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Do Amnesty Policies Reduce Conflict? Evidence from the Niger-Delta Amnesty Program*

Uzoma Iloanugo† Indranil Dutta‡ M. Emranul Haque§

Abstract

We examine the effect of the Niger-Delta Amnesty Program on oil related conflict in Nigeria. The policy enacted in August 2009 made concessions to rebel groups in the oil producing region in exchange for peace. Using a difference-in-difference strategy we compare conflict in Local Government Areas with and without oil fields in the Niger-Delta region. We find robust evidence that amnesty policy reduced the rebel and militia activities significantly. However, the reduction of conflict was not long lasting. We also find evidence of a peace dividend in terms of increase in economic activities — as measured through night time luminosity data — in Niger-Delta LGAs with oil fields after the policy. We explain our results through a simple analytical model.

Keywords: Rebel and Militia, Oil Fields, State Capacity, Niger-Delta.

JEL Codes: D74, O13, Q34, H56

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1 Introduction

Nigeria is the largest oil producer in Africa, and the Niger-Delta region holds the entire bulk of its oil reserve (Akpolat and Bakirtas (2020)). Earnings from oil constitutes a significant part of the federal government's revenue (Udosen et al. (2009), Fenske and Zurimendi (2017))[1]. As often happens in the case of natural resources (Lei and Michaels (2014), Lujala et al. (2007), Dube and Vargas (2013), Brückner and Ciccone (2010)), there has been increasing conflict between various rebel and militia groups and government forces in the Niger-Delta since the early 1990's, resulting in significant loss of revenue for the government.[2] In August 2009, the Nigerian government after years of repressive policies which failed to curb conflict, announced for the first time the Niger-Delta Amnesty Program (NDAP) that aimed to disarm, demobilise and reintegrate rebel members into the society for peace in the Niger-Delta region (Okonofua (2016), Ikelegbe and Umukoro (2016), Okoi (2020)). The purpose of this paper is to quantitatively evaluate the amnesty program (NDAP) both in terms of its effects on conflict and economic activities.

A significant concern for implementing an amnesty policy is time inconsistency where once the violence drops, the incentive to follow through with the policy dissipates making such policies effective only in a short-run (Blattman and Miguel (2010); Walter (1997); Walter (2009)). On the other hand, amnesty policies have a natural element of concession and effort for peace by both sides, which make them more acceptable to all parties in the conflict (Nilsson (2008)). This increases the possibility that the impact of amnesty policies are more sustainable in the long run. Not surprisingly, the appeal of amnesty policies are widespread and they have been used in other conflicts such as Uganda's Lords Resistance Army (LRA), Columbia's The Revolutionary Armed Forces of Colombia (FARC), Sierra Leone's Revolutionary United Front (RUF) and Algeria's Armed Islamic Group (GIA) with varying degrees of success (Bradfield (2017), Daniels (2020), Nilsson (2008), Mallinder and McEvoy (2011)). However, a quantitative evalua-

[1] Oil revenue accounted for about 26.8 percent of Nigeria GDP in 2012 and 70 percent of the federal government revenue (Udosen et al. (2009); Fenske and Zurimendi (2017))

[2] In 2008, the Nigerian government reported losing USD 23.7 billion due to the instability in the Niger-Delta region (Nwozar (2010); Oluduro and Oluduro (2012)).

tion of the impact of amnesty policies on conflict remain unaddressed in the literature. We fill this gap by evaluating the effectiveness of the NDAP in reducing conflict in the Niger-Delta.

To estimate the causal impact of NDAP on conflict, we bring together data from various sources including the Armed Conflict Location and Event (ACLED) data for conflict. We employ a difference-in-difference (DiD) estimation strategy by comparing Local Government Areas (LGAs) with and without oil fields in the Niger-Delta. We find that the probability of an incident of rebel or militia activities reduced by 27.3 per cent after the program was implemented. The policy also impacted other forms of violence as defined in the ACLED database. The probability of having a violent battle between government forces and armed groups and civilian related violence both reduced by about 19 per cent in LGAs with oil fields after the amnesty policy. However, the effect of NDAP on rebel and militia activities was short-lived. We find no evidence of a decrease in conflict in the treatment region, several years after the amnesty policy. The failure of the government in solving the core issue of relative deprivation and development has resulted in new rebel groups like the Niger-Delta Avengers resurfacing in the oil-producing region (Okonofua (2016)).

We further contribute to the literature by assessing the impact of the NDAP on the local economy of the oil-producing region of Niger-Delta through the reduction in rebel and militia activities. The improvement in the local economy can be interpreted as the peace dividend arising from the amnesty policy. The concept of peace dividends – income or welfare gains from the end of conflict – is well documented in the literature (Collier (1995), Besley et al. (2015), Besley and Mueller (2012)). We estimate the peace dividend resulting from the amnesty program through changes in the night lights before and after the amnesty policy. Using data of stable night light from National Oceanic and Atmospheric Administration (NOAA) and the National Geographical Data Center (NGDC), we find that after 2009, the level of economic activities indicated by night-time light increased by 2.15 units in Niger-Delta LGAs with oil fields. We interpret this as peace dividend from the amnesty policy since it accounts for the improvement in the

economy due the reduction in violence in the region.[3]

We extend the existing literature in several ways. First, our analysis is based on the LGAs in Niger-Delta which are at a more dis-aggregated level both in terms of geographical size and administrative region. By matching the data on the reported "oil spill due to sabotage" with our ACLED data on conflict and geo-referenced information on the location of oil fields and length of pipeline in Niger-Delta LGAs, we observe that almost every "oil spill from sabotage" was reported in LGAs with oil fields, and few were reported in LGAs with pipelines but no oil spill was observed in LGAs with no oil facilities.[4] Our treatment region are LGAs with oil fields where the main violence occurs.[5] Thus, our approach avoids assuming that every region within Niger-Delta is oil-producing. Otherwise, we would have untreated observations within the treated group which can bias the DiD estimation.

Second, we distinguish between the short-run and long-run impacts. This allows us to evaluate the amnesty policy in greater depth. We show in this paper that the short-run impacts are different compared to the long-run case. Our post-amnesty data ranges from 2010 to 2016. We have considered 2010 to 2013 as reflecting the short-run impact and 2014 to 2016 as the long-run impact. Third, we restrict our sample within the same region of Niger-Delta to ensure the comparability between the treatment and control regions. Some literature (see Abidoye and Calì (2015), Hönig (2017)) compare observations in Niger-Delta with other parts of Nigeria when estimating economic and violent outcomes in Nigeria related to natural resources. However, the nature and causes of violence in Niger-Delta are very distinct to other parts of Nigeria such as the Fulani conflict in North-central Nigeria (dispute over land resources) and Boko-Haram (religious ideology) violence in North-East Nigeria. To avoid confounding oil related violence in the Niger-Delta with non-oil related violence that are more prevalent in other parts of Nige-

[3]Our findings are similar to the literature on counter-insurgency (Berman et al. (2011), Berman et al. (2013), Singhal and Nilakantan (2016); Kaila et al. (2020) Dube and Vargas (2013)) which demonstrate that a reduction in violence due to government policies should lead to increased economic productivity.

[4]Data on oil spills is from National Oil Spill Detection and Response Agency (NOSDRA).Figure 1 presents the plot of the data.

[5]Vanden Eynde (2018) finds a similar result in the context of India, where districts with mines are associated with greater conflict under negative income shocks.

ria, we use non-oil field LGAs in the Niger-Delta as our control region. Finally, we found the peace dividend in terms of the increase in economic activities, by using night-time lights data. Studies such as Hönig (2017), estimated the effect of the amnesty policy on education, health, and self-employment at state level. However, as those detailed information are not available at the LGA level, we match 1 square kilometer stable light data to LGAs across Niger-Delta to estimate the peace dividends.

The remainder of the paper is as follows: Section 2 provides a brief summary of the institutional context of oil resources and the consequent violence in the Niger-Delta which lead to the amnesty policy. Section 3 discusses data and the estimation strategy used in the paper. It also also addresses possible threats to identification. Section 4 presents the regression results and various robustness checks related to the estimation strategy. The following section provides a simple analytical model to explain our main results. In Section 6 we measure the peace dividend by estimating the impact of the NDAP on economic activities in the LGAs . Section 7 draws the main arguments together and puts forth some concluding remarks.

2 Background: Oil Conflict in the Niger-Delta

In recent years, the disputes over oil escalated and intensified into violence in the Niger-Delta. Relative deprivation in the oil-rich region is known to be one of the important factors that influence the Niger-Delta conflict (Ross (2004)). In the 1960s, according to the resource allocation formula used by the government, 50 per cent of proceeds from mineral extract used to be paid to the mineral extracting region. Under a new formula in the 1990s, five Niger-Delta states that produce 90 per cent of the oil and 70 per cent of government revenue are to receive only 19.3 per cent of allocated revenue (Idemudia and Ite (2006)).[6] With only 13 per cent of revenue allocation in 2001, the Niger-Delta remains poor with 70 per cent of its people living below the poverty line Idemudia and Ite (2006)). Agriculture, which is the primary source of income for people in the Niger-Delta

[6]On the other hand, five main non-oil Northern states received 26 per cent of allocated revenue (Ikporukpo et al. (1996), Idemudia and Ite (2006)).

(Okonofua (2016) Ikoh and Ukpong (2013)), have also suffered the negative externalities of oil extraction, including land expropriation, oil spillage and other environmental degradation (Okonofua (2016)).

The conflict in the Niger-Delta started as a civil protest in 1990. By 1999, it grew in to a broader rebellion covering the oil-producing region of Niger-Delta (Ikoh and Ukpong (2013)). The loss of revenue to the government and multinational oil companies was significant.[7] Prior to the amnesty program, the government of Nigeria responded to the insurgency with military force. This, however, exacerbated the violence in the region (Ikoh, and Ukpong, (2013)).

In August 2009, the Nigerian government, implemented the Niger-Delta Amnesty Program (NDAP), resulting from negotiations between government officials, Niger-Delta tribal leaders, and militia commanders. The policy aimed to demilitarize the Niger-Delta conflict by encouraging rebels to surrender their arms and weapons, sever linkages between fighters and the military groups and reintegrate fighters back into societies (Okonofua (2016), Ikelegbe and Umukoro (2016), Okoi (2020)). The policy provided a 60-day window from 6th August to 4th October 2009 for militants to sign up for the program. In return, the rebels receive a monthly payment of USD 407, housing, education and vocational training in both local and international centres (Oluwaniyi (2011), Okoi (2020)).[8] The amnesty program cost the government 127 billion Nairas ($825 million in 2010 exchange rate dollars) between late 2009-2011.[9] A total of 26,358 ex-combatants signed up for the program; 20,192 in the first phase before October 2009, and 6,166 in a second phase provided in November 2010 (Oluduro and Oluduro (2012)). We take this to account in our estimation strategy. Even though 23 per cent of all rebels who signed up were granted amnesty after the policy shock, the estimation strategy picks up the average effect over the period after the amnesty policy was implemented in the sample.

[7]Between 2003 and 2007, oil companies operating in the region reported a total of $21.5 billion (Nwozar (2010)).

[8]Okoi (2020) provides a comprehensive breakdown of how ex-combatants were allocated across various local and international institutions for rehabilitation training and education.

[9]In 2009, the government spent 3 billion nairas, in 2010, 30 billion nairas and in 2011 the expenditures on NDAP was 90 billion Nairas.

3 Methodology

3.1 Data

Our analysis is based on data from various sources. Data on violent conflict are retrieved from the Armed Conflict Location and Event (ACLED) database, which covers events from 1997 till present and categorises the data into different classifications of violence. For this research, we focus on militia and rebel activities which the amnesty policy mostly targeted. The ACLED dataset allows us to do this, as they categorise conflict by groups based on their observed goals and structure. We sum events where the actors are classified as either a rebel group, political militia and ethnic militia for the estimation. The combination of these three groups of violent incidence by actors rather than types of violence is a good representation of the kind of parties the program aim to buy-off. We also consider other classifications of violence such as battles (mainly involving government forces), violence against civilians, protests and fatalities, to understand if the amnesty program affected other dimensions of violence. All the different types of conflict are captured through a catch-all variable of All Events.[10]

Data on the location and distribution of oil fields in Nigeria are retrieved from Koos and Pierskalla (2016). It is geo-referenced data on the location of oil fields, gas flares, pipelines, and oil wells from GIS Solutions Nigeria (Koos and Pierskalla (2016)). Essential to this research is the number of oil fields in each LGA and the length of the pipeline network per square kilometre for each LGA. We construct a dummy variable that takes the value of one if an oil field is present in a LGA. We use the presence of at least one oil field rather than the number of oil fields across LGAs to limit the possible bias in our estimates since some oil fields were constructed after 2009.[11] Also, the data set does not provide information on the year the oil field began production. The oil field indicator variable will serve to locate where rebel and militia groups that focus on extracting oil

[10]Specifically, All Events includes battles, explosions and remote violence, violence against civilians, protests, riots and strategic development, all of which are defined according to ACLED classifications.

[11]The number of oil fields in a LGA is expected to determine the intensity of rebel-militia activities and what proportion of the amnesty will be assigned to that LGA. This can exacerbate issues of reverse causality where the intensity of rebel activities determine how much amnesty resources is devoted to LGA in Niger-Delta.

rents are likely to operate.

The Nigerian oil spill data comes from the National Oil Spill Detection and Response Agency (NOSDRA). The dataset records information on oil spill across Nigeria, specifically in the Niger-Delta. We use the 2009 records to check if our assumption regarding where oil field exists is correct. Our analysis will be confounded if oil spill events occurred in our control group.

The satellite night data is acquired from the National Oceanic and Atmospheric Administration (NOAA) and the National Geographical Data Center (NGDC). Their stable light product isolates man-made light from other natural sources of light. The data is available at a one square kilometer grid and reports a digital luminosity between 0 and 60, with 0 indicating a dark pixel and 63 represents the highest level of luminosity. The stable night light data is available from 1992-2013 which limits or measure economic activities in the LGAs mainly to the short-run.

In our regressions we control for both rainfall and population at the LGA level. The data on rainfall is the CRU TS3.10 precipitation data from the University of East Anglia Climate Research Unit (UEA-CRU). The UEA-CRU data contains a monthly observation of rainfall from meteorological stations across the world's land area (Harris et al. (2014)). The data is available in 0.5 by 0.5 degree cells, and we aggregate cells within the 774 LGAs across Nigeria. Population data at the LGA level is the Sub-national Population Estimates Components from the US Census Bureau.[12] Table 1 presents the summary statistics of the data used in the analysis. The Niger-Delta comprises of 185 LGAs. The period for the analysis ranges from 2005 to 2016, giving us a total of 2220 observations.

Table 1 shows that some LGAs in the Niger-Delta had no report on rebel activities, an LGA had 45 events in one year as the maximum number of rebel activities. We also see a sizeable amount of other classifications of event across the LGAs in Niger-Delta. The mean value of our focus dependent variable rebel (militia and rebel) activities is 0.489. This means that over the period considered in our research, many Niger-Delta

[12]National Bureau of Statistics in Nigeria only have population data at the state level. Therefore, we rely on LGA level estimates provided by the US Census Bureau.

Table 1: Descriptive Statistics

Variables	N	Mean	St. Dev.	Min	Max
Rebel	2,220	0.489	1.969	0	45
All Event	2,220	0.924	3.091	0	45
Battles	2,220	0.188	0.832	0	15
VAC	2,220	0.259	1.231	0	32
Protests	2,220	0.297	1.480	0	23
Fatalities	2,220	1.317	22.062	0	1,000
NOAA Night Light	1,665	7.732	9.522	0	52.608
Total Rainfall (mm)	2,220	2,033	372	322	2,900
Population	2,208	195,339	90,445	53,208	638,494
Pipearea	2,220	0.055	0.084	0	0.3718
Oil Field	2,220	0.330	0.470	0	1
Reported Oil Spill (2009)	185	1.130	2.549	0	55

Notes- The top section is the summary statistics for the whole country, while the bottom is the summary statistics for the only Niger-Delta. The number of violent events in each category is the sum of all entries in the ACLED dataset by LGA year.

LGAs had no militia and rebel activities.

3.2 Estimation Strategy

In the DiD estimation we compare the incidence of violence between LGAs that have oil fields with those without oil field, before and after 2010. Although the entire Niger-Delta region is oil-rich, rebel activities relating to oil resources are mainly concentrated in LGAs with oil field. Based on the literature on conflict ((Lujala (2009), Lujala (2010), Lujala et al. (2005), Ross (2006)) where the ease of access distinguishes lootable and non-lootable resources, we assume that only oil resources in LGAs with oil fields are accessible to rebel groups.[13] This is borne out in the evidence from oil spill which demonstrate that rebel groups mainly focus on areas of existing oil fields. Figure 1 shows the distribution of the oil spill report across our LGA classifications.

[13]Lujala et. al. (2005) explains that only the fraction of resources that can be extracted by simple methods are lootable. Such extraction also do not require skilled labour and high investment in technology

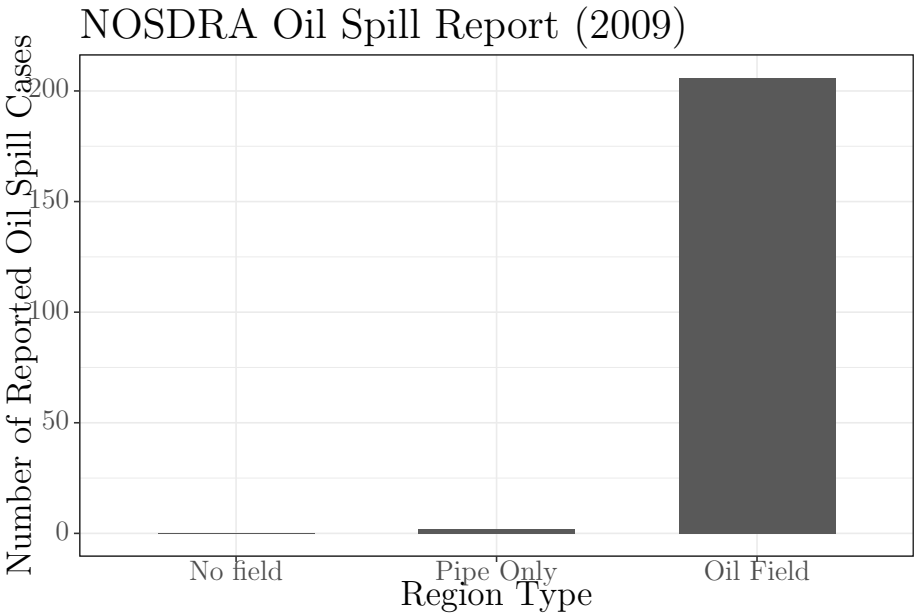


Figure 1: A bar chart of the number of oil spills from sabotage of oil facilities by third parties recorded by National Oil Spill Detection and Response Agency (NOSDRA). We match the report in 2009 with our data that categorise LGAs with oil fields, LGAs with pipeline only and LGAs with no oil facilities in the Niger-Delta.

We observe that almost all cases of oil spillage from sabotage were reported in LGAs that we assigned as having active oil fields, very few were reported in LGAs with pipelines but no oil fields and none was reported in LGAs with no oil facilities that form the most part of our control group in the Niger-Delta. Therefore, oil resources are only lootable when either the government or Multinational companies (MNC) install oil fields. Thus, rebel activities related to oil resources are more prevalent in Niger-Delta LGAs with oil fields, which we consider as our treatment region.

As mentioned earlier, unlike other studies (see Abidoye and Calì (2015), Hönig (2017)), we ensure the comparability between treatment and control regions by restricting the sample of LGAs to only the Niger-Delta region. It allows us to avoid confounding oil related violence in the Niger-Delta with non-oil related violence that are more prevalent in other parts of Nigeria. Figure 2 shows the regions we compare in the analysis: the grey area is LGAs in the Niger-Delta that have oil in reserve; the red region is LGAs in the Niger-Delta that have oil fields.

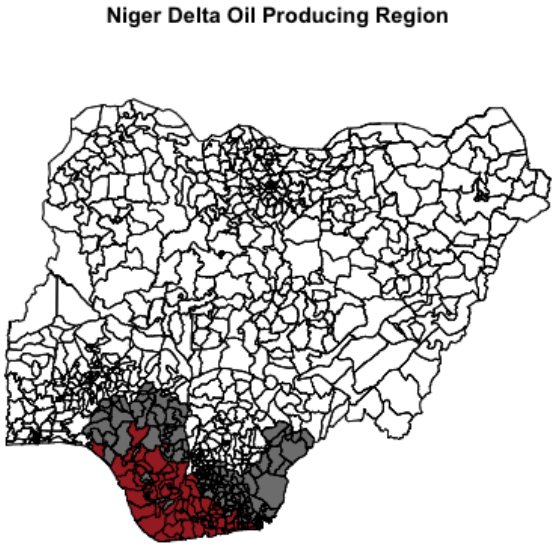


Figure 2: Map of Nigeria showing the Niger-Delta region. The LGAs shaded grey are the LGAs that have oil in reserve, while the LGAs in red have oil fields.

Hence the treatment and control regions for our analysis will be the LGA's with and without oil fields in the Niger-Delta respectively.

3.2.1 Baseline Specification

Our baseline model for estimating the impact of amnesty on conflict is as follows:

$$Conflict_{lt} = \alpha_l + \delta_t + \beta \boldsymbol{OilField_l} \times \boldsymbol{Policy_t} + \gamma_l t + \epsilon_{lt}, \tag{1}$$

where $Conflict_{lt}$ is a dummy variable that takes a value of 1 if there was a recorded conflict in any LGA l at time t, α_l and δ_t are the LGA and time fixed effect respectively. We also include $\gamma_l t$, an LGA-specific time trend. In estimating this regression, we use boot clustered standard errors at the state level. The whole of the Niger-Delta region fall into nine states, and LGA's within each state may have similar economic and political structures. The primary variable of interest is β, the coefficient of the interaction term between a dummy variable that identifies LGA with oil fields and the policy dummy.

There are, however, several threats to identification in our model. First, implicit

in the DiD assumption is that LGAs with and without oil fields in the Niger-Delta should have the same trend of conflict before the amnesty policy was enacted. That is, without the amnesty policy, conflict in Niger-Delta LGAs with oil fields will maintain on their pre-treatment level. While we demonstrate the existence of parallel trends between the treatment and control region for conflict through trend plots of conflict and event study methods, we also include LGA-specific time-trends in our regressions to take account of this issue.

Second, for DiD estimation, strict exogeneity assumption needs to be satisfied. The treatment timing must be statistically independent to the entire distribution of the potential outcome (see (Imbens and Wooldridge (2009); Angrist and Pischke (2008); Wing et al. (2018)). In our context, it means the rebels in Niger-Delta LGAs should not alter their conflict behaviour in anticipation of the amnesty policy. Thus, rebel violence in Niger-Delta LGAs without oil fields should not significantly increase or decrease in the year before the policy. We deal with this threat by undertaking a placebo test which includes an interaction term of oil field dummy with observation in the year 2009. We find no evidence of the policy anticipation in the amnesty policy.

Third, although the policy is designed to demobilise rebel groups by moving rebel members that signed up to camps thus limiting the possibility that participants who receive the payment to operate in other regions, it is vital to ensure that there are no spillover of conflict from the treatment to the control region. To test for possible spillovers, we include an interaction of the length of oil pipelines in LGAs in Niger-Delta with no oil field. We expect that if rebel and militia groups who engage in oil theft move out of LGAs with oil field as a result of the amnesty policy, they can operate in LGAs with no oil fields but oil pipelines, which gives them alternate access to oil resources. We do not find evidence of spillover effects in our mode.

4 Results and Discussion

4.1 Parallel Trends

One of the pre-conditions for DiD estimation is to establish parallel trends in rebel activities between the control and treatment regions. As a first evidence, in the figure below we plot average rebel and militia activities in the treatment and control regions in Niger-Delta for each year from 2006 to 2016. Broad observations of Figure (3) show that

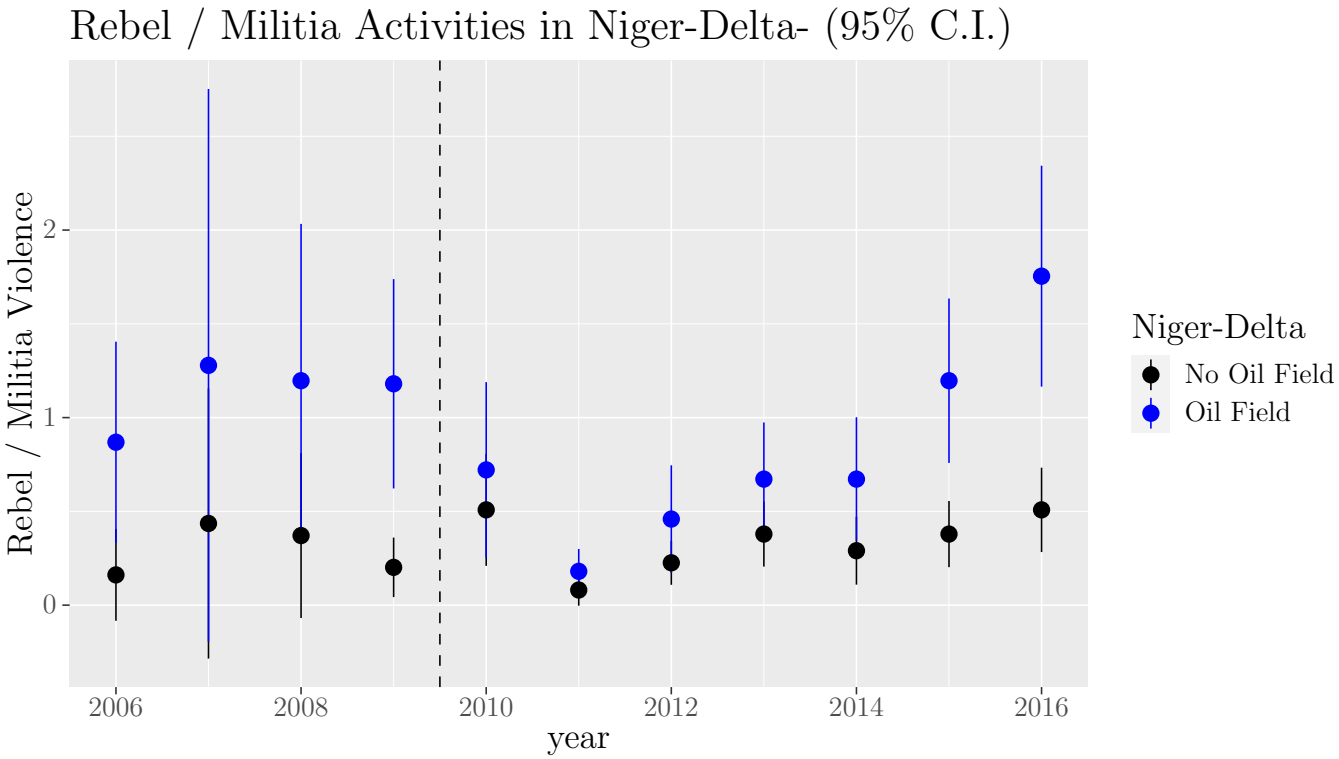


Figure 3: Average level of rebel and militia activities in Niger-Delta LGAs with oil fields and no fields.

pre-2010, although the treatment region had a higher rebel and militia activity compared to the control regions, the trend in these activities were very similar in both the regions with a slight increase in 2007 followed by a slight decrease in 2008. It is only in 2009 that the gap between the control and treatment regions increased slightly. On the other hand, post-amnesty the difference in militia activities in the control and treatment regions almost disappears. The gap between the two regions, however, begins to rise after a few years.

We further undertake an event study, which estimate the changes in rebel and militia activities between treatment and control regions every year relative to 2005.[14] For evidence of the parallel trends, estimates for dummies before 2009 should be relatively stable and insignificant while estimates after 2009 are expected to be negative and statistically significant.

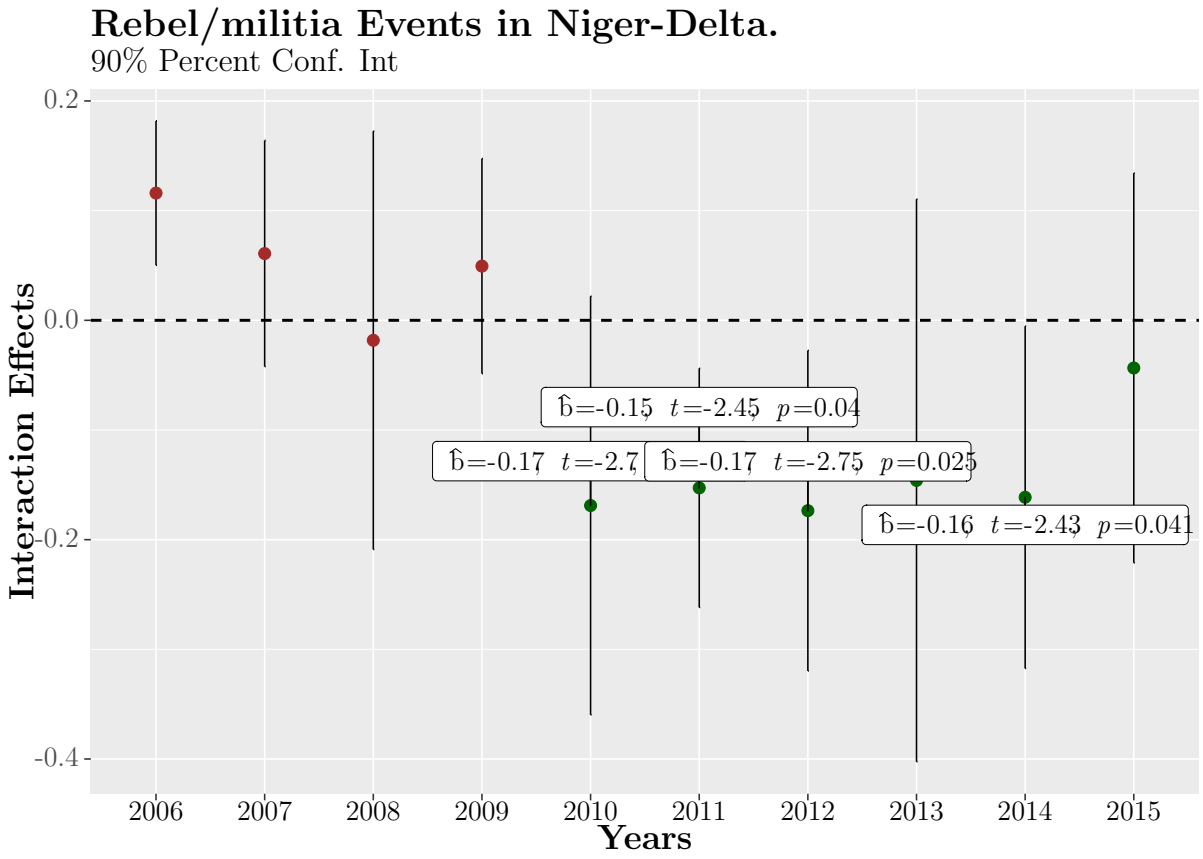


Figure 4: The coefficient plot for the event study estimate of equation 2 — in the footnote. Estimation strategy controls for LGA fixed effect, year fixed effect and LGA specific time trend. The standard errors are bootstrapped at state level. Estimates that are significant below 5% level are shown in the diagram.

It is clear from the Figure (4) that for the pre-amnesty years the coefficient in the treatment region is mostly positive, whereas post-amnesty in 2010, it becomes

[14]We use the following equation to estimate the difference in conflict in the treatment and control region in each year. β_j are the estimates of the regression.

$$Conflict_{lt} = \alpha_l + \delta_t + \sum_{j=2006}^{2016} \beta_j \boldsymbol{OilField_l} \times \boldsymbol{(Year = j)} + \gamma_l t + \epsilon_{lt} \quad (2)$$

negative or insignificant. This implies that relative to the reference year, pre-amnesty years saw on average higher rebel activities, whereas post-amnesty years experienced lower rebel activities in the treatment region relative to the control region.[15] Both the plot of average rebel activity in the treatment and control region and the event study indicate that while there is broad evidence that parallel trends in conflict between the regions have been maintained, we observe significant changes in rebel activities in the treatment region post-amnesty.

4.2 Regression Estimates

For the impact of amnesty on conflict, first, we estimate the baseline regression. Although our focus is on the impact of the policy on the violence by rebel and militia actors, we also check the impact of the policy on other forms of violence such as battles involving government forces, violence against civilians, protests, fatalities, and a catch-all term that aggregates all violent events. In addition, we include in the baseline regression two additional control variables of total population and rainfall in each LGA in each period. We estimate the following equation,

$$Conflict_{lt} = \alpha_l + \delta_t + \beta \boldsymbol{OilField_l} \times \boldsymbol{Policy_t} + \boldsymbol{\theta X_{lt}} + \gamma_l t + \epsilon_{lt}, \tag{3}$$

where X_{lt} is the vector of additional control variables. There is evidence that rainfall (or lack of it) can play a role in engendering conflict in Africa (Miguel et al. (2004), Burke et al. (2015)). In our context, rainfall, through its impact on agriculture, where much of the population work, can affect conflict by changing the opportunity cost of joining the rebels. Total population can also increase the risk of conflict by generating pressure on resources. We take the log of both these variables as our controls. Thus, we are estimating the conditional impact of amnesty on conflict.

Our estimation of the impact of the amnesty policy is provided in Table 2 below. The top panel of table is based on equation (1) and the bottom panel estimates

[15] In Table B1, we provide the estimates for equation (2). They show that the differences in rebel and militia activities in 2005-09 are fairly stable with the average close to zero.

the same regression but with additional control variables as in equation (3). In this table and for the rest of the paper, unless specified otherwise, different forms of $Conflict_{lt}$ that we consider are as follows: in column 1, "Rebels" is a dummy variable that takes value of one when either a Rebel, Ethnic or Political Militia event occurred as recorded by the ACLED; in column 2, "Battles" is a dummy variable which takes value one, when the event involving government forces takes place; in column 3, "Violence against Civilians" is a dummy variable that takes value one, when it occurs; in column 4, "Protests" is a dummy variable that takes value one when the protests take place; in column 5, "All Events" is a dummy variable that takes value one, when any form of violence occurs; while in column 6, "Fatalities" is a dummy variable that takes value one, when fatalities are recorded.

Table 2: Amnesty Policy and Violence

	Rebels	Battles	Violence against Civilians	Protests	All Events	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: No Controls						
Policy Yr * Oil Prod	−0.273**	−0.191**	−0.197**	0.033	−0.184*	−0.115
	(0.096)	(0.065)	(0.074)	(0.045)	(0.093)	(0.090)
R^2	0.450	0.370	0.420	0.429	0.508	0.393
Adjusted R^2	0.336	0.240	0.300	0.310	0.407	0.267
Panel B: Including Controls						
Policy Yr * Oil field	−0.272**	−0.187**	−0.199**	0.029	−0.184*	−0.117
	(0.098)	(0.066)	(0.075)	(0.046)	(0.096)	(0.090)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.449	0.370	0.420	0.431	0.508	0.393
Adjusted R^2	0.334	0.239	0.299	0.313	0.405	0.266
LGA Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
LGA Specific Trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,220	2,220	2,220	2,220	2,220	2,220

Notes- Standard errors are boot clustered at state level. ***, **, * represents significance at the 1%, 5% and 10% respectively

The estimates in Table (2) show that the amnesty policy successfully reduced violence perpetrated by the rebels. Panel A, column 1 shows that the probability of rebel violence in the Niger-Delta LGAs with oil fields reduced by 27 per cent. The amnesty

policy also reduced the probability of having violent battles involving government forces by 18 per cent and violence against civilians by close to 19 per cent. Additionally, in column 5, the probability of having any form of conflict in our treatment region, also reduced by little over 18 percent, implying a reduction in total conflict due to the amnesty policy, although it was weakly significant.[16] This result is driven by the reduction in violent conflict, since All Events also includes non-violent conflict, such as protests, arrests, non-violent transfer of territory, none of which were targeted by the policy. The results remain very similar when we include additional control variables in panel B.

However, as shown in columns (4) and (6) (in both Panel A and B), there was no reduction in the number of fatalities or protests in the region after 2009. The ineffectiveness of the amnesty policy on protests and fatalities suggests that rebel activities mainly involved kidnappings and vandalization of oil facilities. The rebel strategy did not involve increasing fatalities as a means to get the government's attention. Also, we do not expect the policy to have any effect on non-violent conflict, such as protests.

Given the success of the amnesty policy in reducing conflict, a natural question is whether the reduction in conflict from the amnesty policy was sustained. To address this question, as alluded before, we divide the post-amnesty period from 2010-2016 in to two parts. We capture the short-run by the years 2010-2013 and the more long-run effect through the years 2014-2016. Thus, we estimate the following equation:

$$Conflict_{lt} = \alpha_l + \delta_t + \beta_0(\boldsymbol{Oil_l \times Yr(10-13)}) + \beta_1(\boldsymbol{Oil_l \times Yr(14-16)}) + \gamma_l t + \epsilon_{lt} \quad (4)$$

The interaction of the oil field with Yr(10-13) controls for the effect of the amnesty policy in the years 2010 to 2013. The Yr(14-16) compares the probability of rebel and militia activities between 2014 to 2016 and the pre-treatment period. A negative and significant estimate in the two interaction will indicate that the effect of the amnesty policy persisted through the period considered in the research. Table 3 below shows the results for equation (4).

Column 1 in Table 3 shows that the estimate for rebel and militia activities in the main result was mostly accounted for in periods between 2010-13. The policy variable

[16]The impact of amnesty policy is significant for All Events only at 10 per cent level of significance.

Table 3: Amnesty Policy Effect in the Short-run and Long-run

	Rebels	Battles	Violence against Civilians	Protests	All Events	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)
Policy(2010-13) * Oil field	−0.242**	−0.222**	−0.158***	0.104	−0.129	−0.073
	(0.072)	(0.071)	(0.047)	(0.075)	(0.086)	(0.080)
Policy(2014-16) * Oil field	−0.180	−0.283**	−0.083	0.241	−0.024	0.009
	(0.125)	(0.102)	(0.103)	(0.149)	(0.130)	(0.111)
Fixed Effects and Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,220	2,220	2,220	2,220	2,220	2,220
R^2	0.450	0.371	0.421	0.432	0.509	0.394
Adjusted R^2	0.336	0.240	0.300	0.314	0.407	0.268

Notes- Policy(2010-13) is a variable controlling for observations in time period 2010-13 while Policy(2014-16) controls for observation between 2014 and 2016. Standard errors are boot clustered at state level. ***, **, * represents significance at the 1%, 5% and 10% respectively

in LGAs with oil field between 2014-16 is statistically insignificant. The same is true for violence targeting civilians in Column 3. However, violent battles between government forces and rebel groups decreased by the same magnitude in both periods compared to pre-policy levels. The probability of having a battle reduced by 22.2 per cent in 2010-13 and 28.3 per cent in 2014-16 compared to the levels observed before the amnesty policy. This implies that the government pulled out its forces from the Niger-Delta, resulting in a persistent decrease in battles involving government forces. However, rebel and militia violence in the LGAs with oil field may have gone back to pre-treatment levels as has been suggested in Okonofua (2016) and Ikelegbe and Umukoro (2016). For total conflict captured through All Events (column 5), although the impact of the policy is negative in both the short and long-run, they are statistically insignificant. As such it is not surprising since the effect of policy on total conflict which includes non-violent forms of conflict, was weakly significant in our baseline assessment in Table 2. Splitting the post amnesty period into two parts and controlling for each of them in the regression, may have resulted in an increase in standard error due to increased variance, tipping the weakly significant result to insignificant.

4.3 Robustness Checks

4.3.1 Placebo Analysis

In order to test whether the amnesty policy was anticipated by the rebel groups, we undertake a placebo analysis using the following equation:

$$Conflict_{lt} = \alpha_l + \delta_t + \beta_0 \boldsymbol{Oil_l \times Policy_t} + \beta_1 (\boldsymbol{Oil_l \times Year = 2009}) + \gamma_l t + \epsilon_{lt} \quad (5)$$

We include an interaction of LGAs with oil field with a dummy variable where $Year = 2009$. It controls for differences in violent outcomes between observations in 2005-08 and 2009. [17] The results are presented in table below.

Table 4: Amnesty Policy and Violence: Placebo Analysis

	Rebels	Battles	Violence against Civilians	Protests	All Events	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: No Controls						
Policy Yr * Oil Field	−0.295**	−0.184**	−0.200*	0.010	−0.189	−0.158
	(0.104)	(0.073)	(0.096)	(0.045)	(0.102)	(0.124)
Yr = 2009 * Oil Field	−0.042	0.013	−0.006	−0.046	−0.009	−0.084
	(0.034)	(0.027)	(0.070)	(0.041)	(0.055)	(0.069)
R^2	0.450	0.370	0.420	0.429	0.508	0.394
Adjusted R^2	0.336	0.239	0.299	0.310	0.406	0.268
Panel B: Including Controls						
Policy Yr * Oil field	−0.293**	−0.182**	−0.200*	0.008	−0.187	−0.159
	(0.106)	(0.074)	(0.097)	(0.045)	(0.104)	(0.123)
Yr=2009 * Oil field	−0.042	0.011	−0.002	−0.040	−0.007	−0.083
	(0.034)	(0.027)	(0.071)	(0.043)	(0.056)	(0.070)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.449	0.370	0.420	0.432	0.508	0.394
Adjusted R^2	0.334	0.239	0.299	0.313	0.405	0.267
Fixed Effects and Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,220	2,220	2,220	2,220	2,220	2,220

Notes- Standard errors are boot clustered at state level. ***, **, * represents significance at the 1%, 5% and 10% respectively

[17] The assumption that LGAs with and without oil fields in Niger-Delta were on parallel trends before 2010 will be false if the interaction is negative and statistically significant. The negative significant variable will signify that rebel violence in LGAs with oil-field was already in decline before the amnesty program was in effect in 2010.

Table 4 contains estimates of equation (5) and includes a control for the interaction of observation in 2009 − before the amnesty policy − and LGAs with oil fields. The estimation can be interpreted as a test for the parallel trend assumption too. The interaction of 2009 and oil field was insignificant across all measures of violence. The estimate of interest, the probability of rebel and militia activity retains its magnitude and statistical significance in column 1. The estimate for all conflict event taken together, however becomes insignificant compared to the baseline results. All other estimates for other classification of violence retain their magnitude and statistical significance compared to the baseline results in Table 2.

4.3.2 Conflict Spillovers

It is possible that the amnesty policy had not reduced conflict, but simply shifted it from the treatment region to other LGAs. In this section, we test for the possible spillover of conflict using the equation 6 below:

$$Conflict_{lt} = \alpha_l + \delta_t + \beta_0 \boldsymbol{Oil_l} \times \boldsymbol{Policy_t} + \beta_1 (\boldsymbol{PipeNear_l} \times \boldsymbol{Policy_t}) + \gamma_l t + \epsilon_{lt} \tag{6}$$

In equation (6), we include the interaction of the LGAs with oil pipelines but no oil fields in the Niger-Delta with the policy variable. This follows from our discussion before, where accessibility to resources is an important factor in conflict. Since our treatment region is LGAs with oil fields in the Niger-Delta, rebels would simply move their focus to next easy targets of pipelines in LGAs without oilfields. A positive and significant estimate of β_1 will mean that rebels that extract oil resource increased their activities in LGAs with only oil pipelines. Table 5 presents the results.

Table 5 shows an insignificant estimate of β_1 across all measures of conflict except for violence against civilians. In particular, for rebel violence (column 1) which is the primary variable of interest in our context, we find that there is no evidence that the conflict shifted to other LGAs in the Niger-Delta after the amnesty policy. However, it seems that violence against civilians had increased in LGAs with pipelines, while it reduced in LGAs with oil fields. This perhaps reflects the fact that civilians are being used to compensate for any drop in earnings by the militias from the reduction in conflict.

Table 5: Amnesty Policy and Violence: Spillover Effect.

	Rebels	Battles	Violence against Civilians	Protests	All Events	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)
Policy Yr * Oil field	−0.267**	−0.197**	−0.183**	0.043	−0.184*	−0.118
	(0.099)	(0.065)	(0.079)	(0.042)	(0.094)	(0.088)
Policy Yr * Near Pipeline	0.251	−0.253	0.568*	0.393	0.002	−0.115
	(0.584)	(0.348)	(0.298)	(0.676)	(0.426)	(0.411)
LGA Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
LGA Specific Trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,220	2,220	2,220	2,220	2,220	2,220
R^2	0.450	0.370	0.420	0.429	0.508	0.393
Adjusted R^2	0.336	0.239	0.300	0.310	0.406	0.267

Notes- Near Pipeline captures LGAs without active oil fields but have oil pipelines. Standard errors are boot clustered at state level. ***, **, * represents significance at the 1%, 5% and 10% respectively

When we consider all events (column 5), we do not find any evidence of spillover of conflict to other LGAs.

Alternatively, we test for spill over using other non-Niger-Delta parts of Nigeria as the control group.[18] We estimate how rebel activities changed differentially in LGAs with and without oil fields in Niger-Delta after the amnesty policy. The results provide evidence that the amnesty policy had barely any impact on violence in LGAs without oil fields compared to other non-Niger-Delta states. Whereas, the result in LGAs with oil fields are robust in this specification.

4.3.3 Intensity of Conflict

The previous estimations examined how the amnesty program impacted the probability of having at least one violent incidence under different forms of conflict. Next, we estimate if the impact of the amnesty policy affected the intensity of violence in the Niger-Delta oil-producing region. To achieve this, we replace the dummy dependent variables with the number of incidences that occurred in each LGA-year across the Niger-Delta. The variable is transformed using a log (event + 1) transformation. Result of the regressions

[18]See appendix C for more discussion on this.

are presented in Table 6.

Table 6: Intensity of Violence

	Rebels	Battles	Violence against Civilians	Protests	All Events	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)
Policy Yr * Oil field	−0.429***	−0.212**	−0.232**	0.058	−0.377**	−0.165
	(0.118)	(0.080)	(0.080)	(0.036)	(0.127)	(0.183)
Fixed Effects and Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,220	2,220	2,220	2,220	2,220	2,220
R^2	0.565	0.425	0.509	0.623	0.668	0.401
Adjusted R^2	0.475	0.306	0.407	0.544	0.599	0.277

Notes- The dependent variables reflect the intensity of violent incidences. Standard errors are boot clustered at state level. ***, **, * represents significance at the 1%, 5% and 10% respectively.

The intensity of rebel and militia activities tends to decrease by 42.9 per cent in Niger-Delta LGAs with oil fields after 2010. All violent conflict reduced by 37.7 per cent, including violent battles involving government forces by 21.2 per cent and violence against civilians by 23.2 per cent. We still find no significant decrease in the number of fatalities and the number of protests in the estimation. Therefore, the amnesty program did not only decrease the probability of violence but also the intensity of rebel and militia activities in LGAs with oil field in the Niger-Delta.

5 Model

We develop a simple model to explain our empirical observation where amnesty policy reduces conflict in the short-run, but not in the long-run.[19]

Civilians and Militias: We consider two groups of individuals: civilians and militias. Civilians can decide to become militias but cannot revert unless amnesty is offered. Consider a society with N_t civilians in time t. Each civilian, i in time t choose

[19]Our intention here is mainly to put the results in the context of a theoretical framework. Hence, this is not a full scale model.

consumption c_t^i, and participation in militia $m \in \{0, 1\}$ based on the following utility

$$U_t^i = \begin{cases} (c_t^i - \underline{c}(s))(1 - m_t^i) & \text{if } c_t^i > \underline{c}(s) \\ c_t^i - \underline{c}(s) & \text{if } c_t^i \leq \underline{c}(s) \end{cases}$$

where $\underline{c}(s)$ is the basic consumption that an individual needs that depends on government social expenditure s. We assume the minimum consumption an individual would need will reduce with better social safety nets through increased social expenditure.[20] Thus, $\underline{c}(s + \lambda) - \underline{c}(s) < 0$, $\lambda > 0$. If y_t^i is the income of individual i in time t, and δ_t is earned from militia activities (or through amnesty) then the budget constraint is $c_t^i = y_t^i + \delta_t m_t^i$. The optimal choice for a civilian is

$$c_t^i = \begin{cases} y_t^i & \text{if } y_t^i > \underline{c}(s) \\ y_t^i + \delta_t & \text{if } y_t^i \leq \underline{c}(s) \end{cases} \; ; \; m_t^i = \begin{cases} 0 & \text{if } y_t^i > \underline{c}(s) \\ 1 & \text{if } y_t^i \leq \underline{c}(s) \end{cases} .$$

We assume that if one joins the militias in period t, then for the rest of the time they receive at least y_t^i.

Conflict: Each period there is a distribution $f_t(y)$ over the income range $[0, \overline{y}]$. Every period the proportion of people joining the militant ranks is given by

$$\int_0^{\underline{c}(s)} f_t(y)dy = \theta_t.$$

Hence, the total number of militants in period t is $\sum_t \theta_t.N_t = n_t$, which can be considered as a measure of conflict. Rebel activities in period t reduces output R_t from the natural resource to $(R_t - \beta_1 n_t)$, $\beta_1 > 0$.

Government: The government has two alternative strategies. The first is the defence strategy, where the government uses defence tactics to stop the militants. The direct cost of defence due to militias, such as extra police and defence infrastructure, is $\beta_2 n_t$, $\beta_2 > 0$, which increases with more militias. Then, the net benefit of the government

[20]For instance, if health services are provided for free by the government, the minimum level of consumption would reduce.

from the natural resource is

$$G_t^d = \tau(R_t - \beta_1 n_t) - \beta_2 n_t = \tau R_t - \beta n_t,$$

where τR_t, $0 < \tau < 1$, is the tax revenue from the natural resource when there is no conflict, and βn_t, where $\beta = (\tau\beta_1 + \beta_2)$, is the net cost of conflict, which includes the cost of defence and any associated loss in revenue.

The second is the amnesty policy, which yields the following net benefit for the government,

$$G_t^a = \tau R_t - (\alpha n_t + F),$$

where F represents a lump-sum cost of engaging in amnesty, and a marginal cost of payment α, to each of the militants. As a result the militants go back to civilian life and do not engage in violence. We assume $\alpha < \beta$, because under amnesty the government does not suffer any direct loss in revenue due to the conflict and neither does it have to maintain a large defence force. The government is indifferent between the two strategies if

$$n^E = \frac{F}{\beta - \alpha}.$$

Game: Each period, nature chooses the income distribution over $[0, \overline{y}]$. Knowing this, households decide their optimal choice of c and m. After observing the choice of the households, the government decides between defence or amnesty.

Discussion: Suppose, $n_t > n^E > n_{t-1}$, then the Nash equilibrium is where the government engages in amnesty policy in period t, and there are no militants as everyone goes back to civilian life. The government receives G^a and civilians receive income y_t^i and rebel militias receive $y_t^i + \delta_t$. As a result of the amnesty, conflict in period t now reduces to zero. Thus, the output will also increase, since in our model lower conflict results in higher output. However, in $t + 1$ period, the government reverts back to the defence strategy if $\theta_{t+1} N_{t+1} < n^E$. Conflict then slowly rises till it hits n^E at which point amnesty is offered again, and the whole cycle repeats itself.

Note that amnesty in period t does not reduce the number of individuals joining

militant groups in period $t+1$. This is because the underlying issues remain unaddressed. One way the government could address the underlying issue is by reducing $\underline{c}(s)$, through increased social expenditure which provides a social safety net. However, social expenditure can be quite lumpy, that is the government may have to invest a lot to reduce $\underline{c}(s)$, thus making it unviable relative to the other available strategies of defence or amnesty policy.

6 Peace Dividend: Amnesty and the Economy

In this section, we estimate if the amnesty policy had any effect on the level of economic activity in the Niger-Delta. There are no direct data on economic activity available at the LGA level for our time period. Thus, following similar studies, we use satellite data on night light as a proxy for economic activity in the LGAs (Chen and Nordhaus (2011); Henderson et al. (2012); Lessmann and Steinkraus (2019)). Using data from 2005-13 of the stable Night-time light provided by NOAA, we estimate how the economy in the delta changed before and after the amnesty policy. Given the NOAA data on stable night light is only available till 2013, we are not able to separate the short and long run effect of the policy on economic activities in the Niger-Delta.[21]

The stable light data picks up luminosity from residences, offices, retail shopping areas, factories, street lighting, road vehicles, fishing boats, and gas flaring facilities (Addison and Stewart (2015)). We observe that the level of night light in the Niger-Delta seems higher relative to other parts of Nigeria. Figure 5 is the scatter plot of night light at the state level over the years.

The observation at the very top is Lagos state, which is the commercial capital of Nigeria. However, the Niger-Delta states, with oil fields (coloured in blue) are not far behind. They have relatively high values of night light in the sample.

Table 7 presents the result of a DiD estimation of NDAP and night light. The estimation uses the same model specified in the baseline regression (equation (1)) except

[21]Figure 8 in appendix D provides the map of Nigeria showing some of the night light data in raster (.tif) between 2008-2011.

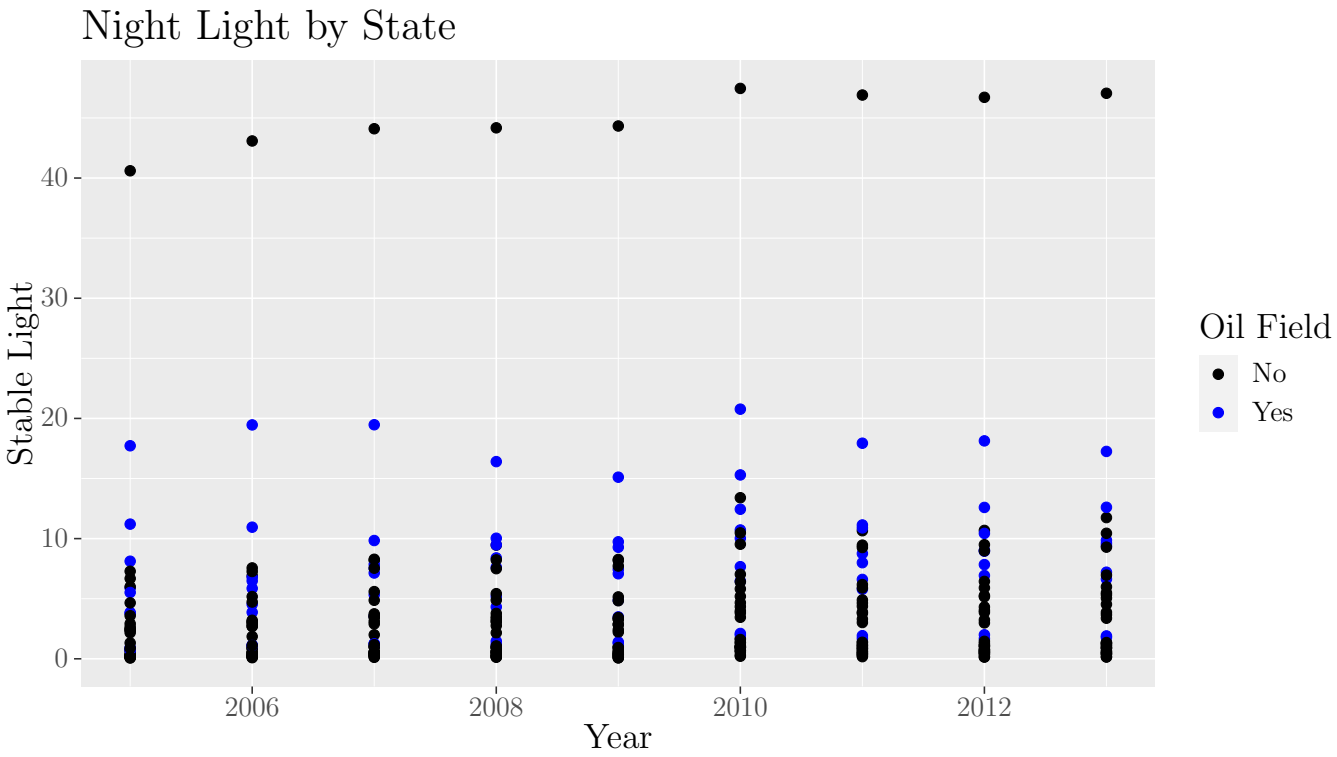


Figure 5: Distribution of stable night light across all Nigerian states over the years. The observation in blue indicates the states that have oil fields. The observation which measures above 40 is Lagos, the financial and commercial capital in Nigeria.

the dependent variable now is luminosity.

Table 7: Rebel and Militia Violence

	Stable Light	Stable Light	Stable Light
	(1)	(2)	(3)
Policy Yr * Oil Field	2.151**	2.170**	1.789**
	(0.660)	(0.677)	(0.721)
Yr=2009 * Oil Field			−0.452
			(0.455)
Controls	No	Yes	No
Fixed Effects and Time Trend	Yes	Yes	Yes
Observations	1,665	1,656	1,665
R^2	0.978	0.978	0.978
Adjusted R^2	0.971	0.971	0.971

Notes- The dependent variable is the NOAA night time light. Standard errors are boot clustered at state-level. ***, **, * represents significance at the 1%, 5% and 10% respectively.

Column 1 shows that the amnesty policy seemed to have increased the night light in the Niger-Delta state with oil field after NDAP by 2.15 units. Column 2 controls

for log population and log rainfall. The results are similar to that in column 1 with NDAP increasing night light by 2.17 units. Column 3 shows a placebo analysis as before, where we include a placebo variable which is the interaction term of the presence of oil field and observations in 2009. The inclusion of the placebo variable checks if there was an increase in the night time lights in the treatment region before the amnesty policy. The estimates in column 3, show that while the placebo term is insignificant, nigh lights improved by 1.79 units after the policy. Overall, there is a strong evidence of improvement in economic activities in the LGA's with oil fields in the Niger-Delta as a result of the amnesty program.

7 Conclusion

Using a DiD framework, we examine the effect on conflict of an amnesty policy offered by the Nigerian government in August 2009 to rebel group members in the oil-producing region of the Niger-Delta. We find that the amnesty policy reduced violence in Niger-Delta LGAs with oil fields. Rebel and militia activities reduced substantially both in terms of the probability of occurring and in the intensity of the violence levels. We also find that other dimensions of violence, such as battles between government forces and civilian violence reduced as a result of the policy. We also find no evidence of spillover of violence into other LGAs in the Niger-Delta.

Surprisingly, the effect of the amnesty policy was short-lived. Compared to the level of violence between 2005 and 2009, the amnesty policy significantly reduced it in Niger-Delta LGAs with oil fields between 2010-13. However, it had no significant impact on rebel violence between 2014-16. It highlights the inability of parties in conflict to credibly commit to an agreement that mitigates conflict in the long-run. This may be particularly true for developing countries, given considerable political instability and mistrust in government. There is also evidence that effectiveness of the amnesty policy was reduced due to implementation inconsistencies and corruption (Okonofua (2016), Ikelegbe and Umukoro (2016)). As we highlight in our analytical model, the underlying

causes of why people join the rebel groups and militias need to be addressed effectively, perhaps through increased social expenditure, otherwise the whole cycle of rising conflict followed by amnesty will repeat itself.

The impact of the amnesty policy was not just limited to reduction in conflict. By using night light as proxy for economic activity, we find that there has been statistically significant increase in the economic activity in the LGAs of Niger-Delta where the policy was targeted. This peace dividend perhaps is a reflection of the reduction in conflict and particularly the reduction of violence against civilians, allowing space for increase in normal economic activities. While we do not have monetary estimates of the peace dividend and thus a direct comparison with the cost of the amnesty policy is not feasible, this paper demonstrates that the policy led to reduction in conflict and improvement in economic activities in the regions where it was implemented. From those perspectives, the policy has been a success.

References

Abidoye, B. and Calì, M. (2015). Income shocks and conflict: Evidence from Nigeria, *Policy Research Working Paper* (7213).

Addison, D. and Stewart, B. (2015). Nighttime lights revisited: the use of nighttime lights data as a proxy for economic variables, *Policy Research Working Paper* (7496).

Akpolat, A. G. and Bakirtas, T. (2020). The relationship between crude oil exports, crude oil prices and military expenditures in some OPEC countries, *Resources Policy* **67**(101659): 1–12.

Angrist, J. D. and Pischke, J.-S. (2008). *Mostly harmless econometrics: An empiricist's companion*, Princeton University Press.

Berman, E., Felter, J., Kapstein, E. and Troland, E. (2013). Predation, taxation, investment and violence: evidence from the Philippines, Working Paper, National Bureau of Economic Research, (19266).

Berman, E., Shapiro, J. N. and Felter, J. H. (2011). Can hearts and minds be bought? the economics of counterinsurgency in Iraq, *Journal of Political Economy* **119**(4): 766–819.

Besley, T., Fetzer, T. and Mueller, H. (2015). The welfare cost of lawlessness: Evidence from Somali piracy, *Journal of the European Economic Association* **13**(2): 203–239.

Besley, T. and Mueller, H. (2012). Estimating the peace dividend: The impact of violence on house prices in Northern Ireland, *American Economic Review* **102**(2): 810–33.

Blattman, C. and Miguel, E. (2010). Civil War, *Journal of Economic Literature* **48**(1): 3–57.

Bradfield, P. (2017). Reshaping amnesty in Uganda : The case of Thomas Kwoyelo, *Journal of International Criminal Justice* **15**(4): 827–855.

Brückner, M. and Ciccone, A. (2010). International commodity prices, growth and the outbreak of civil war in Sub-Saharan Africa, *The Economic Journal* **120**(544): 519–534.

Burke, M., Hsiang, S. M. and Miguel, E. (2015). Climate and conflict, *Annual Review of Economics* **7**(1): 577–617.

Chen, X. and Nordhaus, W. D. (2011). Using luminosity data as a proxy for economic statistics, *Proceedings of the National Academy of Sciences* **108**(21): 8589–8594.

Collier, P. (1995). Civil war and the economies of the peace dividend, *CSAE Working Paper Series* (1995-08).

Daniels, L.-A. (2020). How and when amnesty during conflict affects conflict termination, *Journal of Conflict Resolution* **64**(4): 1612–1637.

Dube, O. and Vargas, J. F. (2013). Commodity price shocks and civil conflict: Evidence from Colombia, *The Review of Economic Studies* **80**(4): 1384–1421.

Fenske, J. and Zurimendi, I. (2017). Oil and ethnic inequality in Nigeria, *Journal of Economic Growth* **22**(4): 397–420.

Harris, I., Jones, P. D., Osborn, T. J. and Lister, D. H. (2014). Updated high-resolution grids of monthly climatic observations–the cru ts3. 10 dataset, *International Journal of Climatology* **34**(3): 623–642.

Henderson, J. V., Storeygard, A. and Weil, D. N. (2012). Measuring economic growth from outer space, *American Economic Review* **102**(2): 994–1028.

Hönig, T. (2017). The impact of peace: Evidence from nigeria, *Munich Personal RePEc Archive* (83302).
URL: *https://mpra.ub.uni-muenchen.de/83302/*

Idemudia, U. and Ite, U. E. (2006). Demystifying the Niger Delta conflict: Towards an integrated explanation, *Review of African Political Economy* **33**(109): 391–406.

Ikelegbe, A. and Umukoro, N. (2016). The amnesty programme and the resolution of the Niger Delta crisis: Progress, challenges and prognosis, *Centre for Population and Environmental Development (CPED)* **14**.

Ikoh, M. U. and Ukpong, E. A. (2013). The Niger Delta crisis: Taming violence beyond the amnesty, *International Journal of Humanities and Social Science* **3**(17): 146–159.

Ikporukpo, C. et al. (1996). Federalism, political power, and the economic power game: conflict over access to petroleum resources in Nigeria, *Environment and Planning C: Government and Policy* **14**(2): 159–177.

Imbens, G. W. and Wooldridge, J. M. (2009). Recent developments in the econometrics of program evaluation, *Journal of Economic Literature* **47**(1): 5–86.

Kaila, H., Singhal, S. and Tuteja, D. (2020). Development programs, security, and violence reduction: Evidence from an insurgency in India, *World Development* **130**: 1–14.

Koos, C. and Pierskalla, J. (2016). The effects of oil production and ethnic representation on violent conflict in Nigeria: a mixed-methods approach, *Terrorism and Political Violence* **28**(5): 888–911.

Lei, Y.-H. and Michaels, G. (2014). Do giant oilfield discoveries fuel internal armed conflicts?, *Journal of Development Economics* **110**: 139–157.

Lessmann, C. and Steinkraus, A. (2019). The geography of natural resources, ethnic inequality and civil conflicts, *European Journal of Political Economy* **59**: 33–51.

Lujala, P. (2009). Deadly combat over natural resources: Gems, petroleum, drugs, and the severity of armed civil conflict, *Journal of Conflict Resolution* **53**(1): 50–71.

Lujala, P. (2010). The spoils of nature: Armed civil conflict and rebel access to natural resources, *Journal of Peace Research* **47**(1): 15–28.

Lujala, P., Gleditsch, N. P. and Gilmore, E. (2005). A diamond curse? civil war and a lootable resource, *Journal of Conflict Resolution* **49**(4): 538–562.

Lujala, P., Ketil Rod, J. and Thieme, N. (2007). Fighting over oil: Introducing a new dataset, *Conflict Management and Peace Science* **24**(3): 239–256.

Mallinder, L. and McEvoy, K. (2011). Rethinking amnesties: Atrocity, accountability and impunity in post-conflict societies, *Contemporary Social Science* **6**(1): 107–128.

Miguel, E., Satyanath, S. and Sergenti, E. (2004). Economic shocks and civil conflict: An instrumental variables approach, *Journal of Political Economy* **112**(4): 725–753.

Nilsson, D. (2008). Partial peace: Rebel groups inside and outside of civil war settlements, *Journal of Peace Research* **45**(4): 479–495.

Nwozar, A. (2010). A delta of a minefield: Oil resource conflict and the politics of amnesty in Nigeria, *Conflict Trends* **2010**(1): 28–35.

Okoi, O. (2020). Peacebuilding and transformational change in Nigeria's oil region, *Conflict Resolution Quarterly* **37**(3): 223–238.

Okonofua, B. A. (2016). The Niger Delta amnesty program: The challenges of transitioning from peace settlements to long-term peace, *SAGE Open* **6**(2).
URL: *https://journals.sagepub.com/doi/full/10.1177/2158244016654522*

Oluduro, O. and Oluduro, O. F. (2012). Nigeria: In search of sustainable peace in the Niger Delta through the amnesty programme, *Journal of Sustainable Development* **5**(7): 48.

Oluwaniyi, O. O. (2011). Post-amnesty programme in the Niger Delta: Challenges and prospects, *Conflict Trends* **2011**(4): 46–54.

Ross, M. (2006). A closer look at oil, diamonds, and civil war, *Annual Review of Political Science* **9**: 265–300.

Ross, M. L. (2004). What do we know about natural resources and civil war?, *Journal of Peace Research* **41**(3): 337–356.

Singhal, S. and Nilakantan, R. (2016). The economic effects of a counterinsurgency policy in India: A synthetic control analysis, *European Journal of Political Economy* **45**: 1–17.

Udosen, C., Etok, A.-I. and George, I. (2009). Fifty years of oil exploration in Nigeria: The paradox of plenty, *Global Journal of Social Sciences* **8**(2): 47–57.

Vanden Eynde, O. (2018). Targets of violence: Evidence from India's Naxalite conflict, *The Economic Journal* **128**(609): 887–916.

Walter, B. F. (1997). The critical barrier to civil war settlement, *International Organization* **51**(3): 335–364.

Walter, B. F. (2009). Bargaining failures and civil war, *Annual Review of Political Science* **12**: 243–261.

Wing, C., Simon, K. and Bello-Gomez, R. A. (2018). Designing difference in difference studies: best practices for public health policy research, *Annual Review of Public Health* **39**: 453–469.

A Tables and Figures

Table A1: Descriptive Statistics

Whole Country	N	Mean	St. Dev.	Min	Max
Rebel	9,288	0.546	2.947	0	125
All Event	9,288	0.894	4.071	0	130
Battles	9,288	0.219	1.287	0	47
VAC	9,288	0.265	1.396	0	61
Protests	9,288	0.228	1.831	0	77
Fatalities	9,288	4.628	43.827	0	2,258
NOAA Night Light	6,966	5.238	11.790	0	63
Total Rainfall (mm)	9,288	1,334	557	311	2,901
Population	9,276	210,692	132,877	37,658	2,707,597

Notes- The top section is the summary statistics for the whole country, while the bottom is the summary statistics for the only Niger-Delta. The number of violent events in each category is the sum of all entries in the ACLED dataset by LGA year.

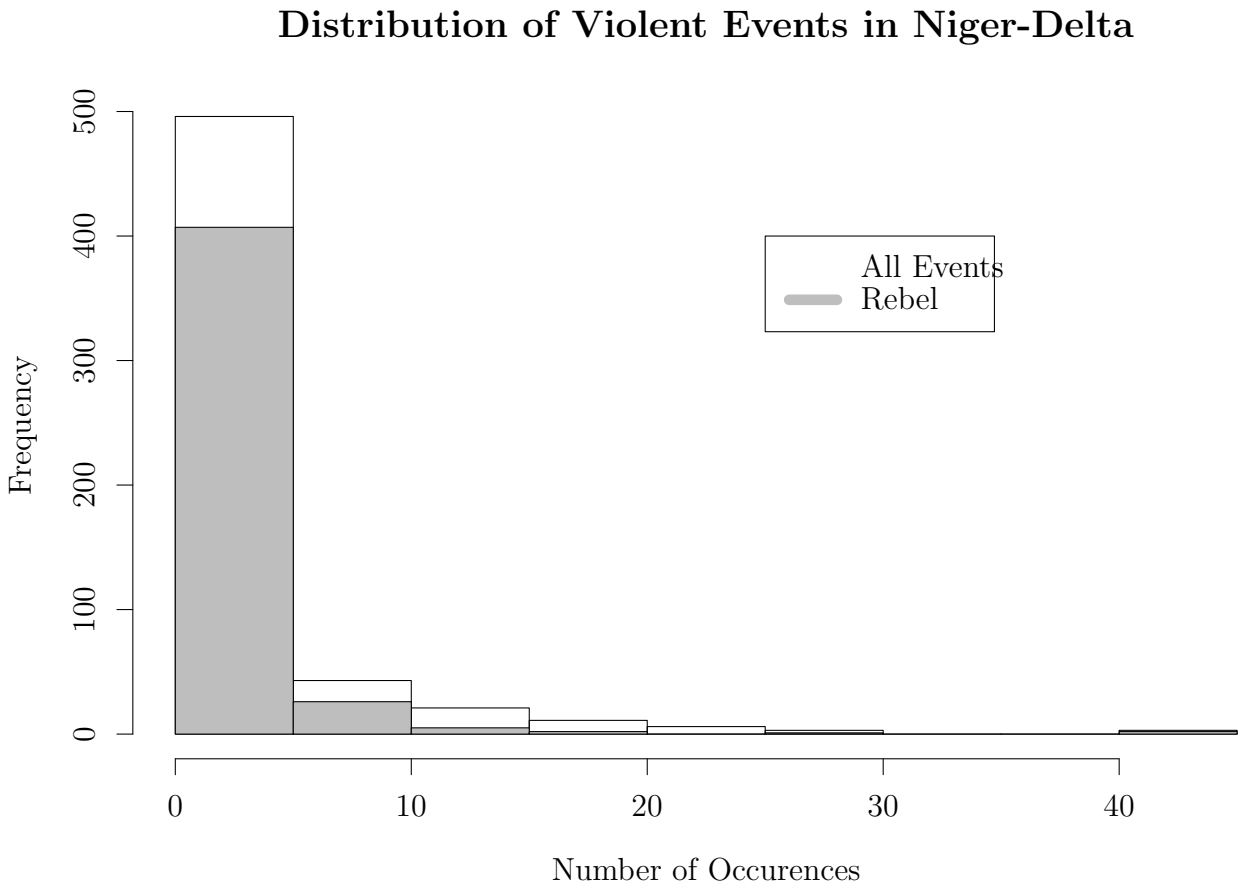
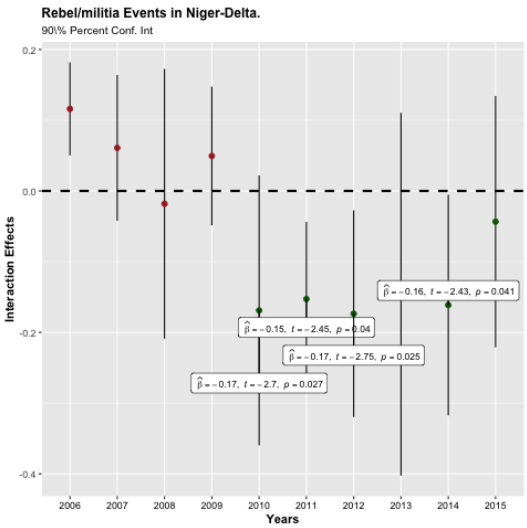
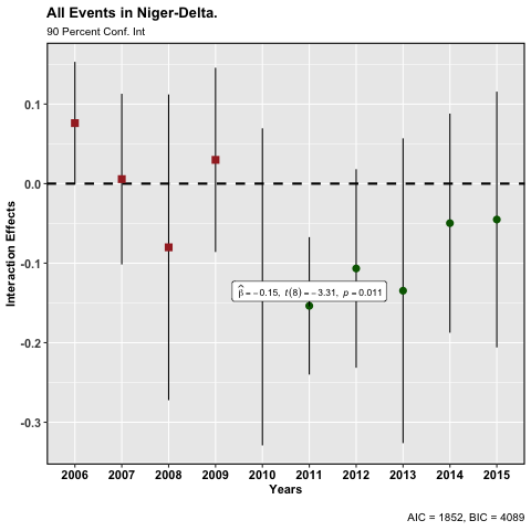


Figure A1: A histogram of all violent events in the Niger-Delta and Rebel/Militia activities.

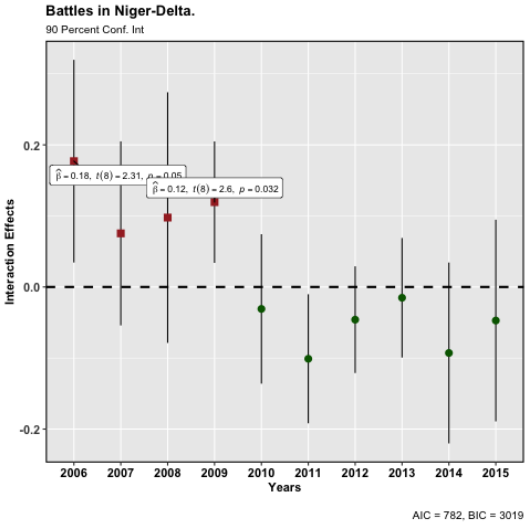
B Event Study



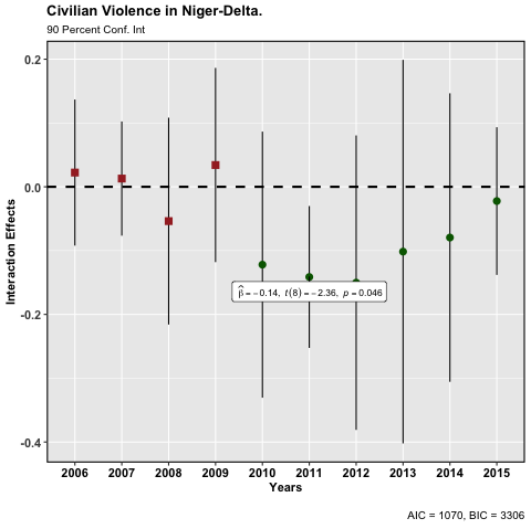
(a) Coefficient Plot for Rebel and Militia Events



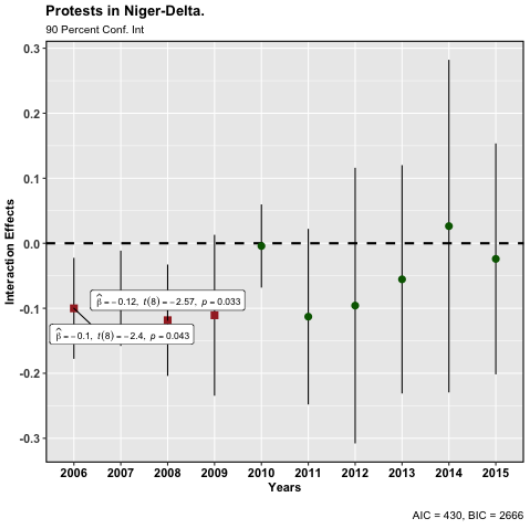
(b) Coefficient Plot for All Events



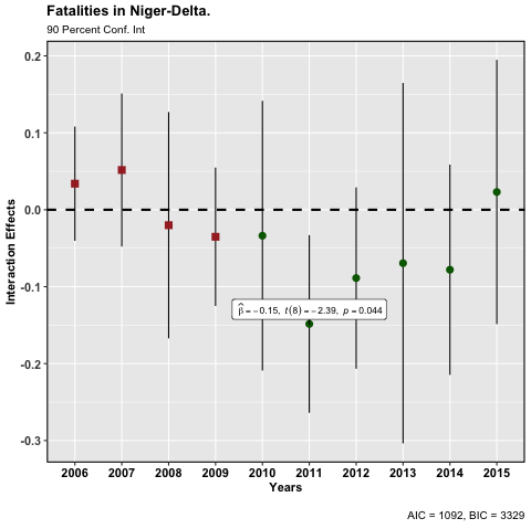
(c) Coefficient Plot for Battles



(d) Coefficient Plot for VAC



(e) Coefficient Plot for Protests



(f) Coefficient Plot for Fatalities

Table B1: Event Study Estimates

	Rebels	Battles	Violence against Civilians	Protests	All Events
	(1)	(2)	(3)	(4)	(5)
Oil Field * 2006	0.116**	0.177**	0.022	−0.100**	0.076
	(0.035)	(0.077)	(0.062)	(0.042)	(0.041)
Oil Field * 2007	0.061	0.075	0.013	−0.085*	0.006
	(0.055)	(0.070)	(0.048)	(0.039)	(0.058)
Oil Field * 2008	−0.018	0.098	−0.054	−0.118**	−0.080
	(0.103)	(0.095)	(0.087)	(0.046)	(0.103)
Oil Field * 2009	0.049	0.119**	0.034	−0.111	0.030
	(0.053)	(0.046)	(0.082)	(0.067)	(0.062)
Oil Field * 2010	−0.169	−0.031	−0.122	−0.004	−0.130
	(0.103)	(0.057)	(0.112)	(0.034)	(0.107)
Oil Field * 2011	−0.153**	−0.101*	−0.141**	−0.113	−0.154**
	(0.059)	(0.049)	(0.060)	(0.073)	(0.046)
Oil Field * 2012	−0.174*	−0.046	−0.150	−0.096	−0.107
	(0.079)	(0.040)	(0.124)	(0.114)	(0.067)
Oil Field * 2013	−0.146	−0.015	−0.102	−0.055	−0.135
	(0.138)	(0.045)	(0.162)	(0.094)	(0.103)
Oil Field * 2014	−0.161*	−0.093	−0.080	0.026	−0.050
	(0.084)	(0.068)	(0.122)	(0.138)	(0.074)
Oil Field * 2015	−0.043	−0.047	−0.022	−0.024	−0.045
	(0.096)	(0.076)	(0.062)	(0.096)	(0.086)
Fixed Effects and Time Trend	Yes	Yes	Yes	Yes	Yes
Observations	2,220	2,220	2,220	2,220	2,220
R^2	0.450	0.371	0.421	0.432	0.509
Adjusted R^2	0.336	0.240	0.300	0.314	0.407

Notes- Estimates are the interaction of the oil field dummy with year fixed effect. The estimated result in each year is relative to the baseline of Oil Field * 2005. To avoid collinearity we drop Oil Field * 2016. The table shows that relative to 2005 there is an observed switch in signs between observations in 2009 and 2010. In 2011, the estimates become negatively large and statistically significant for Rebels, Battles and Violence Against Civilians. Standard errors are boot clustered at state level. ***, **, * represents significance at the 1%, 5% and 10% respectively

C Spill Over - Other Parts of Nigeria as Control Group

Using a sample of all LGAs across Nigeria, equation (7) estimates if there is any difference in rebel activities between non-Niger-Delta LGAs and Niger-Delta LGAs without oil fields.

$$Rebel_{lt} = \alpha_l + \delta_t + \beta_0 \boldsymbol{ND_{ls}} \times \boldsymbol{OilField_l} \times \boldsymbol{Policy_t} + \gamma_l t + \epsilon_{lt} \tag{7}$$

The estimation answers the question of whether the amnesty policy affected rebel activities in Niger-Delta LGAs with no oil-field relative to other LGAs in Nigeria. Eq (7) is a three-way interaction of a dummy ND (all LGAs in the Niger-Delta with and without oil fields) with the dummy oil field (only LGAs with oil fields in the original baseline estimate). The estimates compare the probability of violence occurring in non-Niger-Delta LGAs across Nigeria with LGAs with and without oil fields in Niger-Delta. If Niger-Delta LGAs without oil-field saw a substantial decrease in violence after the amnesty policy compared with the rest of Nigeria, this will give an indication the policy affected the Niger-Delta as a whole, or the effect of the policy in LGAs with oil-fields spilt-over into Niger-Delta LGAs without oil field – bringing to question the same trend assumption the difference-in-difference estimation depends.

Table C1 presents the results of the estimation of eq (v). We expect the interaction of the policy variable (Policy Yr) and Niger-Delta LGA dummies to be insignificant. A significant negative estimate imply that the amnesty policy also impacted violence in Niger-Delta LGAs with no oil fields. The result shows that all estimates of the interaction of Niger-Delta oil-fields with the policy variable is consistent with estimates of the main result in table 2 as expected. We see limited evidence in column 1 that the policy reduced the probability of rebel activities by 6 percent in LGAs without oil fields in Niger-Delta – indicating policy effect spill-over. However, it is worth noting that the estimate was close to the "refuse-to-reject the null" region of statistical significance with a p-value of 0.098. Column 5 also shows that taking all forms of violence together, the probability of conflict in Niger-Delta LGAs without oil-fields seems to decrease by 9.2 percent. We

find no evidence of a decrease in violent battles involving government forces and civilian related violence in Niger-Delta LGAs without oil-field after 2009.

Table C1: Policy Effect Across Nigeria

	Rebels	Battles	Violence against Civilians	Protests	All Events	Fatalities
	(1)	(2)	(3)	(4)	(5)	(6)
Policy Yr * ND	-0.060^{*}	-0.036	-0.023	0.011	-0.092^{**}	-0.087^{***}
	(0.034)	(0.023)	(0.022)	(0.028)	(0.035)	(0.029)
Policy Yr * Oil Field	-0.273^{***}	-0.191^{***}	-0.197^{***}	0.033	-0.184^{**}	-0.115
	(0.092)	(0.062)	(0.070)	(0.043)	(0.089)	(0.086)
Fixed Effects and Time Trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,288	9,288	9,288	9,288	9,288	9,288
R^2	0.469	0.402	0.432	0.496	0.520	0.463
Adjusted R^2	0.361	0.281	0.318	0.395	0.423	0.354

Notes- The sample used in the estimation is all LGAs across Nigeria. The estimation accounts for the differential effect of teh amnesty program on all types of violence between non-Niger-Delta Nigerian LGAs and LGAs with and without oil fields in the Niger-Delta. ND is a dummy variable that indicates all Niger-Delta LGAs (with and without oil fields). The Oil Field is a dummy variable that indicates LGAs with oil fields in the Niger-Delta. Standard errors are boot clustered at state level. ***, **, * represents significance at the 1%, 5% and 10% respectively

D Stable Night Light Maps

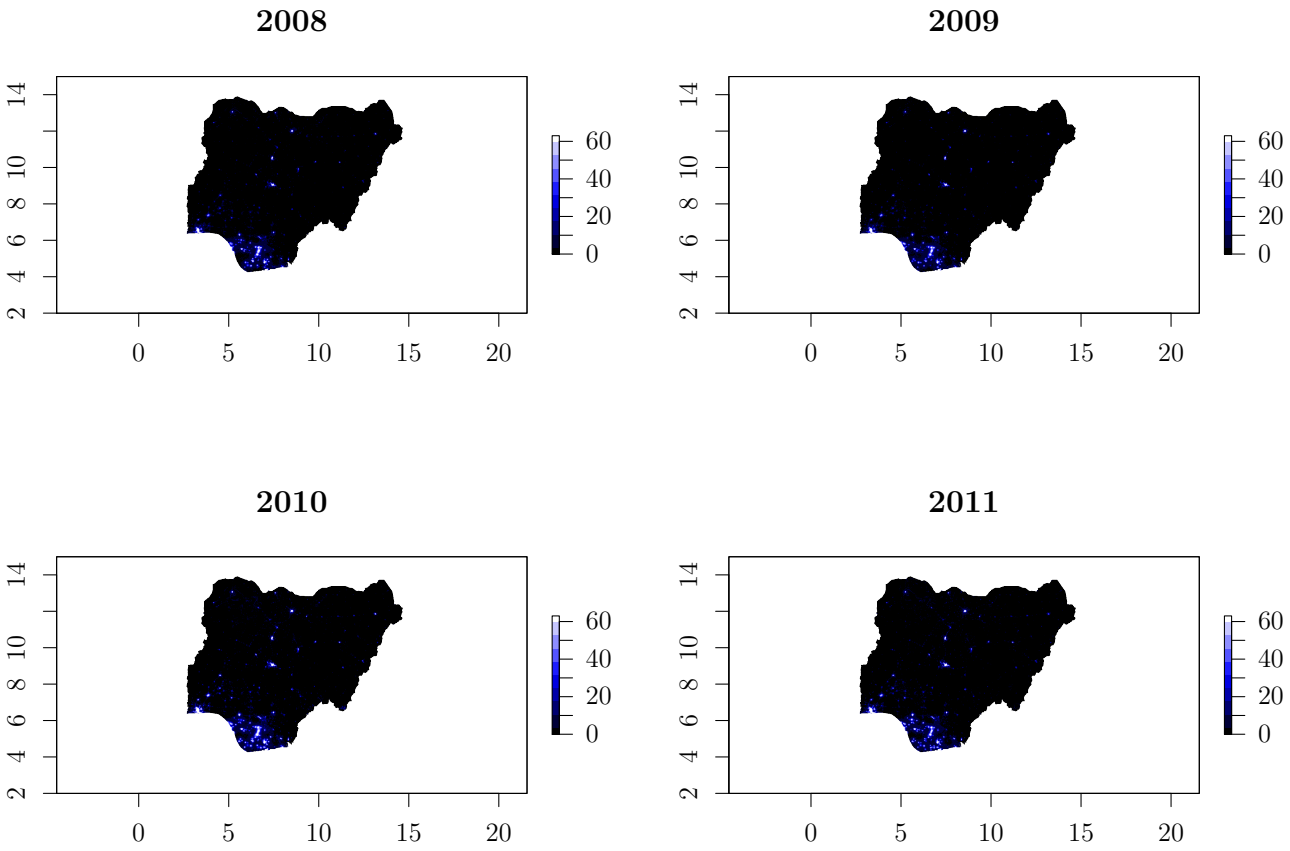


Figure 8: Night-Light: Stable Light