2016), and specifically rejects Western education.[4] This rejection of education has a broad interpretation: it not only concerns schooling, but also other ways in which Western ideas changed or influenced ('educated') society which depart from, according to Boko Haram, true Islamic teachings (Anugwom, 2018).

The group turned violent in 2009 when it was involved in an anti-government uprising. In the years following the uprising the frequency, size and impact of the attacks drastically increased. This change has been attributed to changes in leadership of Boko Haram, as well as Boko Haram's cooperation with al-Qaeda (Center for International Security and Cooperation, 2018). As the Boko Haram grew in size and carried out more attacks, it started to finance itself through robberies, kidnapping, extortion and raids of military stations.
In response to the escalating situation the Nigerian government declared the state of emergency in three states in North East Nigeria - Borno, Adamawa and Yobe - in May 2013 and deployed a

[4]Boko Haram, loosely translated, means "Western education is forbidden".

high number of military personnel to the area. The state of emergency was extended various times, but eventually ended in November 2014 (United Nations, 2015).[5] Though the number of military personnel in the region increased significantly, Boko Haram started to carry out more military-style offensives on towns in the region, gaining control over various LGAs in northeast Borno. In the second and third quarter of 2014 Boko Haram captured more territory (see figure A.7) and declared its caliphate in August 2014.

According to interviews conducted by Amnesty International (2015) with former inhabitants of the caliphate, Boko Haram ruled according to its set of beliefs and ideology. The group actively tried to wipe out all (Western) influences on day-to-day life, and convert and enforce its ideas on the local population.[6] To aid ruling its caliphate, Boko Haram appointed Emirs who dealt with matters in a village.[7] Civilians that did not follow the rules risked being trialed and punished.[8] For those who cooperated with Boko Haram, followed the rules and supported the group, life could sometimes be mildly easier. For example, Boko Haram distributed food, which was often looted from other villages, among households that supported them. The rules that Boko Haram enforced were aligned with goal to implement a strict Shari'a law in its territory, and were based in its strong anti-democracy and anti (Western) education sentiment. For example, attending (Western) schools was entirely forbidden (Amnesty International, 2015) under Boko Harams' rule.

While Boko Haram expanded the area under their control rapidly and continued to do so into January 2015, Goodluck Jonathan - the Nigerian president at the time - supported the creation of an African task-force aimed at countering Boko Haram. In February 2015 the military offensive of the task-force started, and Gwoza - considered the headquarters of Boko Haram - was captured in March 2015. This was considered the end of Boko Harams' caliphate and control over the region. In the time period that followed, the North East saw a significant drop in violence (CFR, 2018) but also suffered the long-term consequences of the conflict and occupation. Additionally, even though Boko Haram was expelled from the areas it controlled, it still carried out attacks in the area and the conflict is considered to have been ongoing. According to the Crisis group (2017), the extensive damage to the economic infrastructure in various parts of the North East, and bans or restrictions on trade of goods as to deny Boko Haram access to supplies lead to a heightened level of food insecurity.

[5] Facing the high number of attacks and quick expansion of territorial control, the Nigerian government tried to broker a ceasefire in October. Boko Haram was reported to have broken the agreement within two days, but the group also claimed to never have agreed to the agreement.

[6] According to Amnesty International (2015) the rules affected almost every aspect of day-to-day life such as the usage, possession or sale of cigarettes, the type of clothing worn by and general appearance of men and women, the selling of products on markets, etc.

[7] For example, the Emir (often someone from the town that supported Boko Haram) was responsible for approving forms of travel between towns within Boko Haram's territory for civilians, as well as ensuring that Boko Harams' rules were followed. Note that leaving the caliphate was in most cases almost entirely prohibited. In various villages Boko Haram imprisoned people or placed them under constant guard. In places where civilians were allowed to move freely within the town, Boko Haram fighters patrolled the streets and areas between villages, ensuring no-one escaped Boko Haram territory.

[8] In order to deal with such cases, Boko Haram installed institutions such as a courts where civilians' cases were judged.

This situation affected the entire North East, but especially Borno, Adamawa and Yobe. After the government had regained control over the region it was possible for humanitarian aid groups to access the LGAs and provide educational, food, and health aid. Importantly, according to Relief web (2017), in all previously occupied states (in the sample used in this study - see section 4) there were NGOs present to provide access to education, quality emergency learning, and educational system strengthening.

The conquering of territory and consecutive proclamation of the caliphate was a clear step towards Boko Harams' goal of establishing an Islamic state in Nigeria: controlling territory and proclaiming yourself as ruler provides a group with a sense of legitimacy (Loyle et al., 2021) and provides a rebel group with the opportunity to extract resources from the local population. Moreover, it is a prerequisite for rebels' exercising of local authority (Anders, 2020; Kalyvas, 2006; Kasfir, 2005): rebel governance. Rebel governance is defined by Arjona et al. (2015) as "the set of actions insurgents engage in to regulate the social, political, and economic life of non-combatants during civil war" and that a rebel group "intervenes in the provision of public goods and services such as education, health, or food" (p.182). Considering the evidence discussed above, it is clear that Boko Haram actively engaged in rebel governance. Moreover, the fact that Boko Harams' strong anti-educational stance was central to this governance provides a clear measure that can be used to examine its effect on the behavior of those confronted with the groups' rebel rule.

3. Framework and mechanisms

The territorial control of Boko Haram, proclamation of its caliphate in these areas, and the groups' actions towards civilians under their rule are considered the 'occupation' or 'rebel governance' that this paper focuses on. These definitions will be used interchangeably throughout the study, as Boko Haram *occupied* areas in which individuals lived which were exposed to the groups' *rebel governance* as a consequence.

Conceptually, rebel governance (often) takes place within a general setting of conflict. This implies that aside from considering the effect of rebel governance and various determinants that might affect the impact it had on individuals' behavior, dynamics relating to conflict are present. Building on work on rebel governance and the extensive literature on conflict, and applying those frameworks to the Boko Haram insurgency, the effects of exposure to conflict and rebel governance are disentangled and the effect of the latter identified. This is done by comparing those who solely experienced conflict to those who experienced conflict as well as rebel governance. In doing so, this study examines whether those exposed to rebel governance adjust their behavior to adhere to the rebels' rule, and provides an in-depth discussion of channels and mechanisms that drive these effects.

3.1. Occupation and rebel governance

Occupying territory allows rebels to exercise authority and thereby govern, or impose rules on, the population of those areas. As discussed in Arjona et al. (2015), when facing rebel governance, the population can either choose to cooperate (comply with the rules) or resist (reject the rules). The extent to which the population cooperates affects the type and extent of governance of rebels that are in control of the territory. In the case considered, lower schooling outcomes would imply that an individual adhered with Boko Harams' anti-educational rule, i.e., cooperated with Boko Haram. The literature identifies various determinants that might lead to certain sub-groups of the population being more likely to cooperate or comply. These determinants will be examined as potential sources of heterogeneity of the treatment effect.

3.2. Social identity, sentiment, enforcement of rule, gender and age

First, sharing a social identity can lead to a heightened sense of belonging or shared identity among people (Stets & Burke, 2000). Having such a shared identity can lead to higher support for those that have, for example, the same religion (Knott & Lee, 2020; Seul, 1999; Stets & Burke, 2000). As noted by Stets and Burke (2000), those who feel a the sense of belonging to a certain group are "more likely than not to participate in that groups culture [...] and show attraction to the group in their behavior" (p. 4). This is illustrated by the findings of Afzal (2020), who notes that around 49 percent of the Muslims living in North East Nigeria held a favorable opinion of Boko Haram in 2014, compared to the regional average of only 39 percent. It might be that having a religion in common indeed leads to having a more positive sentiment or higher level of support, compared to those who do not share a religion. Based hereon, this study posits that inhabitants of the caliphate that have identity markers, such as religion, in common with Boko Haram might have been more likely to converge in terms of behavior and attitudes (i.e., rejection of education) than those who do not have similar identity markers.

Additionally, building upon shared identity and support for a group, the extent of compliance among the local population can be due to pro-Boko Haram sentiment among the population. Especially "those who perceive their institutions as illegitimate or ineffective may welcome change" (Arjona et al., 2015, p. 186). It is known that weak service provision and negligence on behalf of the government lead to increased local support for Boko Haram in the North East (Brechenmacher, 2019). Moreover, in areas with low government service provision, rebel control has been found to increase social cohesion within villages (Rubin, 2020). Increased cohesion might lead to higher levels of social pressure and control to conform to ideas or rules, especially during insurgencies when failure to conform is punished, and the negative consequences of one person failing to conform can affect the whole group. Moreover, individuals are more likely to engage with pro-social behavior and compliance with social rules when they are being watched or experience social pressure (Bursztyn

& Jensen, 2017; Panagopoulos, 2014). This suggests that those who live in an environment where there is stronger pro-Boko Haram sentiment and the occupation increased levels of social control and pressure to conform, will experience lower schooling outcomes.

Archibong (2019) shows that there is a relationship between areas that were traditionally ruled by a centralized authority and had a Muslim supermajority population experience lower levels of public good provision by the government. Weaker service provision has been shown before to lead to heightened levels of local support for Boko Haram, as well as to cause higher social cohesion. Therefore, this measure of Archibong (2019) will be used as an instrument to capture positive sentiment towards Boko Haram (discussed more in-depth in section 5 and 6) and examine potential heterogeneity of the treatment effect. Due to the potential overlap between sharing social identity markers and living in an area with heightened support for Boko Haram, these two factors will be considered simultaneously.

Violence can be used as a tool during occupation, conflict and war by agents, and serves a different purpose in occupied and non-occupied territory. According to Olson (1993), stationary bandits (insurgents in charge of areas) often strive for "peaceful order". Violence aimed at the civilians is often used in order to punish disobedience or defiance of groups' governance. This form of violence will be referred to as enforcement of rule. In areas where insurgents govern, cooperation most frequently takes place as to avoid such violence (Arjona et al., 2015). Based on this notion, it is expected that those who experience such enforcement are more likely to adjust their behavior (i.e., have lower schooling outcomes) to avoid further repercussion, compared to those who are not exposed to such violence. Empirically, violent enforcement of the anti-educational rule will be operationalized by the number of attacks to the school closest to the household.

Additionally, though the differential effects of civil war and conflict with respect to gender are highly context-specific (Buvinić et al., 2014), it is known that Boko Haram strongly opposes girls' education.[9] This additional dimension to the anti-educational rule will be examined by estimating the potential heterogeneity of the effect by gender. Moreover, the start of the occupation will have coincided with a different stage in the education of each child. A child that is just about to start primary school might opt not to attend school anymore; one that has been going to school already might be more inclined to return. This will be considered by examining the effect for different birth cohorts.

3.3. Education, conflict and civil war

The above focuses on the adjustment of behavior in response to direct exposure to rebel governance. It frames cooperation with Boko Harams during occupation as compliance with its' anti-educational rule, leading to rejection of education and, in turn, lower educational outcomes. However, this study is also concerned with what happened after the occupation ended and individuals no longer faced

[9] A clear example of this is the kidnapping of schoolgirls in Chibok in 2014.

rebel rule: were potential shifts in behavior caused by the occupation permanent, or did people return to acting as they did prior? This question focuses on what happened *after* Boko Haram retreated and the government regained control. Did children go to school? Did those who might have dropped out during the occupation return to school?
These questions – as well as those concerning what happened during the occupation itself – are answered in a general conflict setting.[10] It is therefore important to acknowledge the potential presence of mechanisms that are not specific to occupation and rebel rule, but conflict in general. Moreover, after the occupation, "regular" civil war or conflict dynamics might have become more prominent.

Turning to the literature considering the relationship between educational outcomes and conflict, the dominant narrative is that exposure to (civil) war, conflict and violence has a negative impact on educational outcomes (for an excellent overview, see Justino (2011)). The mechanisms considered in this study are well-documented explanations for the decrease in schooling.
There are various mechanisms through which conflict affects the demand for education. First, conflict and civil war can lead to a decrease in income for the household (Bundervoet et al., 2009; Jacoby & Skoufias, 1997; Thomas et al., 2004), causing children to work in order to compensate the loss in household income (Duryea et al., 2007). Second, a decrease in access to healthcare, as well as the potential exposure to danger and violence can lead to worse health among children. Children with worse health are less likely to attend school (Allison, Attisha, et al., 2019). Moreover, child marriage is shown to increase in response to conflict, as the economic situation deteriorates, returns to education diminish, and schooling is disrupted (Mazurana et al., 2019; Mourtada et al., 2017; Walker, 2013). Additionally, when future expected payoffs of having an education are lower, the cost of attending school might not out-weigh potential benefits and children might decide to stay home (Chamarbagwala & Morán, 2011; Shemyakina, 2011).
Finally, considering the general background of conflict and civil war, it is important to examine the role of violence.[11] In non-occupied territory insurgents act as roving bandits and violence in such a setting is aimed at looting and extracting resources (Olson, 1993). This different type of violence (i.e., not aimed at upholding or enforcing rules) can have an impact on educational outcomes. It might be that such general violence is an important mechanism behind the effects on educational outcomes. Various forms of violence will be examined to consider this possibility.
Moreover, conflict can affect the supply of education, prohibiting those that want to go to school to do so. For example, children cannot attend school when there are no schools or teachers, i.e., when school supply is low or non-existent (Akbulut-Yuksel, 2014; Glewwe & Jacoby, 1994; Jayachandran et al., 2002). Along the same line, it is important to consider whether children might have changed the type of school they attended (whether children might have switched from state to religious

[10] Even though Boko Haram was expelled from the areas it controlled, it still carried out attacks in the area and the conflict is considered to have been ongoing.

[11] The potential difference in type (and level) of violence that took place in occupied and non-occupied areas is a potential threat to identification. This will be discussed in section 5 and 6.

schools, etc.) or commute to school has increased.

4. Data and sample

Individual-level data is obtained from four waves of the Nigerian General Household survey (NGHS). Every wave covers two years, and the survey is conducted twice per wave: once during the harvest season (fall), and once during the planting season (spring). Combined, these surveys provide data on schooling outcomes and educational behavior for 2009 – 2013 and 2015 – 2019.[12] The survey was not conducted in the 2014/2015 school-year, which is the time period that Boko Haram controlled large swathes of territory. Only individuals born between 1998 and 2008 are included in the sample as to ensure they were of school-going age prior to the start of the treatment.[13] The sample is further restricted to include only individuals who live in rural areas, and in an LGA that was covered in all survey waves.[14] These inclusion restrictions lead to a final sample of 7,202 observations. Unfortunately, due to the inclusion restrictions and missing data, the last survey wave (conducted in 2018 – 2019) is no longer included.

The NGHS includes a community component. For this part of the survey a group of community members is surveyed on the presence of various public goods, local events, infrastructure, and so forth. These surveys were conducted in 2010, 2012 and 2016. This study relies on this part of the NGHS to examine potential differences between the communities in the sample prior to and after the treatment, as well as obtain more detailed information on the school supply in the region.

Data on violent events comes from ACLED (Raleigh et al., 2010).[15] Only events categorized as violent (excluding, for example, peaceful protests) and initiated by Boko Haram are considered. Since ACLED includes information on the precise location of the violent event and the NGHS on the location of the household, it is possible to construct variables that capture the individual-level exposure to violence. Similarly, data on the locations of schools is from Archibong et al. (2015), and is used to first determine the school(s) in vicinity of a household, and then determine whether these were attacked by Boko Haram. This is the measure discussed in section 5, and when considering the results with respect to exposure to violent enforcement of Boko Harams' rule. All

[12] Respondents are asked about their school attendance, type of school they attended, etc. in the current and/or previous school-year. The survey therefore provides information on the 2009/10, 2011/12, 2012/13, 2015/16, 2017/18 and 2018/19 school-years.

[13] Nine years of (primary and junior secondary) education are free and obligatory in Nigeria, as per the Compulsory, Free Universal Basic Education Act implemented in 2004.

[14] This is an important inclusion restriction that affects the attrition rates. Due to safety concerns, various LGAs were excluded from the survey in later years. Any individuals living in these regions are excluded from the sample, as they would not have been observed prior to the treatment. However, individuals who potentially might have dropped out of the sample are also excluded.

[15] ACLED gathers data on violent events related to Boko Haram through media reports, and a local network of journalists, informants, regional specialists and NGO workers. Any attacks claimed or reported by Boko Haram themselves are cross-referenced with these sources. Through this network ACLED was able to obtain information on events during the height of the conflict and on those that took place in occupied territories.

variables regarding violence are lagged by one year, as to account for last years' events affecting the observed years' decisions on schooling. Note that by doing so, any violence that occurred during the occupation (2014/2015) is thereby accounted for in the analysis.

Additional data on the number of primary and secondary school teachers per LGA comes from the Universal Basic Education Commission (UBEC) and is available for 2010, 2011, 2012, 2013 and 2016. Data on rainfall and temperature on LGA level is obtained from the World Bank. Finally, data on precolonial centralization and ethnic regional majorities is taken from Archibong (2019) and is used to discuss historical grievances and potential positive sentiment towards Boko Haram in various areas, as well as to measure pro-Boko Haram sentiment in various regions.

4.1. Treatment

The treatment is defined as being exposed to Boko Harams' occupation and rebel governance. Therefore, the territory that was under Boko Harams control between 2014 - 2015 determines what individuals belong to the treatment group. The areas are identified using two different data sources. First, data from ACLED is used to document where and when (non-)violent transfer of territory to Boko Haram took place. Figure A.7 shows the progression of the occupation of Boko Haram based on this data from ACLED. Considering the pattern of the spread of occupation in figure A.7 it is clear that the group steered clear, or was incapable of, conquering the more central and middle regions of Borno specifically. This can be explained by the fact that the government forces were stationed in September 2014 around Maidiguri (the capital of Borno) and more south towards the northern borders of Damboa and Bama (OCHA). Second, the data from ACLED is cross-referenced with maps of the IOM (2015). These maps depicts the areas that were fully and partially under Boko Haram control in January 2015 (see figure A.7). By cross-referencing data from ACLED with the IOM (2015) data, it is possible to control for potential measurement errors or diverging accounts. For example, two LGAs (Askira/Uba and Geidam) that did not experience events during which Boko Haram seized control according to ACLED, are considered to be fully controlled by Boko Haram by the IOM. Investigating this further, it turns out that these LGAs are explicitly mentioned in various news sources as having fallen under Boko Haram control and being occupied (Al Jazeera, 2014; Anadolu Agency, 2015; BBC, 2015; France24, 2014). For these reason, these will also be considered occupied in this study.

All LGAs that have experienced any violent event during which Boko Haram gained control over territory according to ALCED and were deemed "inaccessible" or "under control of Boko Haram" according to the IOM are considered to be treated. As noted previously, Boko Haram lost control of the areas relatively quickly and the occupation was temporary.[16]

[16] As can be seen in figure A.8, the task-force moved in rapidly and almost immediately recaptured the entire area. The figure is based on ACLED event-data and shows the number of events where the government retakes, or non-violent transfers of, territory. As was the case with data on Boko Harams' occupation of territory, it has been noted that the military did not always put out verifiable statements which partially feed into the data shown

Given that the occupation in the majority of areas started at the beginning of the 2014/2015 school-year, and ended at the start of the 2015/2016 school-year, areas were occupied for a maximum of 12 months. Note that due to the structure of the data - i.e., the last school-year recorded being 2012/2013, there is a gap of two full school-years between the last pre-treatment observation and the post-treatment observation.

4.2. Specification of control group

The purpose of this study is to isolate and estimate the effect of experiencing Boko Harams' occupation on educational outcomes. As noted previously, this study determines the impact of the occupation of Boko Haram – being exposed to the groups rebel governance, and specifically, its anti-educational rule – on schooling outcomes. In order to correctly identify the effect, selecting the correct control group is crucial. First, the LGAs that did not experience any events during which Boko Haram gained control over territory according to ACLED, and additionally are identified by the IOM (2015) as "fully accessible" or "under control of government forces" in the corresponding time periods are considered to not have been occupied in this study. The inhabitants of these LGAs are eligible to be included in the control group. Second, note that to support the identification of the effect it is required that the control group experienced the conflict and insurgency, and was comparable in other ways. What follows is a brief discussion of the potential groups to clarify the choice of this study to solely focus on the bordering areas. As the treatment is on LGA level, the control group is also selected based on what LGAs are most suited.

Technically, there are a few potential control groups. A first group would consist of the entire North Eastern region of Nigeria. This would clearly form the largest sample, but the differences between the individual regions are obviously larger. Moreover, not all the states in the North East were subject to the state of emergency and schools might not have been closed in every state. This implies the areas are not comparable and results would be biased. Second, only states in which the state of emergency was declared in 2013 can form the control group. The advantage would be that these states would all be exposed to similar rules. However, a large number of these LGAs were not exposed to violence due to the insurgency. Another option would be to consider only contested LGAs.[17] This sample would, however, be too small as only the inhabitants of four LGAs

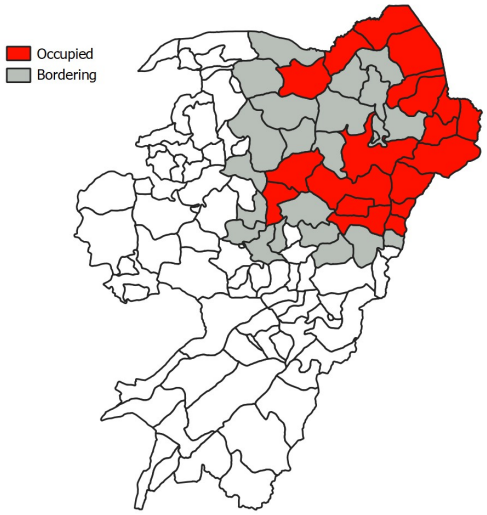
(through media outlets, etc.). However, as the survey that this study relies on was able to be conducted again in September-November 2015, it is assumed that the areas were no longer under Boko Haram control.

[17] First, Boko Haram occupied vast areas in the North East in almost one swift move, but was pushed back by the military starting early 2015. However, there was some push-back to Boko Harams territorial aspirations from mid-2014 to early 2015, prior the the task-force moving in. Using ACLED data on both government and Boko Harams' take-over of territory, certain areas are marked as "contested": where, in the same quarter, both Boko Haram and the government took over an area from the others' control (see figure A.10). This provides insight into potential government presence in various areas and where Boko Harams' territorial control was challenged. No territory was contested prior to the third quarter of 2014, or after the first quarter of 2015. The last image shows all contested areas and the areas that were occupied according to the IOM. It is noteworthy that the most southern areas that were contested (at the end of 2014 and early 2015) are not included in set of LGAs that the IOM identified as under

are considered to be contested.

Finally, a considerable group of LGAs directly bordered the occupied areas. These areas have been exposed to the violence of the insurgency. Moreover, they were threatened with potential occupation (though none were occupied at any point in time): in that sense, it was unknown to individuals in these LGAs whether they would be "treated" or not. For these reasons, the control group that will be used in this study consists of the individuals in the sample that live in an LGA directly bordering the LGAs that were occupied by Boko Haram.[18]

Figure 1: Control group: bordering areas



Note: The maps show various control groups and the (fixed) areas that are considered treated. First, the areas that were contested but not fully conquered by Boko Haram; areas that bordered the occupied areas and might have been exposed to similar dynamics/violence; and all LGAs that experienced the state of emergency.

4.3. Descriptive statistics

The treatment and control group have very similar characteristics, though there are some differences that are significantly different from zero (see table A.10). For example, the treatment group contains slightly more rural and smaller, but fewer Muslim households. These differences will be addressed in the estimation by including controls and individual level fixed effects.

The exposure to violence of individuals in our sample is shown in figure 2. The difference between the two groups is striking: those in the non-occupied areas have, on average, been exposed to higher levels of violence than those in the treatment group. This is in line with the discussion in section 3: rebels acting as stationary bandits in occupied territory have very little incentive to target those

Boko Haram control; this supports the notion of (potentially) not fully occupied areas having been excluded from the IOM definition.

[18]Note: the results are robust to using different control groups in the specification - see the appendix.

living under their rule. Moreover, violence would be aimed at enforcement of rules, more so than 'generic' violence. Simultaneously, violence is used in order to loot and extract resources from those not living under rebel rule - such as those in bordering areas. There is anecdotal evidence that this was also the case with Boko Haram: the group was said to use its territory as a base from which to carry out attacks in neighboring areas (CFR, 2018). To account for these differences in exposure to violence, controls for exposure to violence will be included in the analysis.

The two main variables of interest that capture the level of cooperation with Boko Harams' rebel governance, increase in the YoE and school attendance, are shown in figure 3. Considering the left panel of the figure, it is clear that the average annual increase in education among children in the treatment and control group were more or less similar prior to the occupation. This differs greatly between the two groups when considering the increase in YoE throughout the years of the occupation. Note that the "gap" in the data, during which Boko Haram occupied LGAs, is about 2.5 years in total, while the occupation of Boko Haram lasted approximately a year.[19] Throughout these 2.5 years the children in the control group witnessed an average increase of 1.3 years in YoE, while children in the treatment group increased their education with about half a year. Considering school attendance (right panel), two things jump out: first, the rate of school attendance was slightly lower for individuals in the treatment group, compared to those in the control group, before the treatment. Second, whereas attendance rates among children in the control group are higher after the occupation than before the occupation, for children in the treatment group the reverse is true: school attendance rates have decreased.

5. Empirical approach

5.1. Difference-in-difference estimation

The objective of this study is to estimate and explain the effect of exposure to Boko Haram's temporary occupation and rebel governance on the increase in YoE and current school attendance of children. The following model is estimated:

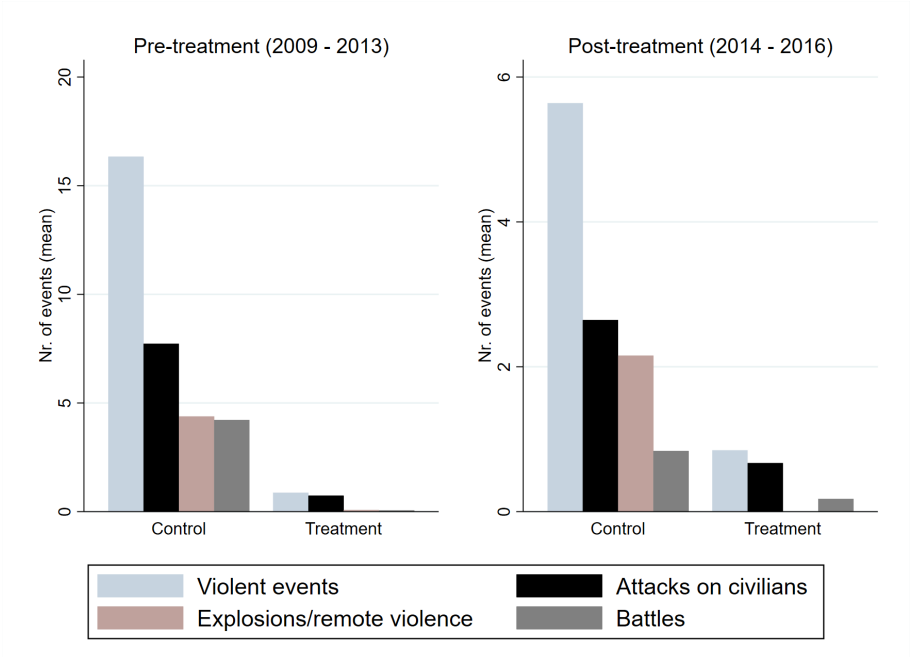
$$Y_{i,t,j} = \alpha_i + \lambda_t + \beta_{i,j,t}(D_t * occupation_{i,j}) + \sigma_{i,j,t}X_{i,j,t} + \epsilon_{i,j,t} \quad (1)$$

Where $Y_{i,t}$ is a continuous variable that captures the increase in the total YoE of individual i, living in LGA j, in year t or a binary variable that captures school attendance.[20] D_t is a dummy variable that is equal to one for 2014 onward. *occupation* is the treatment variable, which is equal

[19] These 2.5 years spanned roughly two school-years, 2013/2014 and 32014/2015.

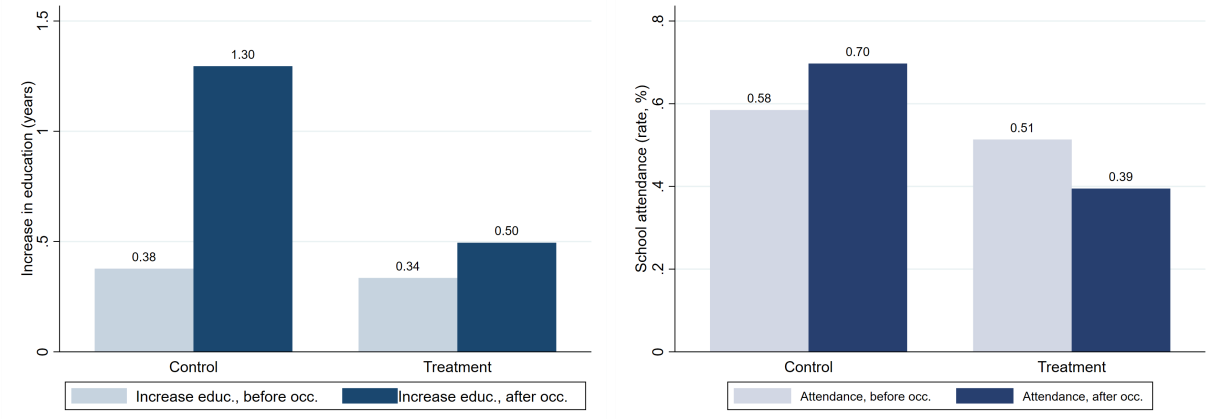
[20] The first captures the annual increase in total YoE, and is therefore one if a child attended school throughout the school-year, but equal to a maximum of two years during the treatment period due to the gap between the moments the survey was conducted. The latter variable is based on the answers respondents gave to the "Are you currently attending school?" or "Did you attend school in the previous school-year?" survey questions.

Figure 2: Violence



Note: The graphs show the sample average levels of violence (measured as the number battles, attacks on civilians, or explosions/remote violence occurring in a 10km radius of the household) for the treatment or control group in the years prior to the treatment (2009 - 2013) and for the post-treatment period (2014 - 2016).

Figure 3: Increase in YoE and school attendance



Note: Sample averages of the two main dependent variables of this study, increase in YoE and school attendance, for the treatment and control group.

to one for individuals living in one of the LGAs that were occupied by Boko Haram. α_i captures the individual fixed effects, λ_t the school-year fixed effects, and $\epsilon_{i,t}$ is the error term.

$X_{i,t}$ is a vector of control variables. Controls included are a dummies for whether the father of the child works in agriculture, the child is of mandatory school-going age (6-14 y/o), it is a rural

household and the household head is Muslim; the household size, the number of sons/daughters of school going age in the household, exposure to violence and individuals' age, as well as and rainfall and temperature (on LGA level).[21]
All standard errors are clustered on LGA level. As there are only 16 clusters in the sub-sample, the robustness of the results is tested by using the wild bootstrap method proposed by Cameron et al. (2008). The results presented are robust to this specification.

5.2. Heterogeneity of effect: drivers of cooperation

As mentioned in section 3, those who share social identity markers with the rebel group and/or have positive sentiment towards the group are more likely to adhere to the rules of the rebels. The first is estimated by interacting the treatment variable with a dummy for whether or not the household is Muslim. The second by using the measure of Archibong (2019) as an instrument to capture higher levels of support for Boko Haram, as well as increased social cohesion. Due to the potential overlap between sharing social identity markers and living in an area with heightened support for Boko Haram, these two factors will be considered simultaneously.
Additionally, enforcement of rule is an important tool rebels use in order to influence the behavior of those they govern. By using violence to ensure civilians adhere to the anti-educational rule Boko Haram might have intimidated the population and raised fears of punishment. It is examined whether the baseline effect is driven by those who have experienced targeted violence by considering the heterogeneity of the effect for those who have, and have not, experienced such enforcement. Enforcement is operationalized by a variable capturing attacks to the school closest to the household. Finally, the literature suggests that it is likely that there are differences in educational outcomes by gender and birth cohort. All the mentioned factors potentially leading to a heterogeneous effect – social identity, social pressure, school-focused violence, gender and birth cohort, captured below by $W_{i,j,t}$ – are interacted with the treatment variable in equation 2.

$$Y_{i,t,j} = \alpha_i + \lambda_t + \beta_{i,j,t}(D_t * occupation_{i,j} * W_{i,t,j}) + \sigma_{i,j,t}X_{i,j,t} + \epsilon_{i,j,t} \tag{2}$$

5.3. Mechanisms

This study considers the effect of exposure to rebel governance through living in occupied areas within a context of civil war. Therefore, aside from estimating the effects as outlined above, it is important to consider what mechanisms – potentially due to the general conflict setting – might drive the effects. The first group of mechanisms can affect the demand for schooling, such as child labor (whether a child works for a household farm, did other paid work, or for a household business), child health (whether a child got sick, or visited a doctor or other healthcare professional),

[21] Violence is measured as number of fatalities due to Boko Haram related events within a 5km radius of the household, similar to the measure used by Bertoni et al. (2019).

child marriage, and decreasing labor market prospects or potential future returns to education. Additionally, fear and intimidation due to having experienced violence might cause a decline in demand for schooling.[22] The second group affects the side of school supply (the number of primary and secondary schools, whether the time to get to school has increased, the type of school has changed). All these mechanisms are estimated by regressing the treatment variable together with the controls, as above, on the respective outcomes:

$$V_{i,t,j} = \alpha_i + \lambda_t + \beta_1 D_t * occupation_{i,j} + \beta_2 X_{i,t} + \epsilon_{i,t} \tag{3}$$

Where $V_{i,t,j}$ captures dummies for child labor, child health, child marriage; or continuous variables capturing violence, school supply and payoffs of education.

6. Identification

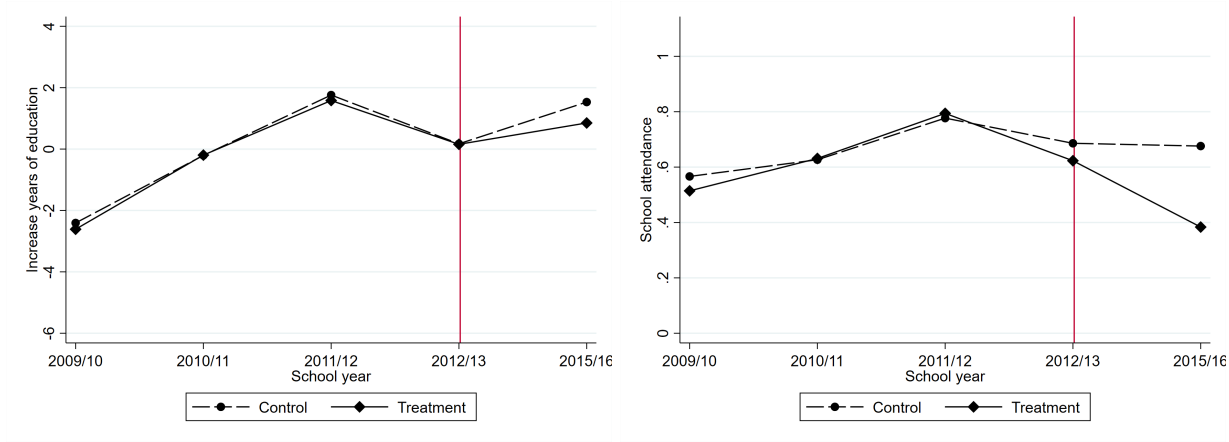
The previous sections elaborated on the selection of the appropriate control group, the comparability of the treatment and control group, and provided a first look at the data. This section focuses on the identification of the effect, specifically to determine the randomness of the occupation of areas and as to identify potential threats to the exogeneity of the treatment. First, it is important that the treatment and control group show similar trends prior to the intervention (pre-event study). Second, it should not be the case that there are very high attrition rates due to the treatment, or forms of self-selection into either group. Finally, the possibility of various confounding factors that contributed to certain areas (not) being occupied should be considered. Factors discussed are pre-existing pro-Boko Haram sentiment that might have made it easier or more likely that certain areas were occupied, LGA-level characteristics such as ruggedness of the terrain, population density, or the distance to Boko Harams' basecamp in the Sambisa Forest; and community-level variables related to local infrastructure, public good provision, and development.

6.1. Pre-event study

In order to ensure that the difference-in-differences estimation truly captures the effect of occupation certain assumptions should be satisfied. First, it is important that the treatment and control group show similar trends prior to the intervention (pre-event study). The conditional trends of the treatment and control group with respect to the increase in YoE are presented in figure 4. Clearly, the trends of the treatment and control group with respect to the YoE as well as school attendance follow very similar paths prior to the start of the treatment and diverge directly after.

[22] Though violence targeted at schools is examined as a potential determinant for cooperation with Boko Harams' anti-educational rule, exposure to 'general' violence (attacks on civilians, explosions and remote violence and battles in the vicinity (10km radius) of the household) might be able to explain shifts in behavior as well. Moreover, by examining violence as a potential mechanism it is shown whether violence, and not occupation and subsequent exposure to rebel governance, is the driver behind the effects.

Figure 4: Pre-event study: school attendance and increase in YoE



Note: The conditional trends for school attendance and increase in YoE for the control (solid line) and treatment (dashed line) group. Note that the occupation started in 2014, but the last available observation in the data is the 2012/2013 school-year (Spring 2013); hence the location of the red treatment line on the x-axis. Finally, the gap between each observed data point is one school-year, except for the last interval, which spans two school-years.

6.2. Attrition and migration

Attrition is, with the treatment being living in an area occupied by an extremely violent terrorist group, an obvious concern. The attrition rate is eight percent in the control group, and there is no attrition in the treatment group. There might be various reasons for this. First, as mentioned above, the survey design was altered in 2015 in order to adjust to the situation in the North East. Any LGAs that are not continuously included in the survey design are excluded by default, thereby potentially omitting the respondents that might have dropped out of the sample. Second, the higher attrition rate in the control group might be due to various households having the possibility to flee the area, while this was not an option for those who lived in – eventually occupied – territories. It is also noteworthy that many individuals cannot flee, as they have no place to go (no family members they can go and live with), the refugee camps are not considered a good (enough) alternative, or fleeing itself is too dangerous (Unicef, 2015). Additionally, as discussed in section 2, Boko Haram prohibited inhabitants of occupied villages to leave the area. Third, it is important to consider migration with respect to exposure to violence. Correlating the different types of violence (battles, attacks on civilians, and explosions/remote violence) with data on migration flows from FEWS, it seems that migration between 2014-2016 was primarily driven by attacks on civilians in the years prior. This corresponds - considering figure 2 - to the higher attrition rates in the control group. All the individuals that attrited are removed from the sample. Importantly, there do not seem to be any differences with respect to age, gender, various household characteristics, or exposure to violence between these individuals and those who remained in the sample.

6.3. LGA-level: Pro-Boko Haram sentiment and other factors

The fact that only specific areas were occupied by Boko Haram might raise concerns that, for whatever reason, these areas were 'easier' to gain control over than others. One possible explanation is that there was (heightened) pro-Boko Haram sentiment among the population of certain areas. If this is the case, it is a clear threat to the identification of the effect and exogeneity of the treatment.

Boko Haram is not the first fundamentalist Islamic group that carries out violent attacks and incites uprisings in the North East, and there is evidence of longer-running grievances and anti-governmental sentiment.[23] Considering the current-day impact hereof, Archibong (2019) shows that there is a significant negative association between the precolonial centralization of a region that also had a Muslim majority population, and access to public goods and infrastructure. As mentioned in section 3, the perception of institutions - such as the education system and schools - with respect to their effectiveness and legitimacy can determine local support for rebel governance. Moreover, Brechenmacher (2019) finds that weak service provision and negligence on behalf of the government lead to increased local support for Boko Haram.

The measure of Archibong (2019) is used as an instrument for an area having higher levels of positive sentiment towards Boko Haram. It is estimated whether the level of support for Boko Haram differs across the treatment and control group. If this would be the case, the positive sentiment might be able to explain why Boko Haram managed to occupy and hold on to certain territories, and was not able to do so with respect to other LGAs that do not share historical similarities.

Table 1 shows that there was no significant difference between non-occupied, bordering LGAs and the occupied LGAs in terms of the measure for positive sentiment towards Boko Haram. This indicates that there was most likely no difference in the sentiment towards Boko Haram that could have contributed to certain areas being occupied and others not. Additional factors, such as population density, ruggedness of the terrain, and the distance to the Sambisa forest - Boko Harams initial base - are also considered. The areas that were occupied are more rugged and more likely to be close to the Sambisa forest. The differences in these time-invariant variables are addressed by

[23] Many scholars refer to the Maitatsine followers and uprisings in the 1980s as drawing on similar anti-Western, anti-secular, and anti-educational sentiment and ideology as Boko Haram (Adesoji, 2011; Aghedo, 2017). This sentiment has its roots in religious and ethnic differences (between the North and South), pre-existing economic conditions, and local governance. For an excellent discussion of these matters (and their relationship to current-day local development), see Archibong (2019). Summarizing, Archibong (2019) shows that centralized regions (with a clearly identifiable sovereign) had the ability to bargain with the federal (British) regime to obtain access to public goods or infrastructure in colonial times. In order to be able to bargain, a region had to be compliant – for example, through supporting direct taxation. Moreover, in the northern part of Nigeria, the ruling Muslim elite was granted a significant level of autonomy, especially with respect to matters of religion and tradition (for in-depth reading on this topic, see, for example, Adesoji (2011) and Aghedo (2017)). This level of autonomy was institutionalized first in the Native Authority Proclamation of 1907, and later again in the Native Authority Law of 1954. The latter ensured that these ethnic regional leaders, in northern areas where the population was predominantly Muslim, had almost absolute power and were able to implement, for example, Shari'a law. In 1976, under military rule and after the civil war, these leaders were removed from politics. This abrupt end to the absolute power of the regional leaders faced strong opposition and contributed to local grievances and anti-governmental sentiment.

including individual fixed effects.

Table 1: LGA level differences

Variable	Control	Treatment	Difference	T-test
Centralization # Muslim super-majority	0.240	0.667	-0.428	-1.689
Ruggedness	215015.1	3798684	-3583669**	-2.998
Density	275.586	70.060	205.526	.472
Distance to Sambisa forest	299.199	150.25	148.949*	2.422
N	16			

Note: The table shows the averages for the control and treatment group for various measures on LGA level. Difference between the means in column four, t-test in column five. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.4. Community level: development, infrastructure and provision of public goods

Are the communities, villages or towns in the occupied and non-occupied areas comparable? The community-survey data from the NGHS, where respondents from villages are asked about the presence of various public goods and infrastructure, is used to answer this question. Table 2 shows whether public goods are present in the average community in the treatment and control group. In terms of development and local infrastructure the communities that were occupied were similar to those that remained under government control, with the exception of treated areas having a higher number of health centers. Remaining unobserved structural differences between occupied and non-occupied communities are addressed by including individual fixed effects in every estimation. As individuals do not move, including these effects captures community-level fixed effects.

7. Results

As Boko Harams' occupation was temporary, it is possible to study the immediate and long-term effects of exposure to the groups' occupation on educational outcomes. As outlined in section 5, two different dependent variables are used. First, the increase in the total number of years of education (YoE). By estimating the effect of the occupation on this outcome, the result captures whether or not - and how long - children attended school in this time period (the immediate effect). Second, school attendance rates, measured after the occupation had ended, capture whether responses to the occupation were permanent, or changed again when the government regained control (the long-term effect).

Table 2: Community level differences

Variable	Control	Treatment	Difference	T-test
Primary school	.857	1	-.143	-1.183
Secondary school	.6	.889	-.289	-1.568
Health center	.667	1	-.333*	-2.049
Public hospital	.333	.375	-.042	-.204
Pharmacy	.211	.125	.086	.505
Post office	.191	.125	.066	.404
Bus stop	.583	.625	-.042	-.196
Bank	.15	0	.15	1.145
Police station	.55	.75	-.2	-.969
Market	.619	.889	-.270	-1.483
Fire station	.105	.286	-.181	-1.115
N	31			

Note: The table indicates whether, on average, a public good is provided/present in the town/community (0 = not present, 1 = present) prior to 2014. Data is based on the surveys conducted in 2010 and 2012. Difference between the means in column four, t-test in column five. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

7.1. During the occupation: increase in YoE

Column one of table 3 shows the results of the baseline estimation of the immediate effect, capturing changes in schooling behavior during the occupation. Children in areas that were occupied had 0.66 years less of schooling throughout the occupation compared to children in non-occupied areas, when controlling for pre-treatment differences between these groups. The 0.66 years correspond to about 8 months, and are incurred in the time period of about 2.5 years (and 2 school-years) between the last observed point in the data (March 2013) and the post-treatment observation (September 2015).[24] To put the number in perspective, the average number of YoE for adults in the sample is 4.90. This implies that the set-back of 0.66 years corresponds to about 14 percent of the average educational achievement in the region.

Considering the heterogeneity of this effect provides insight into who was most likely to comply with Boko Harams' anti-educational rule. First, the results indicate that there is no significant difference between genders. There is a clear difference between birth cohorts. Younger children, from the second and third cohort (born between 2002 - 2008) are more likely to have accumulated less YoE than their counterparts who did not experience Boko Harams' occupation. This implies that mainly younger children, who might have just started school, were more likely to stay or

[24] As noted in section 3, though the exact duration of Boko Haram's occupation of various areas differs, LGAs were occupied for a minimum of eight and maximum of twelve months.

be kept at home. Additionally, those who share a social identity with Boko Haram - children from Muslim households - are more likely to have not attended school throughout the occupation and have significantly lower schooling outcomes at the end of the occupation. Children who lived in areas with positive sentiment towards Boko Haram, and (whose parents or household) might have experienced social pressure to conform to the anti-educational rule, also suffer significantly negative setbacks compared to children who do not experience this pressure. Finally, the fact that the coefficient on the occupation variable - the baseline - is positive and insignificant might suggest that the majority of the effect is, actually, driven by those who share an identity with Boko Haram and/or experience social pressure to conform.

There are interesting findings with respect to violence. First, having experienced the occupation and (non-)school focused violence is associated with a higher increasing education. This is most likely a case of reverse causality: places where education might be higher might have been targets for Boko Haram. Second, there is a strong, significant negative effect from having experienced Boko Harams' enforcement of its anti-educational rule (violence targeted at schools, teachers, students, etc.). Those who have experienced such violence increased their education less throughout the time period than those who were not exposed to it. There does not seem to be a significant impact from having experienced non-targeted violence while being occupied.

7.2. After the occupation: school attendance rates

When considering the long-term impact of Boko Haram's occupation on school attendance rates the results indicate that children in the treatment group are 26 percent less likely to be attending school in the 2015/2016 school-year than children in the control group (see column one, table 4). This finding corresponds to anecdotal evidence regarding a significant decrease in school attendance rates among children of obligatory school-going age reported by NGOs such as Unicef (2017). Moreover, it shows that potential changes in behavior during the occupation - rejecting education, not attending school - have carried over until after the occupation.

When considering the heterogeneity of the effect by gender, it seems to be the case that girls specifically are more likely to drop out of school. Interestingly, there does not seem to be a difference across birth cohorts with respect to school attendance after the occupation. This might imply that the younger children who were more likely to not attend school during the occupation, continue their education afterwards. They might thereby 'catch-up' on schooling.
Additionally, those from Muslim households - who experienced potentially the strongest negative effect during the occupation itself - show significantly lower school attendance rates afterwards. Unfortunately, if these children stay out of school, the initial set-back might become permanent and result in definite loss in educational achievements. However, interestingly – when controlling for whether a child is from a Muslim household and faced the occupation – children from areas

Table 3: Baseline results and heterogeneity: increase in YoE

	Baseline (1)	**Gender** (2)	**Birth Cohort** (3)	**Social identity & pressure** (4)	**Enforcement of rule** (5)
Occ.	-0.664**	-0.595**	-0.354	0.122	-0.587**
	(0.235)	(0.276)	(0.314)	(0.232)	(0.267)
Occ.#Female		-0.140			
		(0.181)			
Cohort 2			0.151		
			(0.285)		
Cohort 3			-0.009		
			(0.431)		
Occ.#Cohort 2			-0.579**		
			(0.217)		
Occ.#Cohort 3			-0.509*		
			(0.262)		
Occ.#Identity				-0.874**	
				(0.307)	
Occ.#Pressure				-0.448**	
				(0.147)	
School-violence					0.597***
					(0.108)
Occ.#School-violence					-0.653***
					(0.210)
Non-school Violence					0.270**
					(0.105)
Occ.#Non-school violence					0.062
					(0.182)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
N	1387	1387	1387	1088	1387
Clusters	16	16	16	11	16

Note: The table shows the estimation of the treatment effect, being exposed to Boko Haram's occupation, on increase in YoE and school attendance. Being female, Muslim, and living in a predominantly Muslim village are time invariant variables and absorbed by the individual fixed effects. The three birth cohorts are defined as children being born between 1998-2002, 2003-2005 or 2005-2008 (cohorts one, two and three). Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

where there was heightened social pressure are more likely to be attending school. It might be that the fear of not complying ceased (somewhat) after the occupation ended, resulting in these children returning to school.

Finally, those who have experienced the enforcement of Boko Harams' rule are much less likely to attend school after the occupation has ended. Having experienced significant pressure through such enforcement might lead to high levels of fear. Moreover, as it was known that even though

Boko Haram was expelled from the occupied territories, the group was not fully defeated, fear of Boko Haram returning might have prevented children from attending school again.

Table 4: Baseline results and heterogeneity: school attendance

	Baseline (1)	**Gender** (2)	**Birth Cohort** (3)	**Social identity & pressure** (4)	**Enforcement of rule** (5)
Occ.	-0.262**	-0.117*	-0.234*	-0.308***	-0.221***
	(0.107)	(0.064)	(0.111)	(0.070)	(0.063)
Occ.#Female		-0.281*			
		(0.135)			
Cohort 2			0.062		
			(0.069)		
Cohort 3			0.057		
			(0.116)		
Occ.#Cohort 2			-0.068		
			(0.167)		
Occ.#Cohort 3			-0.052		
			(0.186)		
Occ.#Identity				-0.354**	
				(0.146)	
Occ.#Pressure				0.199***	
				(0.043)	
School-violence					-0.028
					(0.046)
Occ.#School-violence					-0.542***
					(0.058)
Non-school violence					-0.007
					(0.010)
Occ.#Non-school-violence					0.070**
					(0.028)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
N	1639	1639	1639	1283	1639
Clusters	16	16	16	11	16

Note: The table shows the estimation of the treatment effect, being exposed to Boko Haram's occupation, on increase in YoE and school attendance. Being female, Muslim, and living in a predominantly Muslim village are time invariant variables and absorbed by the individual fixed effects. The three birth cohorts are defined as children being born between 1998-2002, 2003-2005 or 2005-2008 (cohorts one, two and three). Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

8. Mechanisms

The above focuses on the adjustment of behavior in response to direct exposure to rebel governance. However, this study is also concerned with what happened after the occupation ended and individuals no longer faced rebel rule. In this time period, "regular" civil war or conflict dynamics might have become more prominent. Moreover, since the effect of occupation is identified and estimated in a conflict setting, it is important to acknowledge the potential presence of mechanisms that are not specific to rebel rule, but conflict in general. The various mechanisms affecting the demand for and supply of education are discussed below.

8.1. Demand side mechanisms

8.1.1. Child labor, health status, and marriage

A potential explanation for the decrease in schooling is that the conflict lead to a drop in household income, increasing the need for children to work instead of attending school (Bundervoet et al., 2009; Duryea et al., 2007; Jacoby & Skoufias, 1997; Thomas et al., 2004). The household survey provides data on whether an individual worked outside the household, for a household owned business or on the household farm. Table 5 contains the results. Interestingly, children who lived in previously occupied areas are less likely to be working for a household business. However, there is no further evidence of differences in the labor choices between children in the treatment or control group.

Moreover, it is possible that children cannot attend school due to worse health. This worse health status can be caused by the insurgency, either through exposure to violence or lack of access to healthcare (Allison, Attisha, et al., 2019). Data from the NGHS on health status and healthcare usage is used to shed light on this matter. The survey includes questions on whether the child visited a doctor or healthcare professional, was ill, or sustained an injury in the past four weeks. The results are presented in table 5, column four and five. There is no evidence that suggests that health status might influence the choice whether or not to attend school.[25]

It is possible that children get married during the occupation and therefore drop out of school. Child marriage has been shown to be common during insurgencies and civil war due to increased insecurity as well as linked with lower educational attainment and school drop-out (Mazurana et al., 2019; Mourtada et al., 2017; Nguyen & Wodon, 2014; Parsons et al., 2015; Walker, 2013). The results are presented in table 5. Child marriage seems to not be affected by the occupation of Boko Haram. The effect (not shown) is not significant for either boys or girls separately. When asked why children are not working (or attending school), those living in areas that were occupied by Boko Haram are 20 percent more likely to indicate that they stay at home in order to perform

[25] There are no differences in the presence of hospitals, health centers or pharmacies in previously occupied communities and those that were not occupied - see table A.11.

household and childcare tasks (see column 7, table 5).

Table 5: Labor, health, marriage, house work and interest in schooling

	Child labor			Health status		Child marriage	Other	
	(1) *Household business*	(2) *Household farm*	(3) *Other work*	(4) *Illness or injury*	(5) *Doctor visit*	(6) *Child is married*	(7) *Household or childcare*	(8) *(Parental) interest*
Occupation	-0.079*	-0.030	-0.013	-0.015	-0.036	-0.002	0.198**	-0.024
	(0.039)	(0.060)	(0.022)	(0.017)	(0.024)	(0.021)	(0.089)	(0.046)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1670	1670	1670	1077	1077	1670	1670	576
Clusters	16	16	16	16	16	16	16	16

Note: The table shows different alternative explanations for why children might not attend school, namely working instead of attending school, health status, or being married. Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

8.1.2. (Un)employment and returns to education

Education is an investment that is made if there is an expected likelihood of future returns. Conflict might negatively expect these expectations, resulting in deteriorating schooling outcomes (Chamarbagwala & Morán, 2011; Shemyakina, 2011). In order to examine this mechanism various factors are considered: whether children indicate that they do not attend school due to a (parental) lack of interest, there are general labor market effects due to the occupation, and if the occupation had a differential effect on those that completed primary education, i.e., whether the returns to education have changed.

This is examined by selecting a sample of individuals that are older than 15 (i.e., older than mandatory school-going age) and rerunning the baseline analysis with various dependent variables relating to the labor market: average wage, employment rate, and the number of hours worked per week.[26]

There is no evidence that the occupation had a general negative effect on the labor market (table 6, columns one to three). Moreover, there seems to be an education premium: those with at least primary school education earn higher wages and are more likely to be employed - but not work more hours - than those without at least six YoE (table 7, columns one to three).

Interestingly, when considering these effects for women only (see table 6), the results suggest that the occupation resulted in women working more hours in general. However, women with a primary school education work significantly fewer hours (but are more likely to be employed) than women without a similar education level. There was not sufficient data to estimate whether there is a wage premium for women that have a primary school education.

[26] All individuals, older than 15 years, observed at least once before and after the treatment period, and living in either the occupied or bordering areas are included in this sample.

Table 6: Labor market

	General employment effects			General employment effects (women)		
	Wage	*Employment*	*Hours worked*	*Wage*	*Employment*	*Hours worked*
	(1)	(2)	(3)	(4)	(5)	(6)
Occupation	-11.755	-0.065	4.214	-0.898	0.031	37.368***
	(18.389)	(0.084)	(6.326)	(11.960)	(0.098)	(2.497)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
N	205	2297	915	65	1164	415
Clusters	15	16	16	9	16	16

Note: The dependent variable in column one is a dummy equal to one when the respondent indicates not to attend school as there is no (parental) interest in schooling. Wage is the average wage (in thousands of Naira) of an employed respondent, employment is a dummy equal to one when the respondent indicates to be employed, and hours worked captures the weekly number of hours worked as reported by employed respondents. P.educ. is a dummy equal to one when a respondent has completed primary education, defined as 6 or more YoE. Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Returns to education

	Education premiums			Education premiums (women)		
	Wage	*Employment*	*Hours worked*	*Wage*	*Employment*	*Hours worked*
	(1)	(2)	(3)	(4)	(5)	(6)
Occupation	-139.137*	-0.152*	31.098	-5.889	-0.016	73.623***
	(77.557)	(0.084)	(31.365)	(14.302)	(0.100)	(6.171)
Occupation * P.educ.	137.432*	0.216*	-40.078	0.000	0.162	-69.405***
	(76.411)	(0.107)	(30.936)	(.)	(0.101)	(8.859)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
N	205	2297	915	65	1164	415
Clusters	15	16	16	9	16	16

Note: The dependent variable in column one is a dummy equal to one when the respondent indicates not to attend school as there is no (parental) interest in schooling. Wage is the average wage (in thousands of Naira) of an employed respondent, employment is a dummy equal to one when the respondent indicates to be employed, and hours worked captures the weekly number of hours worked as reported by employed respondents. P.educ. is a dummy equal to one when a respondent has completed primary education, defined as 6 or more YoE. Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

8.1.3. Exposure to violence

Violence is a frequently cited reason for children to be kept home and not attend school, with fear of attacks decreasing the demand for education. Though the heterogeneity of the effect is examined for those experiencing non-school and school-focused violence, a potential difference in exposure to "general" types of violence close to the household might play a role. In order to examine this possible mechanism, the three main forms of violence – attacks on civilians, battles, and explosions and remote violence – taking place within a 10km radius of the household are considered. The results are shown in 8. There does not seem to be any evidence suggesting that exposure to violence is a mechanism through which the demand for education decreased, driving the negative effects of the occupation on schooling outcomes.

Table 8: Exposure to violence

	Attacks on civilians (1)	**Battles** (2)	**Explosions and remote violence** (3)
Occupation	0.064	-0.902	0.838
	(0.927)	(0.693)	(0.699)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
N	1670	1670	1670
Clusters	16	16	16

Note: The results above show whether experiencing attacks on civilians, battles, explosions/remote violence within a 10km radius of the household were affected, or more likely, for those living in the occupied areas. Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

8.2. Supply side mechanisms

8.2.1. School supply

It has been shown that physical destruction of infrastructure, such as the destruction of school buildings, leads to lower educational outcomes (Akbulut-Yuksel, 2014). Moreover, school accessibility has been found to be positively correlated to schooling (Jayachandran et al., 2002). A low(er) school supply is a logical mechanism behind the decrease in schooling outcomes in the occupied areas. The absence or destruction of schools or other educational facilities might prevent children from going to school. Moreover, teachers might have left the area due the insurgency and Boko Haram's strong anti-educational views.

The school supply channel is examined in two ways. First, using the community-survey data from the NGHS, the presence of schools in the villages of the respondents in the sample after the occupation is studied.[27] The occupation does not seem to have had a significant effect on the presence of schools in the communities (see column one and two of table 9). Moreover, the various forms of violence - such as school-focused and non-school focused violence - did not have a negative effect on the presence of schools. However, the - though small - positive and significant association between non-school violence and the number of secondary schools might suggest that more violence took place in areas where there were more secondary schools. This, in turn, might be associated with the fact that there was a drop in the number of secondary school teachers.[28] In general, the

[27]The community survey was conducted during the fall of 2015, after the end of Boko Haram's occupation of various LGAs.

[28]The data from UBEC on LGAs that were previously occupied is very limited (there is only one LGA included in the data) and the results are therefore not conclusive and for this reason not shown here. If one would ignore this blatant shortcoming and consider the impact of the occupation on the number of primary and junior secondary school teachers, there seem to be more junior secondary school teachers, but significantly less primary school teachers. The absence of teachers or a high student to teacher ratio in a primary school might explain part of the drop in school attendance.

presence of both primary and secondary schools suggests that children (or their parents) have the option to attend school but choose not to.

Moreover, there is no evidence that children who did attend school after the occupation were more likely to attend a different type of school, faced higher commuting times, or that the education-related expenditure incurred by the household was higher. These results are shown in table A.12.[29]

Table 9: School supply

	Primary schools (1)	**Secondary schools** (2)	**Primary schools** (3)	**Secondary schools** (4)
Occupation	-0.027	-0.075	-0.025	-0.051
	(0.022)	(0.063)	(0.026)	(0.070)
School-violence			-0.053	0.004
			(0.049)	(0.232)
Non-school violence			0.023	0.075**
			(0.018)	(0.029)
Occ.#School violence			0.083	-0.009
			(0.061)	(0.232)
Occ.#non-school violence			-0.006	0.002
			(0.010)	(0.049)
Controls	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1670	1670	1670	1670
Clusters	16	16	16	16

Note: Dependent variable is a dummy that indicates the presence of either a primary or secondary school in the community. Standard errors, clustered by community (column one and two) or on LGA (column three to six), in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Finally, it is examined whether the overall level of development or presence of infrastructure and public goods differed between communities in the occupied and non-occupied areas in the post-treatment period. The results are shown in table A.11. There are barely any police stations in the treated areas: this might contribute to lower levels of (perceived) safety, potentially affecting the demand for schooling. However, there are no other differences between the communities.

9. Concluding remarks

Though the effects of conflict and violence on microeconomic outcomes have been studied extensively, the effect of exposure to occupation and subsequent rebel governance has received little to no attention. However, not only is the occupation of territory by non-state actors common, the

[29] A note on the type of school attended in general: the 82 percent of the children in the sample attend federal, state or local government schools, 8.9 percent private schools, 0.7 percent a community school and 8.4 percent a religious school.

last decade has seen an increasing trend in the occupation and rule of territory by rebel groups. To illustrate the matter, in the past decade alone around half a million people lived under the rule of Boko Haram in 2014-2015, about three million under control of the Islamic state in 2016, and fifteen million under the Taliban in 2017. Clearly, it is of fundamental importance to consider the impact rebel governance and occupation can have on civilians.
This is especially the case with respect to groups such as Boko Haram, that strongly oppose education. Decreasing schooling outcomes can suppress the human capital accumulation of an entire generation and thereby the economic development of states. By considering the effect of insurgents' occupation of territory through a lens of rebel governance, this paper presents a new approach to considering the various ways that conflict can affect schooling outcomes of children.

This study disentangles the effect of conflict and rebel governance, and estimates the effect of exposure to the latter on behavior of individuals. In doing so, it examines whether those exposed to rebel governance adjust their behavior to adhere to the rebels' rule, and provides an in-depth discussion of channels and mechanisms that drive these effects. The focus is on the case of Boko Haram, an Islamic insurgent group with strong anti-educational stance, that temporarily occupied various areas in North East Nigeria in 2014. The temporary occupation of territory by Boko Haram is considered a quasi-natural experiment where a certain group was exposed to rebel governance and conflict, while another group was exposed to conflict but not affected by Boko Harams' governance. Empirically, the effects are estimated using rich and detailed individual-level panel data and estimating the effects through a difference-in-differences (DiD) approach. The treatment is defined as having been exposed to Boko Harams' occupation and subsequent rebel governance - those living in the areas that were directly bordering the caliphate form the control group.

This research considers what happened *during* the occupation as well as what happened *after* the occupation, thereby evaluating both the immediate and long-term impact of exposure to Boko Harams' governance. With respect to the first, the results indicate that the occupation of Boko Haram, and subsequent exposure to rebel governance, lead to decreasing educational outcomes for children of mandatory school-going age relative to those who were not exposed to the groups' governance. Moreover, those who share an identity with the governing rebel group might be more likely to comply, and experiencing social pressure to conform to the rules of Boko Haram - operationalized by living in an area with heightened levels of support for the rebel group - also leads to a decrease in a childs' schooling. Those who were more likely to have a higher level of education were exposed to higher levels of violence, both in terms of violence targeted at schools and 'general' violence. This implies that Boko Haram targeted those who were least compliant. In turn, being being exposed to Boko Harams' governance as well as this violent enforcement of their anti-educational rule lead to higher compliance and coordination: those children have significantly lower educational outcomes than others. Interestingly, exposure to governance and non-targeted violence did not have a similar effect.
Considering the long-term impact, evidence indicates that children from households that faced the

occupation and governance of Boko Haram are 26% less likely to attend school than those from the control group. Interestingly those who shared an identity with Boko Haram, and showed higher rates of compliance with the groups' rule during the occupation, are more likely than others to show similar behavior after the occupation has ended: children are significantly less likely to be attending school. However – when controlling for having faced the occupation and sharing an identity with Boko Haram – children from the treatment group that experienced social pressure to conform are more likely to be attending school. Having experienced enforcement of the anti-educational rule seems to have lead to intimidation and fear: those who have been exposed to such violence are significantly less likely to be returning to school. Additionally, especially female children are likely to drop out of school.

Finally, in order to account for these findings being driven by the general context of conflict, and not rebel governance, this study considered a variety of well-documented mechanisms affecting demand for and supply of schooling from the conflict literature. There are a few findings. First, children are more likely to cite being busy with childcare or other household tasks as a reason for not attending school; though wages and employment have decreased mildly in response to the occupation, there are significant premiums for those who have at least a primary school education. Moreover, there is no indication that there are significant shifts in the number of schools.

It is crucial to understand the impact of insurgents' governance during and after occupation and what drives behavioral changes of those exposed to such governance. Addressing a gap in the literature, this study provides detailed insight into the effect of rebel governance on behavior of those confronted with such rule. As the results of this study show, the effects of exposure rebel governance vary starkly across groups and over time, and cannot be explained by more well-known mechanisms found in the literature. Moreover, this is one of the first papers that presents evidence that social identity, social pressure and network effects are ways through which occupation affects behavior of individuals. Clearly, to develop efficient peace-building and post-conflict development policies that target and support each group correctly, more detailed insight into such complex and multi-layered situations is needed. This study provides a first step in that direction.

References

Adesoji, A. O. (2011). Between maitatsine and boko haram: Islamic fundamentalism and the response of the nigerian state. *Africa today*, *57*(4), 99–119.

Afzal, M. (2020). From" western education is forbidden" to the world's deadliest terrorist group: Education and boko haram in nigeria.

Aghedo, I. Old wine in a new bottle: Ideological and operational linkages between maitatsine and boko haram revolts in nigeria. In: *Understanding boko haram*. Routledge, 2017, pp. 65–84.

Akbulut-Yuksel, M. (2014). Children of war: The long-run effects of large-scale physical destruction and warfare on children. *Journal of Human resources*, *49*(3), 634–662.

Akresh, R., & De Walque, D. (2008). *Armed conflict and schooling: Evidence from the 1994 rwandan genocide*. The World Bank.

Al Jazeera. (2014). *Boko haram seizes another nigerian town*.

Allison, M. A., Attisha, E. et al. (2019). The link between school attendance and good health. *Pediatrics*, *143*(2).

Amnesty International. (2015). *"our job is to shoot, slaughter and kill". boko haram's reign of terror in north-east nigeria*.

Anadolu Agency. (2015). *Boko haram seizes nigeria's askira uba*.

Anders, T. (2020). Territorial control in civil wars: Theory and measurement using machine learning. *Journal of Peace Research*, *57*(6), 701–714.

Anugwom, E. E. (2018). *The boko haram insurgence in nigeria: Perspectives from within*. Springer.

Archibong, B. (2019). Explaining divergence in the long-term effects of precolonial centralization on access to public infrastructure services in nigeria. *World Development*, *121*, 123–140.

Archibong, B., Modi, V., & Sherpa, S. (2015). Geography of infrastructure functionality at schools in nigeria: Evidence from spatial data analysis across local government areas. *Papers in Applied Geography*, *1*(2), 176–183.

Arjona, A. (2014). Wartime institutions: A research agenda. *Journal of Conflict Resolution*, *58*(8), 1360–1389.

Arjona, A. (2016). Institutions, civilian resistance, and wartime social order: A process-driven natural experiment in the colombian civil war. *Latin American Politics and Society*, *58*(3), 99–122.

Arjona, A. (2017). *Rebelocracy: A theory of social order in civil war* (Vol. 422). Helen Kellogg Institute for International Studies.

Arjona, A., Kasfir, N., & Mampilly, Z. (2015). *Rebel governance in civil war*. Cambridge University Press.

Barter, S. J. (2015a). The rebel state in society: Governance and accommodation in aceh, indonesia. *Rebel governance in civil war*, 226–245.

Barter, S. J. (2015b). Zones of control & civilian strategy in the aceh conflict. *Civil Wars*, *17*(3), 340–356.

BBC. (2015). *Nigeria's boko haram: Baga destruction 'shown in images'*.

Bertoni, E., Di Maio, M., Molini, V., & Nistico, R. (2019). Education is forbidden: The effect of the boko haram conflict on education in north-east nigeria. *Journal of Development Economics*, *141*, 102249.

Brechenmacher, S. (2019). *Stabilizing northeast nigeria after boko haram* (Vol. 3). Carnegie Endowment for International Peace Washington, DC, USA.

Bundervoet, T., Verwimp, P., & Akresh, R. (2009). Health and civil war in rural burundi. *Journal of human Resources*, *44*(2), 536–563.

Bursztyn, L., & Jensen, R. (2017). Social image and economic behavior in the field: Identifying, understanding, and shaping social pressure. *Annual Review of Economics*, *9*, 131–153.

Buvinić, M., Das Gupta, M., & Shemyakina, O. N. (2014). Armed conflict, gender, and schooling. *The World Bank Economic Review*, *28*(2), 311–319.

Cameron, A. C., Gelbach, J. B., & Miller, D. L. (2008). Bootstrap-based improvements for inference with clustered errors. *The Review of Economics and Statistics*, *90*(3), 414–427.

Center for International Security and Cooperation. (2018). *Mapping militant organizations: "boko haram"*. https://cisac.fsi.stanford.edu/mappingmilitants/profiles/boko-haram

CFR. (2018). Boko haram's deadly impact.

CFR. (2022). Conflict with boko haram in nigeria.

Chamarbagwala, R., & Morán, H. E. (2011). The human capital consequences of civil war: Evidence from guatemala. *Journal of Development Economics*, *94*(1), 41–61.

Crisis group. (2017). Instruments of pain (iv): The food crisis in north east nigeria.

Duryea, S., Lam, D., & Levison, D. (2007). Effects of economic shocks on children's employment and schooling in brazil. *Journal of development economics*, *84*(1), 188–214.

France24. (2014). *Nigerian forces launch assault on boko haram in baga*.

Glewwe, P., & Jacoby, H. (1994). Student achievement and schooling choice in low-income countries: Evidence from ghana. *Journal of Human Resources*, 843–864.

Hirose, K., Imai, K., & Lyall, J. (2017). Can civilian attitudes predict insurgent violence? ideology and insurgent tactical choice in civil war. *Journal of peace research*, *54*(1), 47–63.

Hogg, M. A. (2020). *Social identity theory*. Stanford University Press.

Huang, R. (2016). *The wartime origins of democratization: Civil war, rebel governance, and political regimes*. Cambridge University Press.

Humphreys, M., & Weinstein, J. M. (2006). Handling and manhandling civilians in civil war. *American Political Science Review*, *100*(3), 429–447.

IOM. (2015). Nigeria crisis. iom regional assessment findings and recommendations.

Jacoby, H. G., & Skoufias, E. (1997). Risk, financial markets, and human capital in a developing country. *The Review of Economic Studies*, *64*(3), 311–335.

Jayachandran, U. et al. (2002). *Socio-economic determinants of school attendance in india* (tech. rep.).

Justino, P. (2011). Violent conflict and human capital accumulation. *IDS Working Papers*, *2011*(379), 1–17.

Kalyvas, S. N. (2006). *The logic of violence in civil war*. Cambridge University Press.

Kasfir, N. (2005). Guerrillas and civilian participation: The national resistance army in uganda, 1981–86. *The Journal of Modern African Studies*, *43*(2), 271–296.

Khan, S., & Seltzer, A. (2016). The impact of fundamentalist terrorism on school enrolment: Evidence from northwestern pakistan, 2004-09.

Knott, K., & Lee, B. J. (2020). Ideological transmission in extremist contexts: Towards a framework of how ideas are shared. *Politics, Religion & Ideology*, *21*(1), 1–23.

Lai, B., & Thyne, C. (2007). The effect of civil war on education, 1980—97. *Journal of peace research*, *44*(3), 277–292.

Loyle, C. E., Cunningham, K. G., Huang, R., & Jung, D. F. (2021). New directions in rebel governance research. *Perspectives on Politics*, 1–13.

Mampilly, Z. C. (2012). *Rebel rulers*. Cornell University Press.

March, A. F., & Revkin, M. (2015). Caliphate of law: Isis'ground rules. *Foreign Affairs*, *15*(4).

Mazurana, D., Marshak, A., & Spears, K. (2019). Child marriage in armed conflict. *International Review of the Red Cross*, *101*(911), 575–601.

Mourtada, R., Schlecht, J., & DeJong, J. (2017). A qualitative study exploring child marriage practices among syrian conflict-affected populations in lebanon. *Conflict and health*, *11*(1), 53–65.

Nguyen, M. C., & Wodon, Q. (2014). Impact of child marriage on literacy and education attainment in africa. *Washington, DC: UNICEF and UNESCO Statistics*.

Olson, M. (1993). Dictatorship, democracy, and development. *American political science review*, *87*(3), 567–576.

Omenma, J. T., Abada, I. M., & Omenma, Z. O. (2020). Boko haram insurgency: A decade of dynamic evolution and struggle for a caliphate. *Security Journal*, 1–25.

Panagopoulos, C. (2014). I've got my eyes on you: Implicit social-pressure cues and prosocial behavior. *Political Psychology*, *35*(1), 23–33.

Parlow, A. (2011). Education and armed conflict: The kashmir insurgency in the nineties.

Parsons, J., Edmeades, J., Kes, A., Petroni, S., Sexton, M., & Wodon, Q. (2015). Economic impacts of child marriage: A review of the literature. *The Review of Faith & International Affairs*, *13*(3), 12–22.

Raleigh, C., Linke, A., Hegre, H., & Karlsen, J. (2010). Introducing acled-armed conflict location and event data. *Journal of Peace Resarch*, *47*(5), 651–660.

Relief web. (2017). *Health sector reporting partners*. https://reliefweb.int/country/nga

Rubin, M. A. (2020). Rebel territorial control and civilian collective action in civil war: Evidence from the communist insurgency in the philippines. *Journal of Conflict Resolution*, *64*(2-3), 459–489.

Seul, J. R. (1999). Ours is the way of god: Religion, identity, and intergroup conflict. *Journal of peace research*, *36*(5), 553–569.

Shemyakina, O. (2011). The effect of armed conflict on accumulation of schooling: Results from tajikistan. *Journal of Development Economics*, *95*(2), 186–200.

Singh, P., & Shemyakina, O. N. (2016). Gender-differential effects of terrorism on education: The case of the 1981–1993 punjab insurgency. *Economics of Education Review*, *54*, 185–210.

Stets, J. E., & Burke, P. J. (2000). Identity theory and social identity theory. *Social psychology quarterly*, 224–237.

Stewart, M. A. (2018). Civil war as state-making: Strategic governance in civil war. *International Organization*, *72*(1), 205–226.

Swee, E. L. (2015). On war intensity and schooling attainment: The case of bosnia and herzegovina. *European Journal of Political Economy*, *40*, 158–172.

Thomas, D., Beegle, K., Frankenberg, E., Sikoki, B., Strauss, J., & Teruel, G. (2004). Education in a crisis. *Journal of Development economics*, *74*(1), 53–85.

Thurston, A. (2016). 'the disease is unbelief': Boko haram's religious and political worldview.

Unicef. (2015). *Nigeria. humanitarian situation report.*

Unicef. (2017). *More than half of all schools remain closed in borno state, epicentre of the boko haram crisis in northeast nigeria.*

United Nations. (2015). *Violations and abuses committed by boko haram and the impact on human rights in the countries affected.*

Valente, C. (2014). Education and civil conflict in nepal. *The World Bank Economic Review*, *28*(2), 354–383.

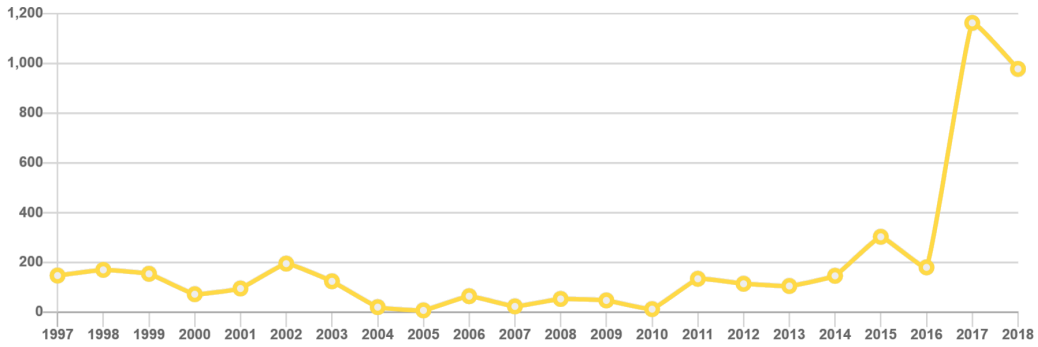
Verwimp, P., & Van Bavel, J. (2014). Schooling, violent conflict, and gender in burundi. *The World Bank Economic Review*, *28*(2), 384–411.

Walker, J.-A. (2013). Why ending child marriage needs to be an education goal. *Improving Learning Opportunities and Outcomes for Girls in Africa*, *6*, 904–908.

Wood, E. J. (2008). The social processes of civil war: The wartime transformation of social networks. *Annu. Rev. Polit. Sci.*, *11*, 539–561.

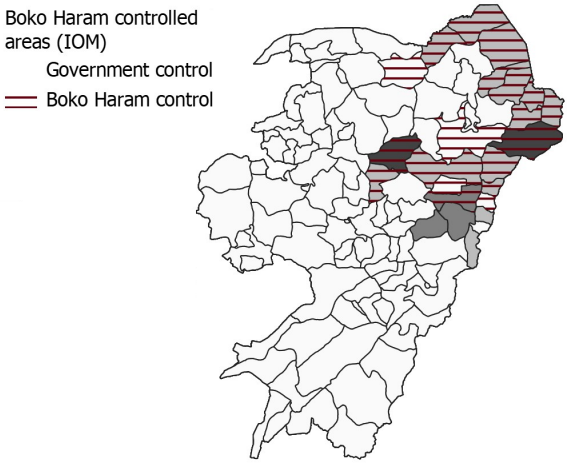
A. Appendix

Figure A.5: Number of conflict events where territory is captured



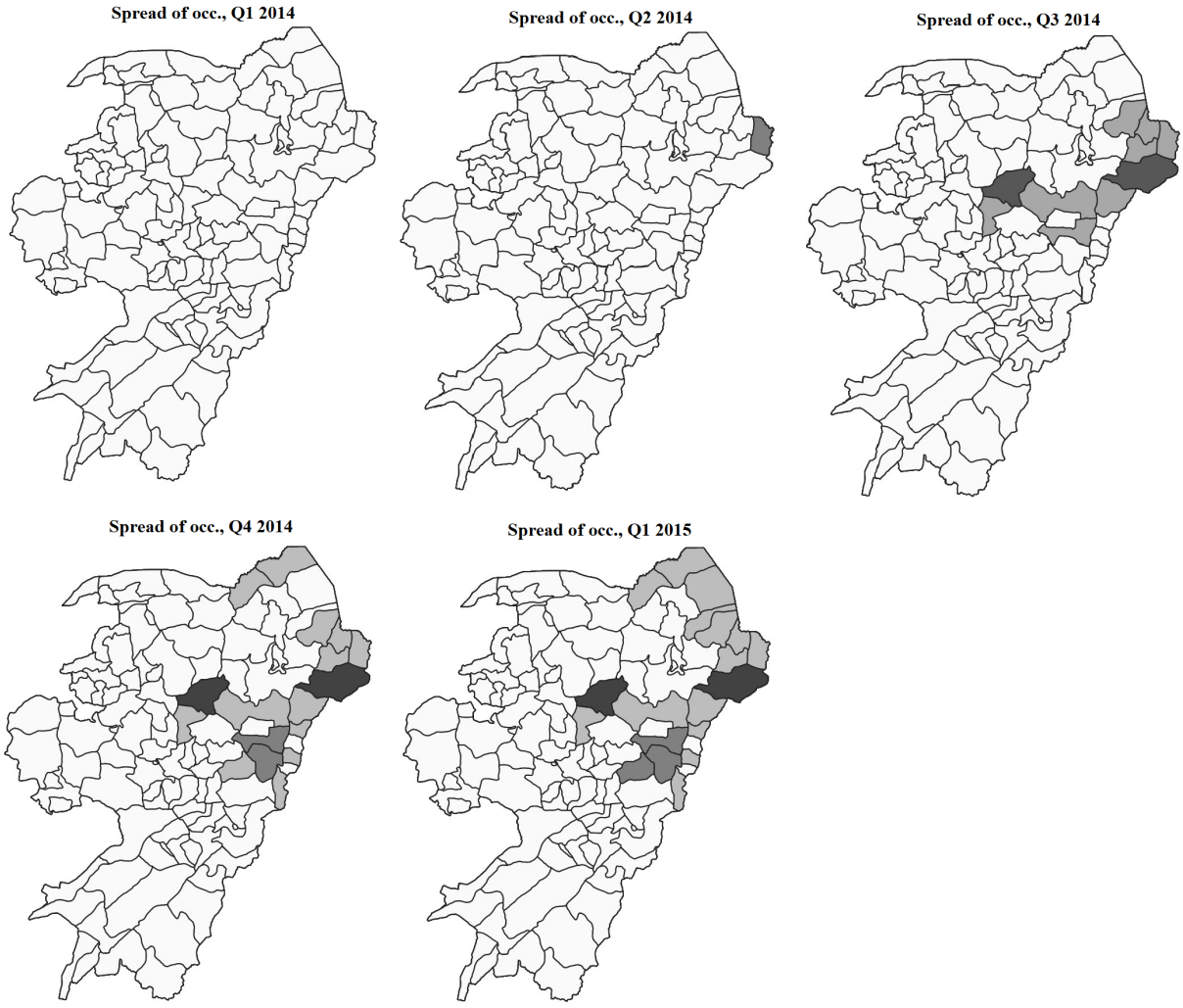
Note: Total number of conflict events, per year, where territory was captured by non-state actors. Source: ACLED.

Figure A.6: Occupation of territory by Boko Haram: ACLED and IOM (2015)



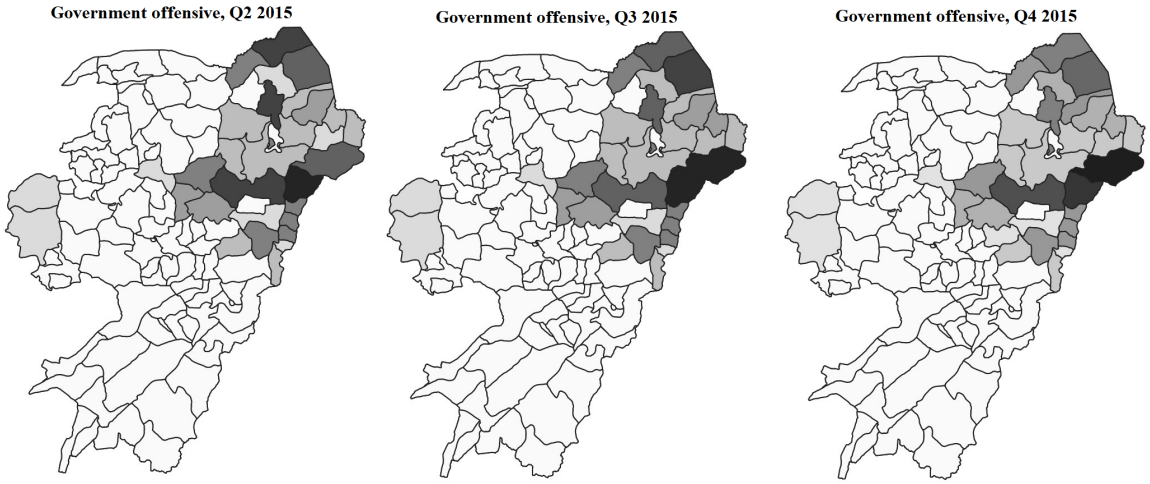
Note: Maps shows the occupation of territory by Boko Haram in Q1 of 2015, as well as the areas that were occupied by the group according to the IOM (striped red). The darker, the more events took place where Boko Haram gained control over territory as recorded by ACLED by quarter/year.

Figure A.7: The progression of the occupation of territory in North-East Nigeria by Boko Haram.



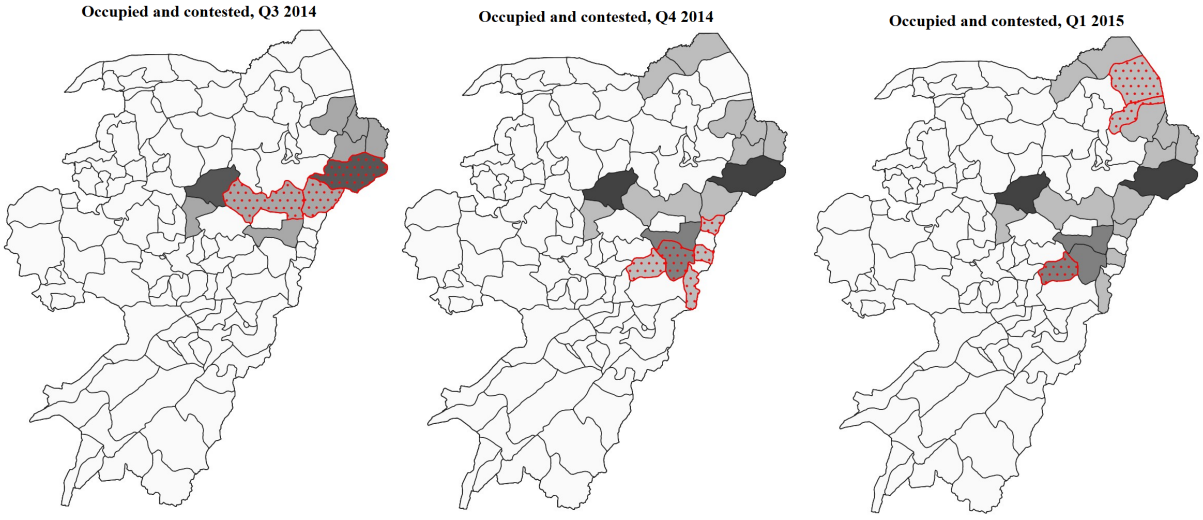
Note: Maps shows the progression of the occupation of territory by Boko Haram. The darker, the more events took place where Boko Haram gained control over territory as recorded by ACLED by quarter/year.

Figure A.8: Government offensives to retake territory



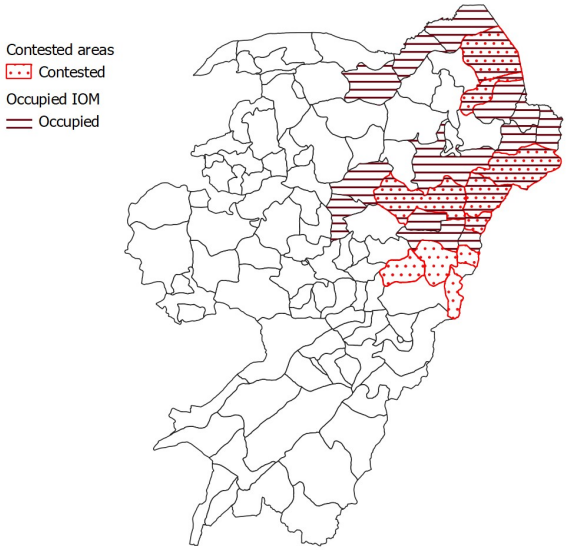
Note: Maps shows the progression of the government offensives to retake territory from Boko Haram. The darker, the more events took place where the government regained control over territory as recorded by ACLED by quarter/year.

Figure A.9: Contested and occupied territory in North-East Nigeria



Note: Maps show the number of events, per LGA, where the Boko Haram gained control over territory as recorded by ACLED by quarter/year. "Contested" implies that in that same quarter/year there was at least one event where the government (re-)gained control over territory. The darker the LGA, the higher the number of events that took place in that time period whereby Boko Haram gained control over territory.

Figure A.10: Contested and occupied territory in North-East Nigeria



Note: The map shows the areas that were contested based on data from ACLED (see A.9) and the areas that were occupied according to the IOM (2015).

Table A.10: Descriptive statistics of treatment and control group

Variable	Mean of control group	Mean of treatment group	Difference	T-test
Household head works in agri.	.081	.075	0.006	0.384
Household size	10.171	8.210	1.960***	8.192
Female	.418	0.504	-.086**	-3.013
Nr. daughters	.224	.197	.027**	2.637
Nr. sons	.267	.295	-.028*	-2.404
School-going age	.710	.634	.076**	2.896
Muslim household	.734	.629	.103***	4.024
Age	8.905	8.865	.040	.185
Rural	.671	1	-.329***	-13.493
N	1948			

Note: Means and standard errors (in parentheses) of the control variables used in the analysis, for both the treatment and control group. Difference between the means in column four, t-test in column five. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.11: Infrastructure within communities across LGAs, post-treatment

Variable	Control	Treatment	Difference	T-test
Primary school	.977	.96	.017	.934
Secondary school	.951	.92	.031	1.216
Health center	.737	.875	-.138	-.814
Public hospital	.105	.125	-.020	-.143
Pharmacy	.325	.167	.158	.876
Post office	.132	.25	-.118	-.760
Bus stop	.342	.354	-.012	-.065
Bank	.833	.75	.083	.347
Police station	.767	.042	.726***	4.820
Market	.254	.167	.088	.519
Fire station	.588	.5	.088	.439
N	101	8		

Note: The table indicates whether, on average, a public good is provided/present in the town/community (0 = not present, 1 = present) prior to 2014. Data is based on the surveys conducted in 2015 and 2016. Difference between the means in column four, t-test in column five. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.12: Type of school attended

	Change school	School commute	School expenses (Naira)
Occupation	-0.063	0.036	1238.818
	(0.141)	(0.291)	(1372.968)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
N	1127	676	841
Clusters	14	16	13

Note: The table shows the whether having lived through Boko Harams' occupation caused children to change the type of school they attended, the time spend travelling to school or the education-related expenses (in Naira) for the household. Standard errors in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.