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Oil Price Shocks and Civil Conflict: Evidence from Nigeria

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Abstract:

This paper studies the effect of international oil prices on civil conflict in Nigeria. Our analysis uses time variation in global oil prices and cross-sectional variation based on the initial distribution of oil production across Nigerian districts. According to our estimates, an increase in oil price increases the risk of civil conflicts in districts that produce oil by at least 63 percent. Using data on intergovernmental transfers, labor outcomes and firm characteristics, the study tests for popular theoretical mechanisms of the resource curse and shows that positive oil price shocks magnify conflict through rising competition for resource rents and grievance against foreign firms. No evidence is found in favor of mechanisms related to changes in the opportunity cost of engaging in conflict.

Keywords: Natural resource, Conflict, Firms

JEL Codes: C23, D74, J30, L70, Q34

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1 Introduction

Contention over natural resources is a recurrent theme in many civil conflicts.[1] Existing literature highlight three competing views to explain this trend. First, the increase in resource rents makes conflict feasible by providing incentives for insurgents to engage in conflict.[2] Second, the decline in local wages reduces the opportunity cost of engaging in violent activities[3]. Third, resource revenues may enable the state to suppress or buy off rebel groups.[4] Although a large body of the literature studies these channels at the cross-country level, the evidence of these mechanisms at the micro-level, however, remains scarce.[5] A plausible reason for this is the paucity of data on natural resource location at the subnational level in developing countries (Nillesen and Bulte, 2014).[6] District-level data on oil production are generally unavailable. This paper provides a novel measure of both. First, firm-level data on oil-producing fields and wells are used to construct a 17-year annual panel of oil-producing districts. Second, I use this data to estimate the average oil production per year in individual districts across a substantial time period.

In this paper, I investigate the impact of a positive oil price shock on civil conflict by using district data on conflict events and oil production in 774 local government areas in Nigeria over the 1998-2014 period.[7] The results show that a rise in global oil price increases violence against civilians by ethnic groups and clash between the government and ethnic groups in the oil-producing districts. The empirical analysis is based on the combination of an original dataset from public records that document yearly production data of oil firms

[1]In the last six decades, no less than 40 percent of intra-state conflicts have been associated with natural resources (see, e.g., Lacina and Gleditsch (2005)). 320 of these events occurred between 1997 and 2014 in sub-Saharan Africa (Raleigh et al., 2010).

[2]See Collier and Hoeffler (2004); Fearon (2005); Besley and Persson (2008, 2011); Berman et al. (2017)

[3]See, for example, Miguel et al. (2004); Brckner and Ciccone (2010); Besley and Persson (2010); Collier and Hoeffler (1998).

[4]Bazzi and Blattman (2014).

[5]Blattman and Miguel (2010) provide a review of the conflict literature.

[6]Recent studies show the importance of geographical concentration of natural resources for conflict. See Morelli and Rohner (2015); Lujala (2010); Bellows and Miguel (2009); Angrist and Kugler (2008); Dube and Vargas (2013). Caselli et al. (2015) show that the presence and location of oil are important predictors of interstate conflict.

[7]Districts are called local government areas in Nigeria.

and conflict events from Armed Conflict Location Events Data (ACLED). I characterize conflict events by actors such as: (i) ethnic group attacks on civilians, (ii) clashes between ethnic groups, (iii) government attacks on ethnic groups and (iv) ethnic group attacks on government. These definitions capture the three distinct features of the civil conflict in the country. The first is the two-sided violence between ethnic groups and the government. The second covers the clashes between two ethnic groups on land and the third is the one-sided violence against civilians by ethnic groups. Using this data, I interact the variation in the price of oil in the international market with districts that produce oil to estimate the impact of price shock on local conflict.[8] A possible confounder to the estimation is the concentration of oil production in the southern part of the country. This within-country heterogeneity may bias our analysis if the pre-sample district characteristics associated with the dynamics of conflict are unbalanced between the oil and non-oil-producing districts.[9] I include district characteristics × year effects and district fixed effects to control for this possibility. I argue that the positive change in oil price captures within-district variation in conflict events conditional on these covariates. Using non-oil districts as a counterfactual, I show that oil price shock differentially increases conflict in districts that produce oil.[10]

The estimated effects are substantial. A standard deviation increase in the price of oil (relative to the mean) translates to a 63 percent increase in the probability of ethnic group attack on civilians and a 65 percent increase in the likelihood of government attack on ethnic groups in oil-producing districts. Considering the oil price boom between 2002 and 2008, the effect translates to a conflict probability increase of 13 percent for ethnic group attack on civilians and 10 percent for government attack on ethnic groups. I find no effect of oil price increase on clashes between ethnic groups and ethnic group attack on government.

[8]The variation of global oil prices can be considered as exogenous to the Nigerian economy as the country produces less than 3 percent of the world oil market. In addition, Griffin (1985) show that although Nigeria is part of OPEC, it does not coordinate its production quantities with OPEC because it is a small producer with competitive fringe tendencies.

[9]For instance, the geographical terrain and educational attainment. Fenske and Zurimendi (2017) study the effect of an oil price shock on inequality between ethnic groups in Nigeria. They find that high oil prices increase schooling for southern ethnic groups.

[10]A similar approach is used by Dube and Vargas (2013).

The paper contributes to the current literature in several ways. First, it provides micro-level evidence consistent with resource rent mechanisms by showing that oil price shocks affect both intergovernmental transfers and violence. These results are in line with the theoretical models which show that rents from resources increase incentives for violence (Grossman, 1995; Bates et al., 2002; Bates, 2008; Besley and Persson, 2010, 2011; Caselli and Coleman, 2013).[11] The results are also consistent with previous cross-country studies which show that rents on primary commodities increase the likelihood of civil conflict especially in sub-Saharan Africa (Fearon and Laitin, 2003; Lujala et al., 2005; Ross, 2004; Humphreys, 2005). In particular, it is consistent with the cross-country analysis of Berman et al. (2017) which shows that a rise in mineral prices increases conflict risk in African countries that export primary commodities.[12] Furthermore, it provides indirect evidence of a relationship between federal transfers (from oil revenue) and political corruption, consistent with the studies of Brollo et al. (2013), Vicente (2010) and Caselli and Michaels (2013).

Second, it shows that positive oil shocks do not affect individual labor outcomes in resource-rich regions. This is consistent with predictions by Grossman (1991), Hirshleifer (1995) and Chassang and i Miquel (2009) that a negative shock to the labor-intensive rather than the capital-intensive sector enhances the opportunity cost of rebellion. It also relates to studies that show a relationship between negative income shocks and an increase of civil conflict by (Miguel et al., 2004; Collier and Hoeffler, 1998; Dube and Vargas, 2013). The paper is related to a recent paper by Abidoye and Calì (2015) on income shocks and conflict in Nigeria. While Abidoye and Calì (2015) focus most of their discussion on differentiating the effect of agricultural and oil prices on civil conflict at the state level, this article develops an in-depth analysis of the effect of oil prices on conflict actors and events at the district level. In addition, it provides evidence on the effect of firm characteristics on conflict. I show

[11] It relates to the theoretical work of Tornell and Lane (1999) which show that the increase in voracious rent-seeking of natural resource revenues occurs after oil windfall. It also relates to the recent research of Lei and Michaels (2014) which show that the discovery of oil fields increase the incidence of internal armed conflict.

[12] This is in contrast to the study by Cotet and Tsui (2013) who find little evidence that oil rents affect political violence.

that ethnic group attack on civilians and government attack on ethnic groups are related with firms that are multinational and of colonial origin.

The rest of the paper is structured as follows. Section 2 briefly reviews the institutional setting of the oil industry and the local conflicts in Nigeria. Section 3 describes the data. Section 4 outlines the empirical strategy and the results. Section 5 discusses possible mechanisms. Section 6 presents the conclusion.

2 Institutional Setting

Oil exploration in Nigeria dates back to 1908 with the prospect for oil deposits in the south-western region of the country. In 1956, discovery was made in Oloibiri in the Niger Delta region and crude exports began in 1958. In 1961, total exports were dominated by cocoa, groundnut, and rubber with crude oil at 7.1 percent of total exports revenue. Between 1965 and 1970, the percentage share of crude oil to export earnings increase from 13.5 percent to 63.9 percent to become the leading source of foreign exchange (Obaje, 2009). By 1979, it contributed to 95 percent of total external earnings and generated 75 percent of government revenue. The strategic importance of crude oil to the Nigerian economy makes it vulnerable to international oil price volatility.

Currently, Nigeria has an estimated 37 billion barrels of proved crude oil reserves and 180 trillion cubic feet (Tcf) of proved natural gas reserves mostly situated along the country's Niger Delta and offshore in the Bight of Benin, the Gulf of Guinea and the Bight of Bonny.[13] Commercial oil production is concentrated within the Niger Delta region situated at the apex of the Gulf of Guinea on the African west coast. The region consists of nine (9) oil-producing states with over 250 oil-producing communities and an extensive network of wells and production-related facilities.[14] Endowed with huge oil and gas fields–half of which are offshore–the region produces over a million barrels of oil per day.

[13] See Oil and Gas Journal (2014).

[14] The states are Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Ondo, Imo, and Rivers.

The oil industry operates under a statutory monopoly over mineral exploitation by the Nigerian government and is regulated through the Nigerian National Petroleum Cooperation (NNPC). The NNPC operates through joint ventures and production-sharing contracts with oil majors who are granted territorial concessions (blocs) to extract oil.[15] Oil revenues are distributed to states through a derivation formula with a higher share to oil-producing states and communities.[16] However, intermittent changes to this revenue allocation strategy make it a source of tension in the Niger Delta region leading to demands for an increase in the amount of derivation or outright control of the natural resource.[17]

The Niger Delta disputes over resource control started in the early 1990's with the disruption of oil production through protests by the Movement for the Survival of the Ogoni People (MOSOP). By late 1990's conflicts intensified between ethnic groups and government due to grievances of environmental and development neglect.[18] Specifically, the ethnic groups demanded greater local control and more transparent management of oil revenues, as well as adequate compensation of local communities for negative externalities derived from oil exploitation. By 2005, violent community conflicts in Rivers, Bayelsa, and Delta states numbered between 120-150 per year, and over fifty armed groups with an estimated 20,000-25,000 armed youths were operating in the oil-producing region (UNDP, 2007).

The formation of Movement for the Emancipation of the Niger Delta (MEND) escalated the conflict in 2006. The most coherent and trained armed group in the region and estimated to have between 5000-10,000 combatants, MEND claimed responsibility for kidnapping oil workers and attacking onshore and offshore oil facilities whilst generating income for arms through oil bunkering trade (Asuni, 2009).[19] In 2009, more than 20,000 ex-combatants

[15] The upstream sector is largely dominated by multinational exploration and production companies such as Dutch Shell, Total Fina Elf, ExxonMobil, ENI/Agip, ChevronTexaco and Addax Petroleum.

[16] Oil producing states currently receive 13 percent of revenue from oil receipts.

[17] The allocation formula of oil revenues has changed eighteen (18) times since 1946. See Ross (2003).

[18] For example, the 1997 protest of 10,000 youths at the Alebiri to end activities of Shell in the district and the 1998-99 mobilization of the Ijaw from the Ijaw Youth and National Council led to conflict with government forces and deepened the political disorder across the region (Watts, 2004).

[19] It is estimated that between 70,000 and 300,000 barrels per day (more than 12 percent of daily average oil production) are lost to illegal oil trade. For instance, Nigeria lost 136 million barrels of oil with an estimated value of $11 billion to oil theft and sabotage between 2009 and 2011 (Kent, 2013). Further estimates show

accepted amnesty from the government and have been participating in a program of disarmament, demobilization, reorientation, and reintegration (DDRR) (Francis et al., 2011).

3 Data

The research design exploits the fact that conflict intensity within oil districts depend on oil price changes in the world market and group competition for resource rents. This naturally requires data on oil production within the local economy, oil prices, conflict events amongst different groups (both government and ethnic groups), district-level income and state revenues. Table 1 presents the summary statistics used in the analysis.

I use conflict data recorded by the Armed Conflict Location and Event Data Project (ACLED). The data covers all countries in sub-Saharan Africa from 1997-2015. The data contains real-time reports on daily violent and non-violent events such as battles, riots, protests, violence against civilians by political actors including rebels, governments, communal groups.

The empirical analysis focuses on conflict events in Nigeria between 1998-2014, a 17-year window that captures conflict trends. Events are observed at district level over time using data specific information on date, location, event type, geographic coordinates and contextual notes. To capture local level violence cycle and distinguish who attacks, conflict actors are aggregated into groups defined as ethnic group attacks on civilians, clashes between ethnic groups, government attacks on ethnic group and ethnic group attacks on the government.

To identify producing districts, I collate firm-level information on district oil production from Nigerian National Petroleum Corporation (NNPC) annual reports. To complement this, additional information from secondary sources are used, including annual reports of oil firms and concession maps to locate exploration districts. The full dataset shows an average annual number of 155 oil wells of more than 1700 million barrels in production in

a loss of 84.8m million barrels at the cost of $6.7 billion to oil theft in 2013 (Wallis, 2015).

46 oil-producing districts across 9 states over the sample period.[20]

To motivate our story, Figure 1 shows a graphical display of international oil price movement and our conflict outcomes in Nigeria. The graph reveals the correlation between oil price movement and conflict events. Differentiating the conflict events between oil and non-oil districts, in Figure 2, shows that the increase in global oil price relates to more violence in oil districts. This is particularly evident for events during the 2002-2008 and 2010-2011 oil boom. The close relationship between the timing of changes in oil price and local conflict events in districts that produce oil rules out the possibility that pre-trend conflict events drive our results.

Figure 3 shows the districts with oil production data at the beginning of the sample period. The map shows the oil-producing districts to be concentrated in the southeastern part of the country. Not all districts in the south, however, produce oil.[21]

Oil price measure is the average annual spot oil price from the West Texas Intermediate (WTI) series.[22] The variation in global oil price can be safely assumed to be exogenous since Nigeria produces less than 3 percent of world oil supply.[23] The study focuses primarily on the period 1998-2014 because it contains oil shocks of sign and magnitude comparable to those of the 1970s. Oil price rose in 1998 from $14.39 per barrel to a high of $99.57 per barrel in 2008 before a collapse to $61.69 per barrel in 2009.[24] The substantial variation in oil price levels over this period means that it is possible to make inferences about changes in violent events in Nigeria by comparing oil price levels within a relatively narrow time window.

[20]The oil-producing states are Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers. There have also been recent oil discoveries in Anambra and Lagos.

[21]There are no oil districts in the North and there is a huge economic disparity between the North and South. The poverty rate in the north is twice that of the south region. The northern region accounts for the majority (66 percent) of the poor in the country. See World Bank (2014).

[22]The choice of price index choice relies on the fact that the United States has traditionally been the largest importer of Nigerian oil until 2012. India is currently the largest importer of Nigerian crude oil at 370,000 bbl/d while the United States is the 10th largest importer at 60,000 bbl/d. Europe remains the largest regional importer of Nigeria oil at 900,000 bbl/d. See UNITED STATES ENERGY INFORMATION ADMINISTRATION (U.S.EIA) (2015). The oil price data is available at http://research.stlouisfed.org/fred2/series/OILPRICE/downloaddata?cid=98.

[23]See http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=5&pid=53&aid=1.

[24]At the nominal price, it was at an all-time high of $145 per barrel on July 3, 2008.

Mechanisms are investigated using labor outcomes data from household surveys and data on intergovernmental transfers to local districts. Specifically, data on wage and employment are from the Nigeria General Household Survey of 2006-2014. The surveys provide information on age, sex, marital status, district, wages, hours worked, employment and migrant status. The sample includes all persons born in 774 districts that are at least 15 years and not more than 65 years between 1998 and 2014.[25] A panel of individuals are defined according to their age, gender, the state of birth and educational level attained. Using this panel, monthly real wage and hours employed are calculated to estimate the opportunity cost of civil conflict.[26] Additional details on data characteristics are provided in the online appendix.

Intergovernmental transfers from the Federation Account are overwhelming the primary source of revenue for subnational governments in Nigeria.[27] Federally-collected revenues are shared between the federal level, the 36 states (plus the Federal Capital Territory) and the 774 local governments (districts) of the country. According to the current revenue allocation formula, 55 percent of the transfers are allocated to the Federal government, 25 percent to state governments and 21 percent to local governments.[28] The fact that revenue from oil represents a substantial share of total public sector income means that the sharing of oil revenue dominates intergovernmental relations in Nigeria and is also a potential source of appropriation. The allocation of revenues to the distinct levels of government are published monthly by the Office of the Accountant-General of the Federation.[29] Using this inventory, I aggregate monthly allocations to generate annual allocation figures at the district level.

[25]The minimum age for work in Nigeria is 12 years.

[26]Although I do not observe the same individuals over time, the availability of the surveys allows us to observe the average wage and employment within the specified age groups over time. A similar method is used by Dube and Vargas (2013).

[27]Internal revenues of most states are below 10 percent of their total revenues.

[28]For states that produce oil, the amount each state receives varies according to the number of local governments within the state and the amount of oil produced (oil-producing states receive an additional 13 percent from the Federation Account).

[29]This is available at the Office of the Accountant-General of the Federation website from 2007. http:www.oagf.gov.ng/

4 Empirical Strategy and Results

4.1 Empirical Specification

The empirical specification follows a difference-in-difference estimation with the exogenous variation from annual oil price movement in the international market.[30] The oil location variable is a dummy variable for districts that produced oil in 1998. Using oil location in the first year of the sample ensures that conflict events over the analysis period are not correlated with local oil supplies or oil field discoveries.

$$Y_{jrt} = \alpha_0 + \alpha_1(Oil_j \times OilPrice_t) + \alpha_2 X_{jrt} + \delta_j + \gamma_t + \lambda_r t + \epsilon_{jrt}, \tag{1}$$

Y_{jrt} is conflict outcomes comprising ethnic group attacks on civilians, government attacks on ethnic group, ethnic group attacks on government and clashes between ethnic groups in district $_j$, region $_r$ and year $_t$. In the main specification, the different conflict outcomes, Y_{jrt}, are regressed on $(Oil_j \times Oilprice_t)$, an indicator variable that captures the interaction between districts that produced oil in 1998 (a dummy variable equal to one, and zero otherwise) and the exogenous oil price increase in the international market (stated in natural log terms to capture the percentage change effect of oil price), a vector of pre-sample covariates interacted with time X_{jrt} , district fixed effects δ_j, year fixed effects γ_t and regional linear trends $\lambda_r t$ and error term ϵ_{jrt}.

The vector of covariates, X_{jrt} , include pre-sample indicator variables such as the percentage of households with primary school education and geographical elevation. These variables capture characteristics between oil and non-oil districts prior to our sample. As shown in Table A1, there are no significant variations in population, average years of schooling, percent of households with secondary education, the proportion of literate households and different measures of household access to public services. Nevertheless, there are differences between

[30] The international oil price is plausibly exogenous to Nigeria because it is a produces a small amount of world oil production. See https://www.eia.gov/beta/international/data.

oil and non-oil areas as measured by percentage of households with primary education and the geographic elevation which can confound our estimation. These variables, in addition to the regional linear trend , $\lambda_r t$, are included in the analysis as controls.

Equation 1 is estimated using ordinary least squares (OLS) for the different conflict events. Limiting the sample to these events is important because it captures the violence cycle and helps to disentangle the effect of oil from the effect of other time-varying factors that influence conflict in Nigeria. The baseline analysis focuses on comparing the effect of oil price increase between oil-producing and non-oil-producing districts. A potential concern in using OLS is that it produces a biased estimate of α_1 because pre-sample characteristics cause ϵ to be correlated with time and, thus with $(Oil_j \times Oilprice_t)$. These confounding factors are addressed using a difference-in-differences (DD) analysis. The identifying assumption is that conditional on the covariates, the average conflict events for oil and non-oil districts would have followed a parallel trend in absence of oil production.[31] Thus α_1 captures the average effect of oil price on conflict outcomes in oil-producing districts. Standard errors are clustered at the district level. I also account for spatial and temporal autocorrelation by using the methods of Conley (1999) as implemented by Hsiang et al. (2011). The specified distance for the spatial dimension is 1km while the time horizon is 3 years.[32]

4.2 Main Results

Table 2 reports estimates of the baseline specification in equation 1. For each conflict outcome, I first report a simple "naive" version of the estimation model and subsequently add controls that capture the pre-sample difference in district characteristics. Columns 1-8 show results of the measures of conflict outcome: ethnic group attack on civilians, clash between ethnic groups, government attack on ethnic groups and ethnic group attack on government. For two out of the four conflict outcomes, an increase in the price of oil is associated with

[31] This is related to the model proposed by Abadie (2005).

[32] As reported in the appendix, the baseline results are robust to alternative specifications of spatial and district-specific correlation.

higher levels of civil conflict. The estimated effects are large and dissimilar in magnitude. In column 1, the positive coefficient on $Oil_j \times Oilprice_t$ shows that on average, net of year and district fixed effects and regional linear time trends, a spike in the price of oil in the global market increases ethnic group attack on civilians. This is significant at the 5 percent level. The inclusion of district covariates × year in column 2 increases this effect by approximately 1 percentage point at a significance level of 1 percent. The result implies that if the price of oil increases by one-standard-deviation, the probability of violence against civilians by ethnic groups (relative to the mean) will increase by 63 percent.[33] I consider the possibility that the oil price boom might lead to land disputes between ethnic groups in oil districts. Not surprisingly, there is a negative and insignificant relationship between price shock and clash between ethnic groups (columns 3 and 4).[34]

Column 5 Table 2 reports estimates for government attack on ethnic groups. The results are significant at the 1 percent level and remain unchanged with the addition of district covariates (column 6). The coefficient of interest, 0.035, implies that a standard deviation increase in the price of oil raises the likelihood of government attack by 65 percent. The probability that ethnic groups might retaliate against the government is considered in columns 7 and 8. The effect is positive but insignificant.

4.3 Robustness

In this section, I consider the possibility that the baseline estimates may be biased by issues related to the definition of oil districts, oil price, oil production intensity, the dataset on violence and conflict characteristics, measurement error or omitted variables.

[33]The point estimate is larger in magnitude to the effect found in Dube and Vargas (2013) with respect to paramilitary attacks.

[34]A positive and significant relationship will imply that conflict related to land dispute is related to oil production. There are cases of conflict over land between the primary ethnic groups in Niger Delta: Itsekiri, Ijaws, Isoko and Urhobo as reported in Raleigh et al. (2010).

4.3.1 Alternative definition of oil districts

The baseline specification of $Oil_j \times Oilprice_t$ in equation 1 is a natural estimation to address the endogenous concern of opening and closure of oil fields. The use of oil districts at the beginning of the sample period (1998) ensures that the exogeneity comes from demand shock in the international oil price market. However, this specification is based on the assumption that conflict events in these districts do not influence oil production activity. Following Berman et al. (2017), I adopt three strategies to address this concern. First, I restrict the estimation of equation 1 to districts which always produced oil from 1998 to 2014. This ensures that the coefficient of interest, α_1 , captures the influence of oil price conditional on stable local production activity. Second, I define oil districts as districts that ever produced oil between 1998-2014. Third, I interact oil price by a lagged oil district dummy over the sample period to capture that fact current production might be influenced by future conflicts.

The results for the different strategies are reported in Table A2. The coefficient of interest remains positive and significant for conflict events regarding ethnic group attack on civilians and government attack on ethnic groups in all specifications. Panel A shows the results related to the permanent oil production throughout the period. The coefficient and size of the magnitude are approximately half as large as the baseline results.[35] The results in Panel B (oil district that ever produced between 1998-2014) is virtually identical to the results from baseline specification. The point estimate and magnitude for lagged dummy variable for oil district (Panel C) is larger than the estimates in the baseline.

I reexamine the robustness to the definition of oil districts by using an alternative dataset that captures oil-producing districts in the presample period. I use a global and georeferenced petroleum dataset (PETRODATA) of oil and gas fields from Lujala et al. (2007). This dataset consists of over 1200 records of oil fields (known to exist) in 114 countries with information on year of first discovery and initial production year.[36] The years of discovery were between

[35] In this specification, a standard deviation rise in oil price increases the probability of ethnic group attack on civilians by 35 percent and a government attack on ethnic groups by 58 percent.

[36] See Caselli et al. (2015) for a paper using similar data combined with a conflict dataset.

1956-1972 while the earliest year of production was between 1958-1978. Using this data, I separately interact oil price by year of discovery and year of first oil production. The results, as reported in Table A5, are comparable to the baseline estimates (with varying effect of magnitude) and also show a positive and significant relationship for ethnic group attack on government.[37] I also examine the issue of endogeneity of producing oil districts by instrumenting the district dummy in sample period in the original dataset with its presample equivalent from PETRODATA. The point estimates, as shown in Table A16, are larger and significant at 1 percent level for conflict events related to an ethnic group attack on civilians and a government attack on ethnic groups.[38]

4.3.2 Alternative definition of oil price

One of the assumptions in equation 1 is that oil price has an instantaneous effect on conflict. I relax this premise by introducing two separate time lags in the baseline model to capture the effect of the timing of oil price shocks on conflict outcomes. I begin by regressing the conflict types by a one-year time lag ($Oil_j \times Oilprice_{t-1}$) and then a time lag of two years ($Oil_j \times Oilprice_{t-2}$). The results are shown in Table A3. The point estimates for the two specifications are approximately close to the baseline results.[39] I replicate this exercise with a one year lead in prices and show the results in Table A8. The coefficients are larger and significant compared to the baseline specification.[40]

[37] The magnitude of effect in panel A (year of discovery) ranges from a conflict probability increase of 49 percent for ethnic group attack on civilians to 69 percent for government attack on ethnic groups. For panel B (year of initial production) this changes to 54 percent for an attack on civilians by ethnic groups and 62 percent for an attack on ethnic groups by the government.

[38] A similar methodology is used in Berman et al. (2017).

[39] Under ethnic group attack on civilians, the coefficient varies in significance when the current price level is combined with time lags of one and two years. However, the coefficient is stable and significant for this specification under government attack on civilians. The results are available on request.

[40] The results are robust to adding current price level to the specification and are available upon request.

4.3.3 Oil production intensity

The geographical location of oil is a proxy for oil production. The use of within-country location(s) of oil is an imperfect measure of oil extraction and production intensity. In practice, the production of oil depends on the decisions of the government and individual firms, which are influenced by factors other than conflict events. The production of oil in Nigeria is primarily carried out either as a joint venture (JV) company between the government and private firms or under a production sharing contract (PSC). Government participation in joint ventures ranges from 55-60 percent and is managed by a subsidiary of NNPC called the National Petroleum Investment Management Service (NAPIMS).[41] International oil companies that operate under PSC do not pay royalties until the initial investment outlay is offset by production. Subsequently, they share the cost value of production and royalties with the government. I consider the impact of oil production in two ways. First, I interact oil price by oil production in 1998. This captures the different production variation in oil districts at the beginning of the sample period. Second, I distinguish two margins of production by interacting oil price by the average oil production between 1998-2014 (the intensive margin) and by the average number of oil-producing wells in the sample period (the extensive margin).

In panel A of Table A4 (using oil production in 1998), the results are broadly similar in point estimate and magnitude with the baseline results. In Panel B, the specification using oil production between 1998-2014 instead of oil location in 1998 also has a positive, significant and larger coefficient compared to the baseline estimate of Table 2 (0.145 vs 0.129) for ethnic group attack on civilians (column 2) and (0.040 vs 0.035) for government attack on ethnic groups (column 4). A standard deviation increase in oil price, hence, translates to an increase in magnitude (relative to the mean) of conflict probability from 63 to 71 percent for violence against civilians by ethnic groups and from 65 to 75 percent for government

[41] All joint ventures have 60 percent government participation. An exception to this is the joint venture with Royal Dutch Shell which is at 55 percent. See International Monetary Fund (IMF) (2004)

suppression of ethnic groups. The use of oil-producing wells, in panel C, show similar results with a substantial increase in magnitude. Compared to the baseline estimates, the size of the magnitude increase by 19 percentage point for ethnic group attack on civilians and by 25 percentage point for government attack on ethnic groups.

4.3.4 Alternative dataset on violence and conflict characteristics

To analyze the possibility of imperfect measurement in conflict events, I employ an alternative dataset on local conflict events which capture incidents, between two organized actors or against civilians, that result in at least 1 fatality. I use the UCDP Georeferenced Event Dataset from Sundberg and Melander (2013). This dataset contains more than 130000 global and geocoded events between 1989-2016. I restrict the analysis to Nigeria and define conflict as events between actors. The results, as shown in Table A6, show estimates to be positive and significant for the conflict events similar to the baseline results.[42] The magnitudes are also comparable to estimates from the main specification.

To examine whether conflict events are driven by oil production activities, I redefine each conflict event into two distinct features: oil related and non-oil related conflict events. Oil related events are episodes of violence directly related to oil firms for example killing of oil workers or a battle to take over an oil field. Non-oil related events are incidents such as the clash between communities, terrorism or assassinations. The results reported in Table A10 show that the relationship between oil price and conflict are positive but insignificant for oil attacks related to an ethnic group attack on civilians (Panel A, columns 1-2). However, the result is different for violence against civilians under non-oil related attacks (Panel B, columns 1-2). The coefficients, in this case, are significant and closely similar to the baseline estimates. The point estimates under government attack on ethnic groups are positive and significant at 5 percent level for oil-related events (Panel A, columns 5-6) and 1 percent level (Panel B, columns 5-6) for non-oil related events.

[42]Surprisingly, the data set does not capture events related to an ethnic group attack on the government. Hence, the non-result for this conflict type.

4.3.5 Measurement error

The use of disaggregated data on oil production and conflict in Nigeria ensures that the estimates do not lead to attenuation bias. In addition, the inclusion of district fixed effects in the estimation strategy reduces the possibility that classical measurements errors attenuate the results. However, discrepancies in the report of average crude oil production may bias the baseline estimates with non-classical measurement errors in two ways.[43] On the one hand, if districts with low risk of conflict are more attractive to firms than those of high risk, then the estimated effect of an increase in oil price on conflict will be downward biased if there is less production in districts with more conflict. On the other hand, the estimates will be overstated if firms take advantage of politically unstable environments to increase production in districts with greater conflict risk.

These concerns are mitigated by the inclusion of district and year fixed effects. Besides, the use of oil districts prior to the sample period from PETRODATA show that the results are not driven by this error. Nevertheless, I follow the estimation approach of Berman et al. (2017) and regress the district sample from the new dataset on the data from PETRODATA and on conflict events to see whether the residual variation in the original data is explained by conflict.[44] The results are shown in Table A17. For consistency, the results are reported under two panels to distinguish the year of first oil discovery from the year of initial oil production; fixed effects are added sequentially and robust standard errors are clustered at the district level. In every column, there is a positive and significant correlation between oil districts in 1998 and districts as measured in the PETRODATA. All point estimates for conflict events are zero and statistically insignificant.[45] This shows that the original dataset is not subject to errors related to non-classical measurement.

[43] This reporting error is evident when industry reports are compared with those by the NNPC. For instance, for the period January to September 2002, the NNPC reported an average crude oil production of 1.840 mbd while OPEC reported 1.955 mbd. See International Monetary Fund (IMF) (2003).

[44] See Berman et al. (2017) for a detailed explanation of this estimation strategy.

[45] There similar results for individual conflict events as defined in the main specification. The results are available on request.

4.3.6 Omitted variables

The possibility of omitted variables is examined in two ways. First, I consider whether certain time-varying factors influence the impact of oil price on local violence in oil-producing districts. Second, I analyze the asymmetric effect related to how the geographical concentration of oil production might increase the effect of oil price on conflict. The use of the vector of covariates, X_{jrt}, in the baseline specification plays an important role in addressing these concerns. However, I perform two robustness checks to ensure that the baseline results are not driven by these factors. Under time-varying factors, I examine the following: (i) whether disaggregated data on oil price and conflict at the month by year level yield similar results as the baseline estimates; and (ii) whether past conflict trends mitigate the effect of oil price on the current conflict. Table A7 shows the result of the monthly variation in oil price and conflict events. The main effect is comparable to the baseline specification and is about the same in terms of the size of magnitude. Recent literature shows that historical conflict in Africa is correlated with contemporary civil conflict in the region.[46] I control for this effect by interacting presample conflict events (from the ACLED dataset) by a linear and quadratic trend. Table A14 reports the results for presample conflict linear trend while Table A15 considers the quadratic trend. The estimates are similar to the baseline results.

The assumption in equation 1 is that the increase in oil price affects conflict in districts that produce oil. However, it is unclear if a rise in oil price also increases conflict in non-oil districts. I perform a placebo analysis to exclude this concern and check the validity of the estimation strategy. The idea is to randomly assign oil price shock to non-oil districts to see the effect on civil conflict. This random assignment is done in three ways: (i) by non-oil districts in the southern region (close to oil districts); (ii) by districts in the northern region; and (iii) by the combination of non-oil districts in the southern and northern region. Table A19 shows the results for each analysis. As expected, the coefficients are not statistically different from zero. This shows that the baseline results are not driven by non-random

[46] See Besley and Reynal-Querol (2014) and Dincecco et al. (2018).

location specific factors related to oil production.

I also address the possibility that conflict spillover from oil to non-oil-producing districts may influence the violence effect in the baseline results. First, I consider the issue of proximity by dropping non-oil districts that are that are within the same geopolitical region.[47] In other words, I drop the non-oil producing districts in the southern region and use only the northern districts as the control group. Second, I follow Acemoglu et al. (2012) and Buonanno et al. (2015) to implement a neighborhood-pair fixed effects by interacting oil price to a subsample of oil districts and their immediate neighboring districts that do not produce oil. The results, as reported in Tables A20 and A21, show that there is no spillover effect of conflict between the two district types.

Additional robustness checks are provided in the appendix. To account for the geographic and time structure of oil price, I do a two-way clustering by district and year. As reported in Table A9, the results are robust when estimated using two clusters. Similarly, I consider the sensitivity of the baseline results to different spatial correlations that may influence conflict events and oil districts. The results for these specifications are shown in Table A11. The sign and effect of oil price on conflict events are similar to the baseline estimates. I further test whether the growth of oil price over time affects conflict events. I estimate the baseline specification by interacting oil district with the difference in log-price of oil. The results in Table A12 indicate oil price change between period t - 1 and period t are less likely to increase conflict. However, the probability of conflict increases for the price change between t and t - 2; t and t - 3 especially for ethnic group attack on civilians.[48] I also examine the results using Poisson fixed effects (Table A13) as an alternative estimation model. The main effect is similar to the results in the baseline. Finally, in Table A18, I investigate the effect of oil price on other conflict events such as the clash between political parties, religious violence, government repression, and riots. The results are essentially insignificant.

[47] The importance of this exercise relies on the assumption that ethnic groups between two districts may clash over land rights following the discovery of oil.

[48] This is comparable to that of Berman et al. (2017) which use a similar methodology.

5 Discussions

This section examines the possible explanations for the likelihood of conflict increase due to positive oil price shocks. Understanding district and household responses to oil price shock are important in explaining the conflict level results as well as for assessing the extent to which the experience in Nigeria can be generalized. Overall, the evidence indicates that, relative to the non-oil district, positive oil price shocks increase fiscal transfers to oil districts. In contrast, there is no price effect on individual wages or labor hours.

To highlight how natural resource rents increase the risk of conflict this section considers the effect of a rise in oil price on federal transfers to districts. Evidence of an increase in the probability of conflict might be explained by an increase in revenue allocated to oil districts. As described earlier, intergovernmental transfers are the primary source of local government budget and also a source of tension and conflict for districts in the oil region.[49] Thus, an increase in oil price would raise transfers to the district government and provide an incentive for appropriation resulting in conflict.[50] Results indicate a positive and significant increase in federal transfers which I interpret as evidence for the rent-seeking channel. Furthermore, the results also provide evidence to the theory of voracity effect (Tornell and Lane, 1996) which shows that an increase in resource windfall generates demand for more transfers by powerful groups (for example, state and local governments). In other words, an increase in oil price generates an appropriation effect that leads oil districts to demand a greater share of oil revenue through more transfers.

An important contributory factor to the high level of oil-related conflict is the role of oil firms in producing districts. Previous studies on the relationship between conflict and firms usually focus on the impact of conflict on stock market returns of firms (Abadie and

[49] The debate around allocation of federal transfers generated campaigns and eventually led to the creation of new states and local government areas, as local politicians sought to benefit from patronage in the distribution of transfers at state and local levels (?).

[50] Little of the revenue from federal transfers to the state and local governments are actually spent on genuine development projects and there appears to be no control or proper audit overspending by state and local governments (Human Rights Watch, 2002).

Gardeazabal, 2003), stock market reaction to conflict events (Guidolin and Ferrara, 2007) or the response of firms to violence (Ksoll et al., 2016). In this section, I also study the effect of firm characteristics on conflict outcomes. The idea is to examine how the physical presence of oil firms affects the probability of conflict in local districts. As shown later, the ownership, size and the country of the firm headquarters have a substantial impact on conflict events.

5.1 Fiscal Transfers and Household Income

Federal transfers to local districts come from the Federation Account. This account is sustained by oil revenues, company income tax proceeds, customs duties and excise taxes. Oil revenues represent more than 70 percent of total revenue from the federation account.[51] Prior to intergovernmental transfers, the federation account is subject to initial deductions known as first charges. These first charges are deducted from oil revenues in the federation account and include a 13 percent allocation of oil revenue to the oil-producing states.[52] The remaining amount is distributed amongst the federal, state and local governments according to a derivation formula.[53] To assess the effect of oil price on federal transfers, equation 1 is estimated using federal transfers to districts as a dependent variable.

To examine the impact of oil price on household labor hours and wages, I use the following specification:

$$W_{ijrt} = \alpha_0 + \alpha_1(Oil_j \times OilPrice_t) + \alpha_2 P_{ijrt} + \delta_j + \tau_t + \lambda_r t + \upsilon_{ijrt}, \tag{2}$$

W_{ijrt} is the log of hourly wage and hours worked of the individual i in district j, region r and at time t. The vector of covariates, P_{jrt} , includes educational attainment, age, age

[51] Revenue from oil is generated from the sale of crude oil and gas; signature bonuses, royalties and petroleum profit tax (PPT) with a rate of 85 percent (65.75 percent in the first 5 years of production).

[52] Other charges comprise of external debt service, the share of government production cost of oil, the cost of government-sponsored projects and National Judiciary Council expenditure.

[53] The federal government receives 50.5 percent of the total revenue, the state governments 25 percent, the local governments 21 percent, 1 percent goes to the Federal Capital Territory Abuja; 2 percent to the Ecological Fund and 0.5 percent to the Stabilization Reserve Fund.

squared, rural status, gender, and marital status. δ_j is a district fixed effects, τ_t is a year fixed effects; $\lambda_r t$ is a regional linear trend and υ_{ijrt} is the error term.

Column 1 of Table 3 reports estimates for the effect of an oil price shock on fiscal transfers to districts. The coefficient of interest, 0.024, implies that a standard deviation rise in the price of oil increased the revenue transferred to oil-producing districts by 0.12 percent.[54] In contrast, the point estimates for labor hours and wages are negative and insignificant.[55]

5.2 Firm Characteristics

The results shown so far have made minimal use of the information on firm characteristics. However, firm characteristics help to explain under what circumstances violence against civilians or government attack on ethnic groups in oil-producing districts occurs. As explained in section 2, the key features of the Nigerian civil conflict comprise of the feasibility of ethnic groups to disrupt oil production and the ability of government to suppress these groups. The nature of the conflict, therefore, implies that oil firms can either pay ethnic groups to refrain from attacks (or as a ransom for kidnapped employees) or elicit a protective response from the government by paying fewer royalties due to a reduction in production.[56] For this purpose, I exploit a feature of the dataset that captures firm identity and the oil fields operated by each firm throughout the sample period. I adopt a similar strategy to Berman et al. (2017) by: (i) differentiating firms by ownership (foreign firms, domestic public and domestic private firms) and by colonial origin (whether the firm has colonial ties to Nigeria); and (ii) interacting the share of each firm category (at the beginning of the sample period) within the district with the coefficient of interest,$(Oil_j \times OilPrice_t)$. 93 percent of the firms are foreign-owned, 4 percent are owned by the government and the remaining 3 percent are

[54] Interestingly, this magnitude is closely related to the effect of an oil price shock on fiscal revenue found in the literature. For example, Dube and Vargas (2013)find that a one percent rise in oil price increased allocated revenue by 0.03 percent to the oil-producing municipality. Caselli and Michaels (2013) show that oil municipalities in Brazil receive more revenue from the federal government.

[55] This can be a consequence of the capital-intensiveness of oil production or the small labor share of oil in Nigerian employment.

[56] This invariably means less revenue for the government.

private-owned.[57] More than half of the foreign companies have their headquarters in the former colonizing country (the United Kingdom).

In Table 4, columns 1 and 2, we see that empirically, the share of foreign and public (government-owned) firms increases the impact of oil price on ethnic group attack on civilians. In contrast, there is a negative and significant effect for private (indigenous) firms. These results are consistent with the idea that foreign and public firms are more likely to pay extortion money to ethnic groups to avoid or cease attacks on production facilities whereas private firms are less disposed to make payments.[58] In columns 3 and 4, there is no significant effect for firm ownership under the clash between ethnic groups. Columns 5 and 6 demonstrate that the effect of oil price on government attack on ethnic groups is applicable for all types of firm ownership especially if the government is the proprietor. This is consistent with the documentation of government crackdown in oil-producing communities by human rights group.[59] A plausible explanation for this result is the close relationship between oil firms and the government. As mentioned earlier, foreign oil firms usually form a joint venture with NNPC, the state-owned oil company. In addition, they also have agreements with government agencies ranging from land acquisition to arms purchase for the security forces (Frynas, 2001). Under ethnic group attack on government (columns 7 and 8), the effect of oil price on conflict is small and insignificant.

Finally, I examine the possibility that the colonial origin of the firms magnifies the impact of oil price shocks on conflict.[60] To assess this, I differentiate foreign firms into colonizer and non-colonizer. The point estimates in Table **??** show that foreign firms with colonial affiliation are associated with conflict related to ethnic group attack on civilians (columns 1-2),

[57]The Nigerian oil industry is dominated by foreign and government-owned companies such as Shell, Mobil, Chevron, Elf, Agip, Texaco and Nigerian Petroleum Development Company (NPDC). For instance, Shell Development Petroleum Company (SPDC) accounts for 43 percent of total oil output in Nigeria. It owns more than 1000 oil-producing wells in the Niger Delta Region (Catan and Mahtani, 2006).

[58]For instance, in March 1997, over 100 Shell workers were taken hostage by Ijaws armed with automatic rifles and oil installations were occupied by groups of Ijaws (Frynas, 2000).

[59]See Human Rights Watch (1999b). In addition, it is reported that oil firms lent helicopters and boats to the government for the attack on ethnic groups in Niger Delta (Human Rights Watch, 1999a).

[60]This is supported by the literature that firms with colonial ties receive more concessions from the governments of former colonies. See White (2000); Stockwell (2004); Frynas et al. (2007).

government attack on ethnic groups (columns 5-6) and ethnic group attack on government (columns 7-8). The clash between ethnic groups (columns 3-4) is negative and insignificant. The result for firms without colonial links show a positive and statistically significant relationship for government attack on ethnic groups but no effect for other conflict types.[61]

6 Conclusion

Using a novel dataset on oil-producing districts, this paper provides evidence that positive oil price shock influences civil conflicts in Nigeria. Higher oil prices increase the likelihood of ethnic group attacks on civilians and government attacks on ethnic groups. The magnitude of these effects ranges from 63 percent to 65 percent over 1998-2014. The results are robust to alternative specifications such as using various definitions of oil-producing districts, oil price and production, different dataset on oil districts and conflict events; and pre-sample conflict trends.

Consistent with the view that resource rents are an important determinant of civil conflict, the paper shows that oil districts receive relatively more federal transfers in years of higher oil prices. There is no evidence that oil prices induce conflict through the opportunity cost channel. In addition, there is strong evidence that firm ownership, especially foreign and government-owned firms, magnify the probability of conflict after oil price shock. Further evidence suggests that the colonial origin of firms also affect conflict. Firms with colonial ties are associated with more conflict probability than firms without such affiliation. While previous work shows that ownership and colonial origin of firms in mining regions can intensify conflict, most of it is based on natural minerals in Africa. None has been in the oil context which is highly concentrated in Nigeria. Besides, the nature of variation in this paper, provided by the interaction of oil location with changes in oil price, means that the results are unlikely to be driven by fluctuation in local oil production. Instead, it provides

[61] These results are in contrast with those of Berman et al. (2017) who find no relationship between foreign firms with headquarters in colonial countries and conflict after mineral price shock.

micro-level evidence of the role of firm characteristics and management practices on the presence of violence.

The findings of this study have a number of policy implications. The analysis suggests that volatility in revenue from natural resources plays a significant role in causing incidents of civil conflict. This implies that government dependence on oil revenues influences its response to conflict. Given that oil is the primary export commodity of the country, any disruption in oil supply by rebel groups would instigate a government reprisal. The results also indicate that greater corporate social responsibility by oil firms is important in reducing conflict risk in regions that produce oil.

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Table 1: Summary Statistics

	Observation	Mean	Std. Dev.	Min.	Max.
Conflict outcomes					
Ethnic groups attack civilians	13,158	0.113	1.192	0	86
Clash between ethnic groups	13,158	0.0223	0.269	0	14
Government attack ethnic groups	13,158	0.0296	0.408	0	23
Ethnic groups attack government	13,158	0.0252	0.383	0	29
Commodity prices					
Log oil price, millions of 2015 naira per barrel	13,158	5.001	0.553	2.952	5.473
Demographics					
Percent of households with primary school education in 1990	13,158	5.357	14.26	0	96.60
Elevation (meters)	13,158	268.0	219.5	1	1,494
Intergovernmental Transfer					
Log district revenue, millions of 2015 naira	13,158	10.99	13.23	-6.908	22.75
Household Labor outcomes					
Log real wage (2006-2012)	15,470	8.967	1.168	2.079	16.99
Log labor hours (2006-2012)	15,470	4.671	0.331	3.466	5.050

Table 2: Oil price shock and Civil Conflict

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district × log oil price	0.118**	0.129***	-0.090	-0.091	0.035***	0.035***	0.026	0.030
	(0.048)	(0.049)	(0.071)	(0.071)	(0.008)	(0.008)	(0.022)	(0.023)
	[0.038]	[0.039]	[0.046]	[0.046]	[0.008]	[0.008]	[0.022]	[0.022]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. Oil price shock is the interaction between global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses and conley standard errors computed at 1 km cutoff (in brackets). The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table 3: Fiscal distribution and Opportunity cost

Dependent variable	(1) Log district revenue	(2) Log labor hours	(3) Log wages
Oil district × log oil price	0.024**	-0.079	-0.095
	(0.011)	(0.301)	(1.239)
	[0.008]	[0.235]	[0.877]
District fixed effects	Yes	Yes	Yes
District covariate × year	Yes	Yes	Yes
Regional linear trends	Yes	Yes	Yes
Demographic controls	No	Yes	Yes
Observations	13,158	15,470	15,470
Sample period	1998-2014	2006-2014	2006-2014

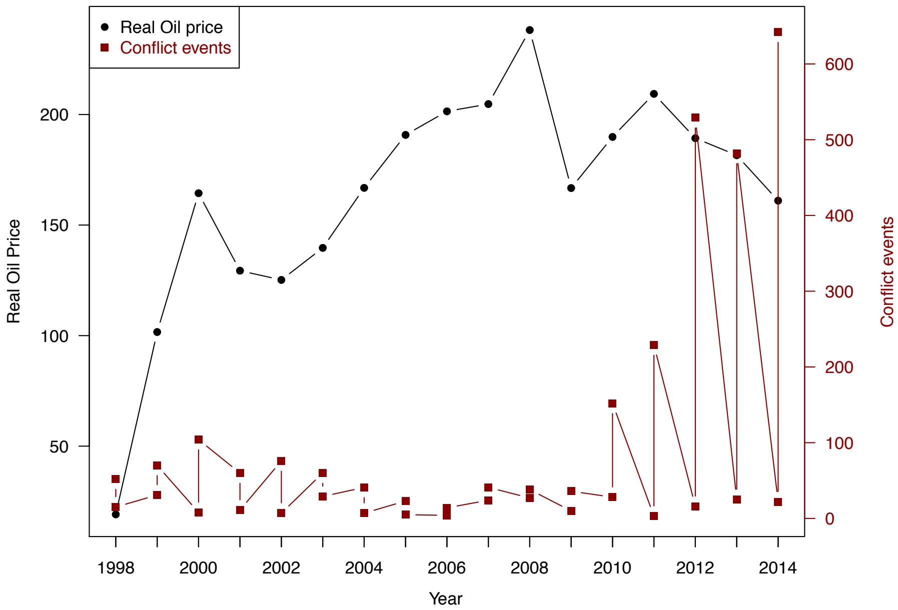
Notes: Each column represents a separate regression. Oil price shock is the interaction between global oil prices (in log terms) and districts that produced oil in 1998. For all regressions robust standard errors clustered at district level are in parentheses and conley standard errors computed at 1 km cutoff (in brackets).The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Demographic controls include educational level attained, age, age squared, rural status, gender and marital status. Revenue allocation is the natural log of annual intergovernmental transfer of oil revenue from the federal government to the local government. Log labor hours is the log of hours worked in the last month and log wages is the log of hourly wages defined as individual earnings per hours worked in the last month. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table 4: Firm Ownership

Dependent variable	(1) Ethnic group attack civilians	(2)	(3) Clash between ethnic groups	(4)	(5) Government attack ethnic group	(6)	(7) Ethnic group attack government	(8)
Oil district × log oil price × foreign firms	0.114**	0.127**	-0.099	-0.100	0.032***	0.032***	0.028	0.033
	(0.049)	(0.050)	(0.077)	(0.077)	(0.008)	(0.008)	(0.024)	(0.025)
	[0.038]	[0.039]	[0.050]	[0.050]	[0.007]	[0.007]	[0.023]	[0.024]
Oil district × log oil price × public firms	0.572***	0.562***	0.033	0.037	0.137***	0.140***	-0.002	-0.007
	(0.149)	(0.145)	(0.035)	(0.037)	(0.038)	(0.037)	(0.009)	(0.009)
	[0.225]	[0.224]	[0.026]	[0.027]	[0.088]	[0.088]	[0.101]	[0.101]
Oil district × log oil price × private firms	-0.301***	-0.331***	0.028	0.034	0.017**	0.020**	0.003	-0.009
	(0.022)	(0.025)	(0.031)	(0.034)	(0.007)	(0.008)	(0.009)	(0.013)
	[0.088]	[0.083]	[0.025]	[0.027]	[0.011]	[0.011]	[0.011]	[0.013]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158

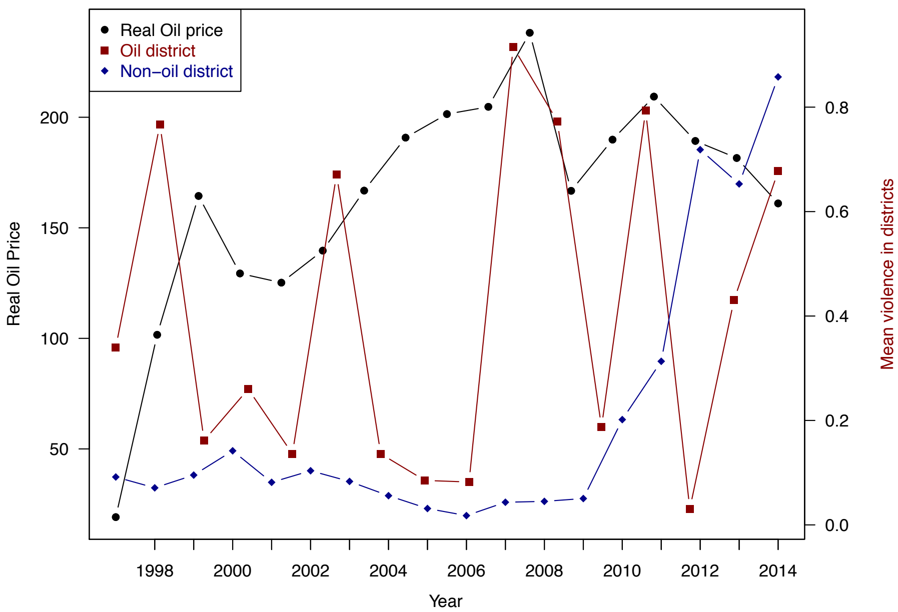
Notes: Each column represents a separate regression. Oil price shock is the interaction between global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses and conley standard errors computed at 1 km cutoff (in brackets). The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Figures



Note: Oil price data is from WTI Series and conflict data from ACLED

Figure 1: Oil Price and Conflict Outcomes



Note: Oil price data is from WTI Series and conflict data from ACLED

Figure 2: Oil Price and Violence in Districts

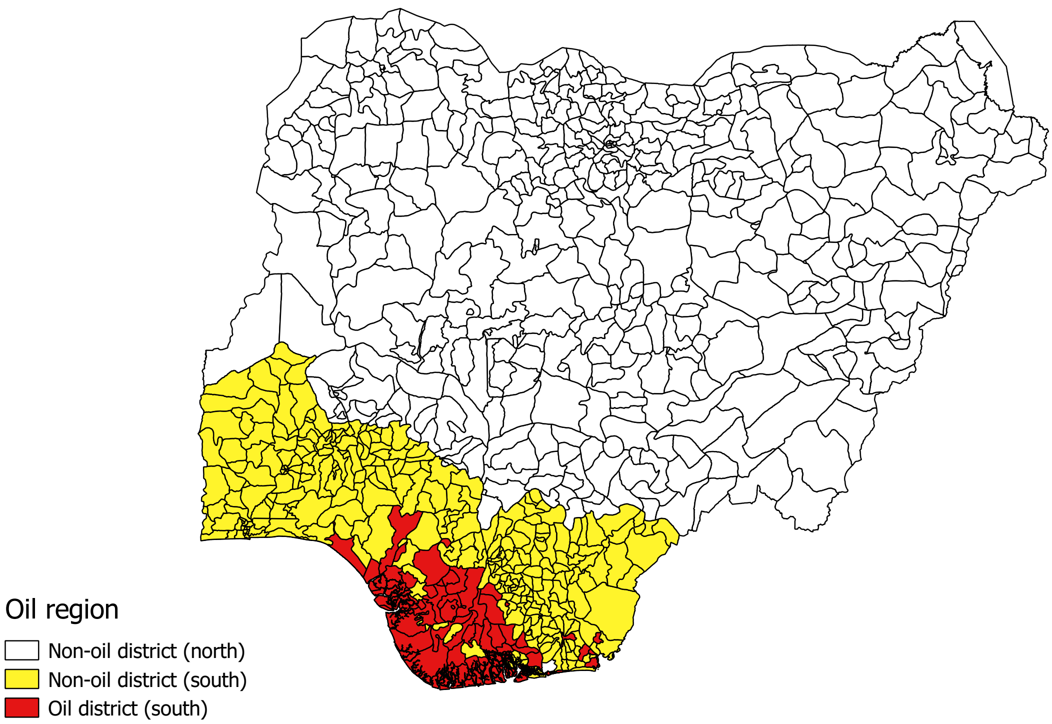


Figure 3: Oil districts in 1998

Appendix

Oil Districts Data

The data on oil districts is constructed using the annual statistical bulletin of the Nigerian National Petroleum Corporation (NNPC) from 1997 to 2014.[62] Each statistical bulletin contains production of crude oil, gas and gas flare figures per oil field under different producing companies. Establishing the location of oil at district level involves two steps: first, to build a dataset of oil output by company and oil field; and second, to allocate oil fields to districts using company reports and district records which indicate the local districts where oil fields are situated.[63] I restrict the oil location to districts that produced oil in 1998. A similar restriction is done for gas production districts.

Intergovernmental transfers

The data on intergovernmental transfers is from the Federal Accounts Allocation Committee (FAAC) report. It contains a monthly distribution of revenue allocation to state government and local government councils by the federation account allocation committee. I collate the data on total net allocation to local government from 1999 to 2014. At the time of writing the following was the path to downloading the data: from http:www. oagf.gov.ng follow the link to FAAC reports, select month and year then click download.

Nigeria General Household Survey

The Nigeria General Household Survey (NGHS) is a nationally representative survey of over 700 districts. I use the employment, time use and characteristics of the main occupation of surveys covering the years 2003-2014. The survey covers employment and wage data for each household member including wage amount, a time unit (daily, weekly, fortnightly, monthly, quarterly and yearly), the number of hours worked and in what industry the work was done.

I restrict the wage and labor hours data to household members aged between 18 and 64 years. The wage data is further restricted to observations that capture amounts paid for work performed (this excludes imputed wages for secondary employment/jobs or self-employment). I compute real wage as the individual earnings divided by the number of hours worked in the last month. I focus only on wages in cash (all in-kind wages are excluded). The number

[62] The statistical bulletins are available at http://www.nnpcgroup.com/PublicRelations/OilandGasStatistics/AnnualStatisticsBulletin/MonthlyPerformance.aspx .

[63] For instance, the oil spill data reported by Shell Nigeria indicates the oil field and the local district, for example, http://www.shell.com.ng/environment-society/environment-tpkg/oil-spills/data-2011/february.html. In addition, oil-producing state portals also indicate the oil-producing districts, for example, http://services.gov.ng/delta.

of hours worked reflects the hours worked in the last month. District codes are recorded differently across surveys; in order to keep the district codes as consistent as possible, I manually recoded all district codes across all surveys to ensure that codes align.

Population and Elevation Data

Population data is taken from the NBS Annual Abstract of Statistics covering 2010-2012. The data contains district level population census figures of 1991 and 2006, in addition to, projected population estimates from 2007-2012. Between 1991 and 2006, the Nigerian Government created new states and districts, in order to keep the district codes as consistent as possible across the years, I manually recode the old district codes to the new district codes.

Elevation data is collected from NASA's SRTM3 dataset which includes 90-meter resolution for the entire world. The data was downloaded from http://www.gpsvisualizer.com/elevation.

Demographic Health Survey Data

The following district variables were collected from the 1990 Nigeria Demographic health survey: average years of schooling, percent of households with secondary education, percent of households with primary education, fraction literate within households, percent of households with water linked to main-network, percent of households with toilet linked to main-network and percent of households with electricity.

Table A1: Pre-sample characteristics of oil and non-oil districts

	(1) Mean (oil district)	(2) Std. Error (oil district)	(3) Mean (non-oil district)	(4) Std. Error (non-oil district)	(5) Difference in Mean	(6) Std. Error of difference	(7) Observations
Population 1991 (in natural log)	6.210***	(0.966)	5.575***	(0.122)	0.635	(0.477)	774
Elevation (meters)	2.669***	(0.804)	5.078***	(0.058)	-2.410***	(0.231)	774
Average years of schooling (1990)	0.766***	(0.233)	0.469***	(0.053)	0.297	(0.228)	774
Percent of households with secondary education (1990)	2.671**	(1.072)	1.762***	(0.247)	0.909	(1.068)	774
Percent of households with primary education (1990)	9.229***	(2.357)	5.141***	(0.532)	4.088*	(2.286)	774
Fraction literate within households (1990)	9.051***	(2.958)	6.206***	(0.667)	2.845	(2.882)	774
Percent of households with water linked to main-network (1990)	4.810**	(2.089)	3.056***	(0.483)	1.754	(2.094)	774
Percent of households with toilet linked to main-network (1990)	2.893	(1.767)	2.171***	(0.411)	0.722	(1.785)	774
Percent of households with electricity (1990)	7.834**	(3.717)	7.074***	(0.844)	0.760	(3.659)	774

Notes: Oil districts are districts that produced oil in 1998 while non-oil district are districts that did not produce oil in 1998. Each row is a separate regression of pre-sample characteristics on indicators of oil and non-oil districts. Columns (1)-(4) show coefficients and standard errors for each district. Column (5)-(6) show the difference in characteristics between the districts. Column (7) is the number of observations.* $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A2: Alternative definition of oil districts

Dependent variable	(1) Ethnic group attack civilians	(2)	(3) Clash between ethnic groups	(4)	(5) Government attack ethnic group	(6)	(7) Ethnic group attack government	(8)
Panel A: Districts that always produced oil								
Oil district$^{a}\times$ log oil price	0.063**	0.072**	-0.154	-0.154	0.030***	0.031***	0.004	0.007
	(0.026)	(0.030)	(0.113)	(0.113)	(0.008)	(0.009)	(0.028)	(0.029)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel B: Districts that ever produced oil								
Oil district^{b} $\times$ log oil price	0.118**	0.129***	-0.090	-0.091	0.035***	0.035***	0.026	0.030
	(0.048)	(0.049)	(0.071)	(0.071)	(0.008)	(0.008)	(0.022)	(0.023)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel C: Lagged district dummy								
Oil district^{c} $\times$ log oil price	0.154*	0.180*	-0.494	-0.493	0.108***	0.110***	0.007	0.017
	(0.092)	(0.100)	(0.357)	(0.357)	(0.038)	(0.038)	(0.136)	(0.138)
Observations	12,384	12,384	12,384	12,384	12,384	12,384	12,384	12,384
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate $\times$ year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. Oil district^{a} $\times$ log oil price is the interaction between global oil prices (in log terms) and districts that produced oil from 1998 - 2014. Oil district^{b} $\times$ log oil price is the interaction between global oil prices (in log terms) and districts that ever produced oil between 1998 and 2014. Oil district^{c} $\times$ log oil price is the interaction between global oil prices (in log terms) and a lagged district dummy. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A3: Alternative definition of oil price

Dependent variable	(1) Ethnic group attack civilians	(2)	(3) Clash between ethnic groups	(4)	(5) Government attack ethnic group	(6)	(7) Ethnic group attack government	(8)
Panel A: One-year lag of oil price								
Oil district × log oil price $_{(t-1)}$	0.087**	0.099**	-0.114	-0.115	0.034***	0.034***	-0.020	-0.016
	(0.043)	(0.044)	(0.096)	(0.096)	(0.008)	(0.008)	(0.039)	(0.039)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel B: Two year lag of oil price								
Oil district × log oil price $_{(t-2)}$	0.114**	0.126**	-0.064	-0.065	0.030***	0.031***	0.005	0.009
	(0.050)	(0.052)	(0.063)	(0.063)	(0.007)	(0.007)	(0.027)	(0.028)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. Oil district× log oil price $_{(t-1)}$ is the interaction between a one year lag in global oil prices (in log terms) and districts that produced oil in 1998.Oil district × log oil price $_{(t-2)}$ is the interaction between a two year lag in global oil prices (in log terms) and districts that produced oil between 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A4: Intensity of oil production

Dependent variable	(1) Ethnic group attack civilians	(2)	(3) Clash between ethnic groups	(4)	(5) Government attack ethnic group	(6)	(7) Ethnic group attack government	(8)
Panel A: Oil Production in 1998								
Oil production^a × log oil price	0.126***	0.137***	-0.103	-0.104	0.037***	0.038***	0.026	0.031
	(0.047)	(0.049)	(0.080)	(0.080)	(0.009)	(0.009)	(0.024)	(0.024)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel B: Oil production (1998-2014)								
Oil production^b × log oil price	0.136***	0.145***	-0.102	-0.103	0.040***	0.040***	0.043	0.047*
	(0.049)	(0.051)	(0.074)	(0.075)	(0.009)	(0.009)	(0.027)	(0.027)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel C: Oil producing wells (1998-2014)								
Oil production^c × log oil price	0.154***	0.168***	-0.152	-0.153	0.047***	0.048***	0.043	0.048
	(0.057)	(0.059)	(0.109)	(0.109)	(0.010)	(0.011)	(0.031)	(0.032)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. Oil production^a × log oil price is the interaction between global oil prices (in log terms) and oil production in 1998. Oil production^b × log oil price is the interaction between global oil prices (in log terms) and average oil production between 1998 and 2014. Oil production^c × log oil price is the interaction between global oil prices (in log terms) and average oil producing wells between 1998 and 2014. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A5: Alternative dataset on oil districts (PETRODATA)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Panel A: Year of First Discovery								
Oil district$^a \times$ log oil price	0.095***	0.100***	-0.016	-0.017	0.037***	0.037***	0.018**	0.020***
	(0.021)	(0.022)	(0.015)	(0.015)	(0.008)	(0.009)	(0.007)	(0.007)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel B: Year of First Production								
Oil district$^b \times$ log oil price	0.101***	0.111***	-0.023	-0.023	0.033***	0.033***	0.018**	0.022**
	(0.021)	(0.023)	(0.020)	(0.020)	(0.008)	(0.008)	(0.009)	(0.009)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate $\times$ year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. Oil district^a $\times$ log oil price is the interaction between global oil prices (in log terms) and districts with oil discoveries prior to 1998. Oil district^b $\times$ log oil price is the interaction between global oil prices (in log terms) and districts that produced oil before 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A6: Alternative dataset on violence (UCDP)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group	
Oil district× log oil price	0.046***	0.047***	-0.022	-0.024	0.004*	0.004*
	(0.010)	(0.011)	(0.067)	(0.067)	(0.002)	(0.002)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. Oil price shock is the interaction between global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A7: Monthly variation in oil price and conflict events

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district× log oil price	0.005**	0.006**	-0.005	-0.005	0.001***	0.001***	0.001	0.001
	(0.002)	(0.002)	(0.004)	(0.004)	(0.000)	(0.000)	(0.001)	(0.001)
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	157,896	157,896	157,896	157,896	157,896	157,896	157,896	157,896

Notes: Each column represents a separate regression. Oil district × log oil price is the interaction between global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A8: Additional definition of oil price

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district× log oil price $_{(t+1)}$	0.336**	0.345**	-0.068	-0.068	0.118***	0.119***	0.036	0.040
	(0.140)	(0.140)	(0.067)	(0.067)	(0.040)	(0.040)	(0.044)	(0.044)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. Oil district× log oil price $_{(t+1)}$ is the interaction between a one year lead in global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A9: Two-way clustering of the geographic and time structure of oil

Dependent variable	(1) Ethnic group attack civilians	(2)	(3) Clash between ethnic groups	(4)	(5) Government attack ethnic group	(6)	(7) Ethnic group attack government	(8)
Oil district× log oil price	0.024**	0.025**	0.009	0.009	0.004**	0.004**	0.011*	0.011*
	(0.012)	(0.012)	(0.007)	(0.007)	(0.002)	(0.002)	(0.006)	(0.006)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. Oil district× log oil price is the interaction global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level and year are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A10: Oil and Non-oil related attacks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Panel A. Oil related attacks								
Oil district× log oil price	0.008	0.010	-0.029	-0.030	0.004**	0.004**	0.026	0.030
	(0.012)	(0.013)	(0.032)	(0.033)	(0.002)	(0.002)	(0.022)	(0.023)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel B. Non-oil related attacks								
Oil district × log oil price	0.111**	0.122***	-0.061	-0.062	0.034***	0.034***	0.026	0.030
	(0.043)	(0.045)	(0.062)	(0.062)	(0.008)	(0.008)	(0.022)	(0.023)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. Oil district × log oil price is the interaction between global oil prices (in log terms) and districts produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A11: Alternative spatial specifications for standard errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district$^{a}\times$ log oil price	0.118***	0.129***	-0.090*	-0.091*	0.035***	0.035***	0.026	0.030
	(0.040)	(0.042)	(0.048)	(0.048)	(0.008)	(0.008)	(0.024)	(0.025)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Oil district^{b} $\times$ log oil price	0.118**	0.129**	-0.090**	-0.091**	0.035**	0.035**	0.026	0.030
	(0.052)	(0.055)	(0.042)	(0.041)	(0.018)	(0.018)	(0.029)	(0.029)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate $\times$ year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. Oil district^{a} $\times$ log oil price is the interaction between global oil prices (in log terms) and districts that produced oil in 1998 with conley standard errors computed at 50 km cutoff. Oil district^{b} $\times$ log oil price is the interaction between global oil prices (in log terms) and districts that produced oil in 1998 with conley standard errors computed at 1000 km cutoff. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A12: Periodic change in oil price

Dependent variable	(1) Ethnic group attack civilians	(2)	(3) Clash between ethnic groups	(4)	(5) Government attack ethnic group	(6)	(7) Ethnic group attack government	(8)
Oil district × log oil price[a]	-0.006	-0.013	0.100	0.100	-0.018**	-0.018**	0.079	0.076
	(0.029)	(0.029)	(0.097)	(0.097)	(0.008)	(0.007)	(0.062)	(0.062)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Oil district × log oil price[b]	0.041*	0.040*	0.082	0.082	-0.007*	-0.007*	0.060	0.060
	(0.023)	(0.023)	(0.066)	(0.066)	(0.004)	(0.004)	(0.043)	(0.043)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Oil district × log oil price[c]	0.028*	0.028*	0.043*	0.043*	-0.002	-0.002	0.026	0.026
	(0.016)	(0.016)	(0.022)	(0.022)	(0.002)	(0.002)	(0.020)	(0.020)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. Oil district × log oil price[a] is the interaction between districts that produced oil in 1998 and the change in global oil prices (in log terms) between period t - 1 and period t. Oil district × log oil price[b] is the interaction between districts that produced oil in 1998 and the change in global oil prices (in log terms) between period t - 2 and period t. Oil district × log oil price[c] is the interaction between districts that produced oil in 1998 and the change in global oil prices (in log terms) between period t - 3 and period t. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A13: Poisson Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district× log oil price	0.288***	0.298***	0.258**	0.260**	0.217***	0.214***	0.276**	0.254**
	(0.085)	(0.084)	(0.110)	(0.111)	(0.078)	(0.079)	(0.108)	(0.113)
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. Oil district× log oil price is the interaction global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A14: Controlling for pre-sample conflict linear trend

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district× log oil price	0.108**	0.119**	-0.036	-0.037	0.027***	0.027***	0.038	0.042
	(0.046)	(0.047)	(0.045)	(0.045)	(0.008)	(0.009)	(0.024)	(0.026)
Pre-sample conflict linear trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. Oil district× log oil price is the interaction global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A15: Controlling for pre-sample conflict quadratic trend

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district× log oil price	0.106**	0.117***	0.006	0.005	0.033***	0.033***	0.051*	0.055*
	(0.041)	(0.043)	(0.043)	(0.043)	(0.008)	(0.008)	(0.030)	(0.032)
Pre-sample conflict quadratic trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. Oil district× log oil price is the interaction global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A16: Additional definition of oil districts

Dependent variable	(1) Ethnic group attack civilians	(2)	(3) Clash between ethnic groups	(4)	(5) Government attack ethnic group	(6)	(7) Ethnic group attack government	(8)
Panel A: Year of First Discovery								
Oil district^a × log oil price	0.428***	0.452***	-0.072	-0.076	0.167***	0.167***	0.080**	0.089**
	(0.106)	(0.112)	(0.064)	(0.066)	(0.043)	(0.043)	(0.034)	(0.035)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel B: Year of First Production								
Oil district^b × log oil price	0.334***	0.371***	-0.075	-0.078	0.110***	0.111***	0.061**	0.074**
	(0.080)	(0.089)	(0.063)	(0.064)	(0.029)	(0.029)	(0.030)	(0.032)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. Oil district^a × log oil price is the interaction between global oil prices (in log terms) and districts that produced oil in 1998 (instrumented with districts with oil discoveries prior to 1998 from PETRODATA). Oil district^b × log oil price is the interaction between global oil prices (in log terms) and districts that produced oil in 1998 (instrumented with districts that produced oil before 1998 from PETRODATA). For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A17: Measurement error

Dependent variable	(1)	(2) Oil districts in 1998	(3)	(4)
Panel A: Using year of oil discovery				
Districts with oil discoveries (PETRODATA)	0.231***	0.231***	0.174***	0.174***
	(0.032)	(0.032)	(0.033)	(0.033)
Number of events (ACLED)	0.005	0.005	0.004	0.004
	(0.003)	(0.003)	(0.002)	(0.003)
Panel B: Using year of initial oil production				
Districts with oil production (PETRODATA)	0.313***	0.313***	0.248***	0.248***
	(0.040)	(0.041)	(0.039)	(0.040)
Number of events (ACLED)	0.004	0.004	0.004	0.004
	(0.003)	(0.003)	(0.002)	(0.003)
Fixed Effects	No	Year	Region	Region-year
Observations	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. For all regressions, robust standard errors clustered at district level are in parentheses. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A18: Other conflict events

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Clash between political parties		Religious violence		Government repression		Riots	
Oil district× log oil price	-0.010	-0.010	-0.001	-0.001	0.001	0.002	-0.004	-0.003
	(0.010)	(0.010)	(0.001)	(0.001)	(0.007)	(0.007)	(0.011)	(0.012)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158

Notes: Each column represents a separate regression. Oil district× log oil price is the interaction global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A19: Placebo Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Panel A. Artificially varying the non-oil southern districts								
Oil district × log oil price	0.000	0.000	-0.001	-0.001	-0.001	-0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel B. Artificially varing the northern districts								
Oil district × log oil price	-0.008	-0.008	-0.001	-0.001	-0.002	-0.002	-0.004	-0.004
	(0.008)	(0.008)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Panel C. Artificially varying non-oil southern and northern districts								
Oil district × log oil price	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	13,158	13,158	13,158	13,158	13,158	13,158	13,158	13,158
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District-level covariates × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each column represents a separate regression. For all regressions, robust standard errors clustered at district level are in parentheses. See Table 2 for description of district-level covariates. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A20: Spillover effect: Excluding non-oil southern districts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district × log oil price	0.156***	0.156***	-0.077	-0.077	0.057***	0.057***	0.043	0.043
	(0.047)	(0.047)	(0.072)	(0.072)	(0.019)	(0.019)	(0.029)	(0.029)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate × year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,565	7,565	7,565	7,565	7,565	7,565	7,565	7,565

Notes: Each column represents a separate regression. Oil price shock is the interaction between global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.

Table A21: Neighborhood pair fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ethnic group attack civilians		Clash between ethnic groups		Government attack ethnic group		Ethnic group attack government	
Oil district$\times$ log oil price	-0.033	-0.034	0.017	0.017	0.010	0.010	0.024	0.024
	(0.048)	(0.048)	(0.023)	(0.023)	(0.019)	(0.019)	(0.000)	(0.025)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District covariate $\times$ year	No	Yes	No	Yes	No	Yes	No	Yes
Regional linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,139	1,139	1,139	1,139	1,139	1,139	1,139	1,139

Notes: Each column represents a separate regression. Oil district$\times$ log oil price is the interaction global oil prices (in log terms) and districts that produced oil in 1998. For all regressions, robust standard errors clustered at district level are in parentheses. The sample period is 1998-2014. The district-level covariates include percent of households with primary school education in 1990 and district elevation (in meters). Each conflict event capture annual number of attacks or clashes. * $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$.