The Micro-Foundations of the Resource Curse: Oil Ownership and Local Economic Well-Being in Sub-Saharan Africa

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The quantitative evidence on whether extractive industries generate economic wealth at the local level is far from conclusive. In line with recent studies highlighting the importance of considering institutional contexts and governance structures when assessing a possible resource curse, we argue that the effect of oil on local economic activity is largely driven by different control right regimes. We claim that state-controlled oil production stimulates local income more than privately-controlled extraction since national oil companies promote more linkages between the oil industry and other economic sectors. To test our micro-level arguments, we combine information on districts' economic activity as well as individuals' assessments of their personal economic situation with a new data set that establishes the control rights over hydrocarbons at the individual extraction site of the resource. Relying on this novel data, we perform district and individual-level analyses of sub-Saharan Africa covering the period from 1997 to 2014. Our multi-level and two-way fixed effects models show that the presence of domestic national oil companies is associated with increased local wealth, while international oil companies show no effect on subnational economic development. We also find that state-controlled oil production particularly furthers economic well-being under democratic institutions, good governance and low levels of corruption.

Research support from the German Research Foundation is gratefully acknowledged (WE4850/1-2). We want to thank Juliane Giesen, Anne-Kathrin Stroppe, Leonhard Oswald and Albert Martinez Sequero for their excellent research assistance.

Introduction

Recent media reports have extensively covered corruption charges faced by international investors trying to seal oil or mining deals in Africa. In Nigeria, for example, the Anglo-Dutch company Shell and the Italian oil company Eni are accused of paying about 1.3 billion USD to Nigerian officials in order to secure a contested license tract in the Atlantic Ocean (The New York Times, 2017). The so-called "Paradise Papers" uncovered seemingly unsavory business practices of Glencore, the world's biggest mining company, to sign controversial mining agreements in the Democratic Republic of the Congo (The Guardian, 2017). According to a UN report, diamond deals between Western businessmen and the DRC can be considered a "nightmare" for the country (UN Security Council, 2001).

While multinational corporations and local officials have amassed fortunes from commodity deals, the valuable resources have not uplifted indigenous populations from poverty in most African states. The Africa Progress Panel, as an example, examined five mining deals between international companies and the DRC in the period 2010-2012 and concluded that the country lost a total of 1.36 billion USD, almost twice the nation's combined health and education budgets (Africa Progress Panel, 2013). In light of this descriptive evidence, it is not particularly surprising that international oil and mining companies have a bad reputation worldwide, facing charges of siphoning nations' natural wealth while leaving local citizens in dismal living conditions.

More than twenty years of academic scrutiny have yielded ambiguous support for the question of whether extractive industries benefit local populations. Yet, the scholarly community increasingly agrees that the welfare effect of resource extraction depends on the complex interplay between institutional contexts, resource types and possible economic spillovers (Chuhan-Pole et al., 2017; Gamu et al., 2015; Havranek et al., 2016).

One conditioning factor on which an increasing number of studies focuses is resource control rights arrangements. On the country-level, Luong and Weinthal (2006) have pointed out in a pioneering study that states' direct control over resource revenues may lead to weak regulatory and fiscal institutions, thereby possibly hampering national growth. Khanna (2017) demonstrates that international oil companies (IOCs) generate more aggregated economic growth compared to national oil companies (NOCs). However, the author stresses that NOCs may in fact further countries' economic development in the presence of good economic and political institutions. Related research takes the variation of ownership arrangements within a state into account, pointing out that the presence of international oil companies increases protest or state repression in the proximity of the oil fields (Christensen forthcoming; Wegenast and Schneider, 2017).

We argue in line with these contributions that we can only understand the conditioning factors of the resource curse fully if we uncover how the local extraction arrangements affect the welfare of the people living in the surroundings of a mine or a gas or oil field. To develop proper micro-foundations of the resource-growth nexus, this article examines the effect of oil control rights structures on local livelihoods. We contend that one main reason renders government ownership of oil fields more beneficial than the assignment of the property rights to international investors: state-owned enterprises promote more linkages between the oil industry and other economic sectors by overseeing local content policies, hiring more local labor force and encouraging local skill formation.

Drawing on novel data on the property rights regimes of natural resources, we assess the impact of state-owned and international oil and gas companies on regional economic wealth at the district and individual level of analyses. Multilevel, linear two-way fixed effects and logistic estimations of survey data for 38 African states over the period 1997-2014 reveal that only state-controlled hydrocarbon production promotes local economic wellbeing. Moreover, our analysis underlines the importance of the institutional framework: national oil companies are particularly likely to spur regional economic welfare when corruption is low, the oil producing region is well governed and when citizens can hold the political leaders accountable for their actions.

The Resource Curse at the Macro and Micro Level

The Macro Level

According to pioneering work from Gelb (1988) or Sachs and Warner (1997), natural resources may hinder economic growth in developing countries by reducing the competitiveness of non-resource commodities through an appreciation of the real exchange or by promoting careless state spending. In the footstep of these studies, an ever-growing body of literature has analyzed the existence and causes of the so-called resource curse. Positive as well as negative evidence for the counter-intuitive finding that countries that are rich in particular natural resources tend to experience slower growth, has grown steadily in the last two decades (c.f. Havranek et al., 2016).

Resource extraction may impact countries' aggregate economic output through various channels. The so-called "Dutch Disease" describes a phenomenon in which the discovery and extraction of valuable natural resource boost incomes and increases consumer demand. The inflationary pressure that these developments generate, however, easily translates into an appreciation of the real exchange rate and an increase of the relative prices of non-resource commodities, which negatively affects the exports sector and eventually triggers deindustrialization (c.f. Sachs and Warner, 1997). Another channel that links natural resource dependence to poor economic performance is the volatile nature of natural resource prices in global markets. This volatility is associated with pro-cyclical fluctuations in government revenues and export earnings, possibly leading to erratic government spending and reducing the efficiency of both public and private investments (Van der Ploeg and Poelhekke, 2009).

Resource rents can also lead to economic mismanagement, as resource-funded fiscal cushions may induce governments to neglect the supply of education or other infrastructure requirements for long-term economic development (Gylfason, 2001). A prominent political causal channel for the resource curse is the notion of rent seeking. Instead of pursuing entrepreneurial activities, economic actors try to obtain political rents through their political influence (Karl, 1997; Gylfason, 2001; Luciani, 1987; Mahdavy, 1970). Thereby, natural resources may negatively impact growth by promoting corruption and leading to a deterioration of political and economic institutions (Arezki and Brückner, 2011).[1]

The quantitative evidence for the country-level resource curse is mixed: while some authors find negative (Gylfason, 2001; Kim and Lin, 2017; Sachs and Warner, 1997), positive (Alexeev and Conrad, 2009; Cavalcanti et al., 2011; Brunnschweiler and Bulte, 2008) as well as no significant correlation

[1] Badeeb et al. (2017) and Van Der Ploeg and Poelhekke (2017) provide comprehensive overviews of the mechanisms linking natural resources to economic growth.

(Lederman and Maloney, 2007) between resource exploitation and economic growth, others claim that the effect is conditional on the institutional framework (Khanna, 2017; Mehlum et al., 2006).

The Micro Level

More recently, scholars assessing the resource curse hypothesis have increasingly considered regional variance in economic activity and – instead of exclusively focusing on aggregated growth – have started to investigate the impact of extractive industries on local economic wellbeing and living conditions. Studies in this vein have explored how commodity extraction is linked to economic well-being and livelihoods at the regional level. Local communities may benefit from oil or mineral production mainly through fiscal transfers, direct employment, backward and forward linkages and companies' CSR practices (c.f. Gamu et al., 2015). Under wealth sharing agreements as well as fiscal decentralization, regional and local governments may benefit from resource revenues accruing to states' coffers. Subnational governments can utilize these fiscal transfers to invest in health or education or to finance infrastructure projects that generate jobs and economic growth. Scholars show that – particularly under good governance – fiscal transfers benefit local communities (Cust and Rusli, 2014; Hinojosa et al., 2012; Mosley, 2017).

Due to the to the skill- and capital-intensity of resource exploitation, extractive industries' capacity to generate direct jobs are rather limited (Gamu et al., 2015: 168). However, shifts in the demand for labor within the resource sector may spillover into the non-resource economy. These so-called "backward linkages" tie resource extraction to the local economy. Local firms or agricultural producers provide, for example, services and supply inputs to the mining or oil industry. Although these firms and individuals do not have a direct link to the resource sector, they benefit from it through the increased demand.[2] Various studies have shown that every job created in the resource sector leads to an additional one to two jobs in other sectors of the local economy (c.f. Marchand and Weber, 2017: 13-15).

Marchand (2012), for instance, finds that ten new oil and gas extraction jobs created an additional three construction jobs, two retail trade jobs, and 4.5 services jobs during boom periods in Canada. Similar backward linkages are identified in the mining and energy sector from seven Sub-Saharan countries by Morris et al. (2012). Finally, mining or oil companies may indirectly contribute to local economic well-being by providing transportation, power, water-based infrastructure, education or medical assistance from which local populations may benefit (Adewuyi and Oyejide, 2012; Tordo et al., 2011).

As the outlined mechanisms show, there are different ways through which resource extraction may generate regional economic wealth. The quantitative evidence on whether extractive industries contribute to better livelihoods of local communities are mixed, however (c.f. Cust and Poelhekke, 2015; Van Der Ploeg and Poelhekke, 2017). Some quantitative analyses exploring within-country variation show that resource-producing regions are often characterized by poverty; underemployment; a neglect of public services such as health, education, security, or basic utilities;

[2] In addition to backward linkages, authors argue that so called "forward linkages" (i.e. governments and private actors invest resource rents into the development of indigenous processing and refinement facilities that add value to raw commodities before export) may contribute to growth (Mancini and Paz, 2016: 868).

and reduced community well-being (see Deaton and Niman, 2012; Jensen et al., 2012; Perdue and Pavela, 2012; Stedman et al., 2004; Lawrie et al., 2011; Tonts et al., 2012).

It is often argued that extractive activities promote economic enclaves with no linkages to other regions or economic sectors. An enclave economy is associated with a lack of production, of consumption, and the absence of fiscal backward or forward linkages (c.f. Hirschman, 1964; Karl, 2007). Ferguson (2005: 378), for example, describes how the Nigerian oil industry is characterized by imports of virtually all its equipment and materials. Employing very few Angolans, the industry relies on crews of foreign workers brought in on short-term contracts for the supply of skilled labor. According to the author, enclaves of mineral-extractive investment in Africa are "normally tightly integrated with the head offices of multinational corporations and metropolitan centers, but sharply walled off from their own national societies" (Ibid: 379).

Various authors have, however, challenged the notion that extractive industries invariably further an enclave status and are disconnected from the rest of the economy. In fact, some studies provide evidence of positive socio-economic effects of resource extraction via, for example, increases in local income and employment or the increased dynamism of small businesses (c.f. Cust and Poelhekke, 2015). For instance, Aragón and Rud (2013) conducted an econometric study of the Yanacocha gold mine in Peru and found positive income levels for the local population living within 100 km of the mine. The authors assume that the mine's demand for local inputs (the so-called backward-linkage channel) explains these welfare effects (see also Loayza et al., 2013). For the African context, Lippert (2014) finds that Zambians have benefited from mining in the Copper Belt region through mines' backward linkages. Employing survey data and a constituency-level panel, the author shows that an increase in local copper output improves measures of living standards. Similarly, Bloch and Owusu (2012: 434) conclude that gold mining in Ghana is "more deeply linked into the Ghanaian economy than hitherto understood."

In addition to the promotion of backward linkages, extractive industries may contribute to local growth by generating fiscal transfers to resource-producing communities which can be used for the provision of public goods or infrastructure development. Caselli and Michaels (2013), for example, show that oil revenues have moderately increased local educational spending in Brazilian municipalities through fiscal transfers.[3] Focusing on the varied growth patterns across Indonesian districts and municipalities, Cust and Rusli (2014) conclude that regions have economically gained from "fiscal spillovers from local government spending associated with revenue windfalls from extraction activity." Analyzing resource-intensive economies in eight developing countries, Mosley (2017) shows that local communities in states such as Botswana and Indonesia have profited from fiscal transfers. As we outline below, oil or mining companies may also prompt local economic development by pursuing non-commercial goals, helping to improve local social services or infrastructure by directly funding schools, hospitals, roads, electricity, or sanitation (Tordo et al., 2011).

Scholars are unanimously calling for a more thorough examination of local contexts when addressing the question of whether resource extraction may economically benefit local communities (c.f. Chuhan-Pole et al., 2017: 56-57; Hinojosa, 2011). In fact, studies are increasingly highlighting the important mediating effect of institutional arrangements. To illustrate, a recent World Bank report argues that a

[3] At the same time, the authors stress that oil windfalls have also commonly been diverted to patronage, rent sharing or embezzlement by mayors trying to improve reelection chances.

lack of political responsiveness and of technical capacities as well as poorly designed fiscal decentralization and wealth-sharing arrangements may limit "the positive effect of revenue windfalls on public good provision, and local living conditions" (Aragón et al., 2015:16). Examining the cases of Botswana, the Democratic Republic of Congo and Equatorial Guinea, Daniele (2011) stresses that the effects of natural resources on human and economic development can be strictly related to specific national political and institutional characteristics.

Resource governance is another key moderator of the effect that resource extraction has on economic well-being (Gamu et al., 2015). Thereby, the question of how resource ownership arrangements impact various political and socio-economic outcomes has recently regained scholarly attention. In their groundbreaking contribution, Luong and Weinthal (2006; 2010) stress the importance of ownership rights in the resource sector when assessing the resource curse. The authors show that oil wealth leads to poor taxation and spending outcomes only when there is state ownership. If private investors have a more prominent role in the oil sector, oil-rich countries would witness better fiscal institutions, including more broadly-based tax systems and more stable budgets, which in turn could eventually lead to more economic growth. In a similar vein, other scholars have argued that the pernicious effects of resource dependence could eventually be avoided by private ownership (Treisman, 2010). Relying on a country-level analysis of oil-exporting developing countries during the period 1984–2005, Khanna (2017: 214) concludes that state ownership over oil "reduces growth when the institutional quality is poor, but increases growth when the institutional quality is good."

In line with this emerging literature on resource governance, we assess in this article how the assignment of extraction rights of oil fields affects local economic activity and general living conditions of extractive communities. Our core argument on the growth effects of private vs. public ownership, however, departs fundamentally from the cross-country evidence that these studies have established. While the empowerment of National Oil Companies (NOCs) might be less beneficial at the national level than the assignment of property rights to International Oil Companies (IOCs), the reverse might be true at the local level. We expect that NOCs are more likely to economically benefit local populations than IOCs and assume this effect is due to the enhanced redistribution of oil rents and more economic spillovers under the former ownership arrangement.

NOCs and Economic Linkages

International oil and mining companies have a bad reputation. But are international investors less likely to improve livelihoods of local extractive communities? Proponents of a liberal view tend to consider that the exploitation of natural resources is more efficient and produces more aggregated wealth when managed by the private sector (Schmitz and Teixeira, 2008; Wright and Czelusta, 2003). Authors argue in this vein that oil rents represent pools of easy money that – combined with state ownership – generate favorable conditions for rent seeking and poor governance, undermining the development of good institutions and hindering long-term growth (Sinnott et al., 2010).

Dependency theorists conversely contend that state intervention in the resource sector is needed to ensure domestic capital accumulation, promote industrial diversification and broaden the scope of re-distributional policies. The reliance on foreign capital, technology and skills, combined with the control of exports, inhibits from this vantage point forward and backward linkages and may exacerbate the enclave character of extractive industries (Furtado, 1968; Hirschman, 1964; Prebisch, 1981). Recently,

scholars have also argued that the size and financial sophistication of international oil firms hamper attempts by governments – particularly from low- and middle-income countries – to tax and regulate this industry (Stiglitz, 2007). Ross (2012: 240-241) describes how even the USA and Mexico have a dismal record in trying to regulate IOCs. The author asserts that privatization of the oil sector may not lead oil-rich states to adopt enhanced forms of taxation. The author argues that privatization is not the right cure for most oil-producing states in the developing world.

We contend that, compared to IOCs, NOCs are more likely to promote local economic wealth for one main reason: NOCs are more likely to generate economic linkages to non-resource sectors by supervising local content policies, employing more local labor and encouraging skill formation and technology transfer.

As outlined in the literature review, recent empirical studies on developing countries suggest that the presence of backward economic linkages from the resource sector may play an important role in determining local economic outcomes. Research on the ability of IOCs to generate linkages to other economic sectors have shown that multinational oil companies operating in Africa are less likely to be involved in information exchange compared to their local counterparts since they tend to profit from information flows within their internal multinational operations (Adewuyi and Oyejide, 2012). Furthermore, scholars find that the presence of local partners in the ownership structure of multinational corporations fosters technology transfer and skills upgrading and promotes local linkages (Amendolagine et al., 2013; Fesshehaie, 2012; Morris et al., 2012).

We claim that internationally-controlled oil production is more likely to have an enclave character since multinationals can rely on their international network of skills, technology and machines, thereby operating independently from the local endowment context. Various scholars note that in Africa's extractive industries, decisions over the employment of technology or skills are generally made by the staff of multinational corporations based not on local imperatives but, rather, on following their standard technology and labor practices which their company has always used worldwide (Ayee et al., 2011; Ferguson, 2005). While international oil or mining firms import equipment, machinery and skilled labor, local recruitment often concentrates on low-skill and low-paid work, limiting potential know-how and wage spillovers (Mohan, 2013).

In contrast, NOCs may have higher incentives to build up local know-how, as they cannot rely on an international reservoir of technology and skilled labor. Oil-rich states throughout Africa are therefore concerned in establishing technical schools and training centers for recruiting staff (e.g. technicians, engineers, administrators) for operating their oilfields. Mozambique's national oil company ENH, for example, has built a large technical training center in the region of Pemba to support the adjacent LNG offshore industry and has established vocational training activities encompassing 217 programs with a focus on exploration, engineering, procurement, HR, finance and English language learning (Andres and Playfoot, 2015: 47). Nigeria's NNPC finances scholarship programs and centers of excellence for oil and gas research throughout the country (This Day, 2016). Aiming to help supply Angola's oil industry with professionals and technical specialists, the state-owned oil company SONANGOL finances scholarships programs and centers such as the Higher Polytechnic Institute for Technology and Science (Angonotícias, 2015; ANGOP, 2016). As shown by Wegenast and Krauser (2017), NOCs indeed seem to promote local skill formation more than IOCs.

In addition to engaging in local skill-formation for recruitment purposes, NOCs – distinctive from IOCs that operate under the exclusive premise of profit maximization – often pursue non-commercial goals. The idea of state-owned enterprises as social actors has a long tradition in the social sciences (Kaldor, 1980; Schumpeter, 1942). State-owned resource-extraction companies are expected to contribute to local development and ideally enhance public welfare (c.f. Marcel and Mitchell, 2006). The existence of non-commercial objectives and obligations is often viewed as a defining characteristic of NOCs compared to their international counterpart (Tordo et al., 2011: 24).[4]

One key non-commercial goal of NOCs is job creation. Several studies suggest that the potential for local economic development of mineral-rich regions is closely related to the capacity of generating local employment (Fleming and Measham, 2014; Chapman et al., 2015). Compared to IOCs, state-owned hydrocarbon companies are likely to hire local labor. Hartley and Medlock (2008) show that NOCs tend to favor excessive employment compared to private international oil companies (see also El-Katiri, 2014, p. 29). Applying stochastic frontier estimations, Eller et al. (2011:638) find that public ownership of the oil sector "tends to result in a larger workforce than necessary to meet purely commercial objectives." Case studies confirm that regional unemployment rises after the privatization of resource production (c.f. Mususa, 2010).

In addition to employing less labor, private and international companies tend to hire non-local workers throughout the African continent (Lucas, 1987; Taylor, 1990). Highly mobile workforces operating on long distance commuting models and complex sub-contracting arrangements limit the economic benefits retained within local communities of resource-rich regions (Petrova and Marinova, 2013; Tonts, 2010). Foreign workers or workers not permanently residing in extractive regions often spend most of their income elsewhere, thereby not contributing to local economic development in a substantive way (Measham et al., 2013).

The tendency of NOCs to employ more indigenous labor may contribute to local economic wealth. Furthermore, NOCs may encourage backward linkages and economic diversification by actively promoting local content policies. Local content laws require mining or oil companies to use local labor force and local firms for the procurement of goods and services (Tordo et al., 2013). With the help of such policies, various African states seek to promote local capacity building and economic spillovers e.g. by fostering the transfer of technology from international to domestic companies, encouraging foreign investors to build up local human capital and reinvest their profits domestically or providing infrastructure.

As shown by various authors, NOCs are often used as channels to actively pursue local content policies. The state-owned Tanzania Petroleum Development Corporation, for example, has become an instrument to enhance local content in Tanzania's gas sector (Kinyondo and Villanger, 2017; Melyoki, 2017).[5] Algeria's Sonatrach is tasked with maximizing social welfare through the "Algerianization" of the oil and gas sector, promoting non-petroleum economic growth by spurring productive linkages to and from the hydrocarbon sector (Tordo et al., 2011: 65). Local content has also been pursued by the

[4] Also, politicians are the principals of state-controlled enterprises and may use them for political gains (La Porta and López-de-Silanes, 1999; Wilson, 2015). Enabling a direct control over resource revenue flows, NOCs may be an instrument for political elites to buy off political support among voters.

[5] As shown by Chuhan-Pole et al. (2017: 16), local procurement within Tanzania's resource sector includes "services such as catering, vehicle repair, machine shop services, welding, metal work, electrical work, and plumbing."

Angolan governments since the early 2000s and is coordinated by its national oil company Sonangol (Ovadia, 2014; Tordo et al., 2013).

Critics of local content policies maintain that such regulations may promote rent-seeking and patronage (e.g. by politically favoring particular local firms) and possibly decrease state revenue gained from taxing multinational oil or mining companies (Kolstad and Kinyondo, 2015). However, empirical research has shown that local content policies were in fact able to intensify internal and external linkages of the hydrocarbon sector with the broader economy within several countries. Tordo et al. (2013: 98), for instance, conclude that Angola's Sonangol managed to promote forward and backward linkages to activities such as drilling, fabrication, transportation, industrial supplies and infrastructure, distribution, storage, services, banking, food retail or civil engineering. Monday (2015: 75) shows that local content policies in Nigeria strengthened local firms' "absorptive capacities to internalize the technological and managerial skills that flow to them." Relying on structural equation modeling techniques, Adeji et al. (2016) also find that Nigeria's local content policies have a positive impact on local value creation by increasing firms' participation, backward linkages and job creation.

This section argued that, compared to IOCs, NOCs are more likely to promote local economic activity by pursuing non-commercial goals (particularly the employment of local labor) and by coordinating and supervising local content policies that may encourage forward and backward linkages. Moreover, we contend that the extent to which local content policies may contribute to regional economic well-being largely depends on the responsiveness of political institutions, good governance structures, low levels of corruption and the quality of bureaucracies.

Research design

To test the hypothesis that state-controlled oil production is more conducive to regional economic wealth, we employ geo-referenced data at the district and grid cell level. Thereby, we rely on four main sources: a new dataset containing field-level information on companies, district-level panel data from the Demographic Health Survey (DHS), individual cross-sectional data from Afrobarometer surveys and the PRIO-GRID 2.0 dataset (Tollefsen et al., 2012). Our database covers 38 sub-Saharan African countries over the period 1997-2014.

Dependent Variables

We measure regional economic activity by districts' degree of nightlight emissions obtained from the PRIO-GRID 2.0 dataset. Nightlight emissions are considered highly accurate predictors of economic wealth estimates at the grid level (see Weidmann and Schutte, 2016). To assess the robustness of our estimations, we also employ the variable "gross cell product" (gcp) based on the Geographical-based Economic Data (G-Econ) v4.0 (Nordhaus, 2006).[6] The basic metric of this variable is the regional

[6] This variable was retrieved from PRIO-GRID 2.0 dataset. Since it is only available for 1990, 1995, 2000 and 2005, we interpolate the intervals with the value corresponding to the start year of each interval.

equivalent of gross domestic product (in USD) and it is measured at a 1-degree longitude by 1-degree latitude resolution at a global scale.[7]

Furthermore, we also test the impact of oil control rights structures on economic wealth by employing survey data from Afrobarometer in which respondents were asked about their present living conditions.[8] The variables living conditions is a dummy that equals "1" if respondents perceive their current living conditions as being "fairly good" or "very good".

Independent Variables of Interest

To assess ownership structures within the oil industry, we rely on a new dataset on the control rights of mines and oil fields within sub-Saharan Africa (c.f. Wegenast and Schneider, 2017). It contains information on the ownership of 606 oil and gas fields, depicting the respective shares held by domestic private, domestic state-owned, private international and state-owned international companies.

To match the oil information to the district-level data structure, we overlay the point coordinates of each oilfield using spatial information from the Global Administrative Unit Layers (GAUL)[9] and GIS software. Each facility was thereby assigned to its host district. Every oilfield is dummy coded as majority controlled by domestic state-owned or international companies if the relevant company holds at least 51 per cent of the shares. The resulting variable sums up the number of oilfields per district-year that satisfy this criterion. Figure 1 locates oil and gas fields as well as nightlight emission data for the covered sub-Saharan countries.[10]

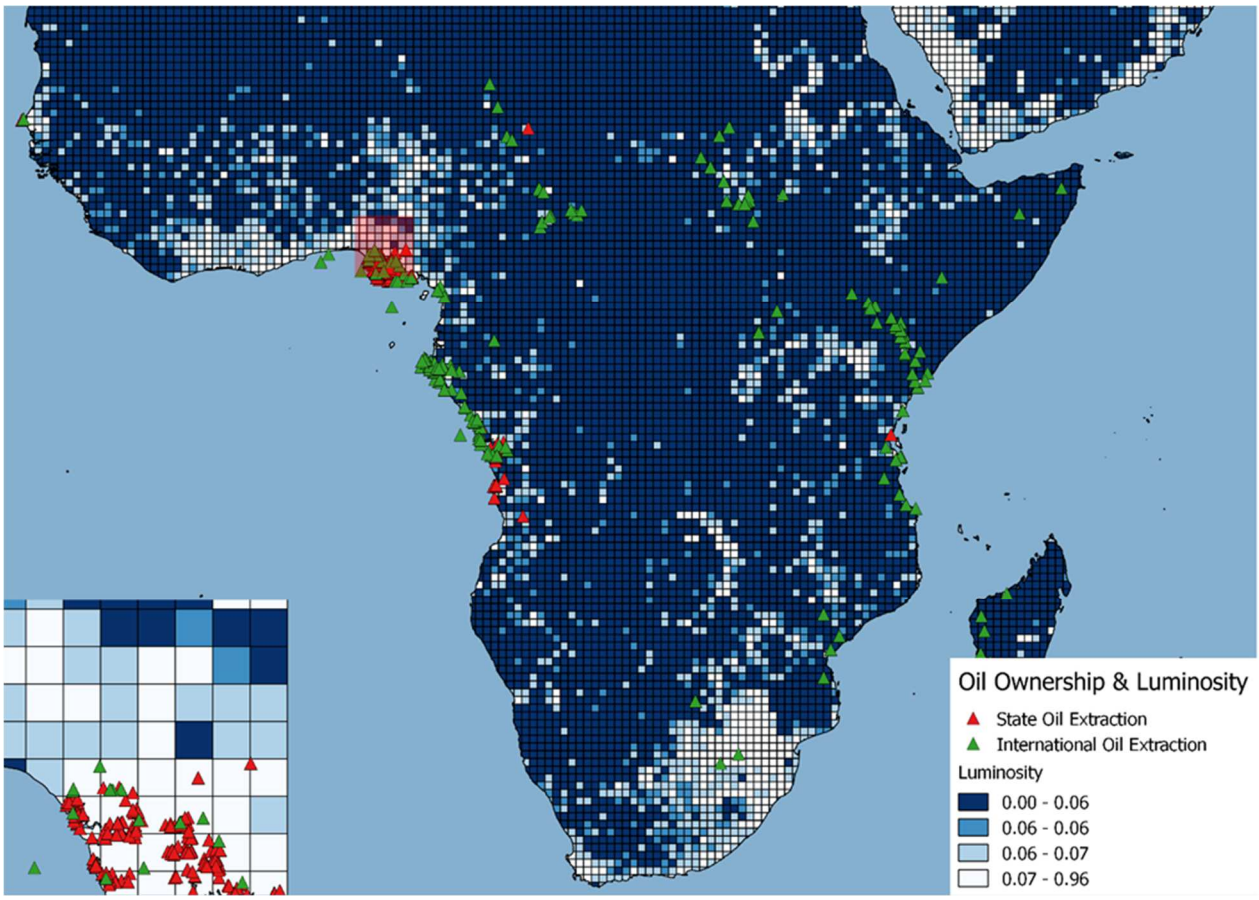
[7] Given that we use interpolated data, our period under analysis is relatively small and variance of our main dependent and independent variables is essentially cross-sectional, we use levels of economic activity instead of growth rates.

[8] Respondents were asked "In general, how would you describe: Your own present living conditions?"

[9] GAUL features global geographic polygon layers with all districts in all countries of the world (EC-FAO Food Security Programme, 2008).

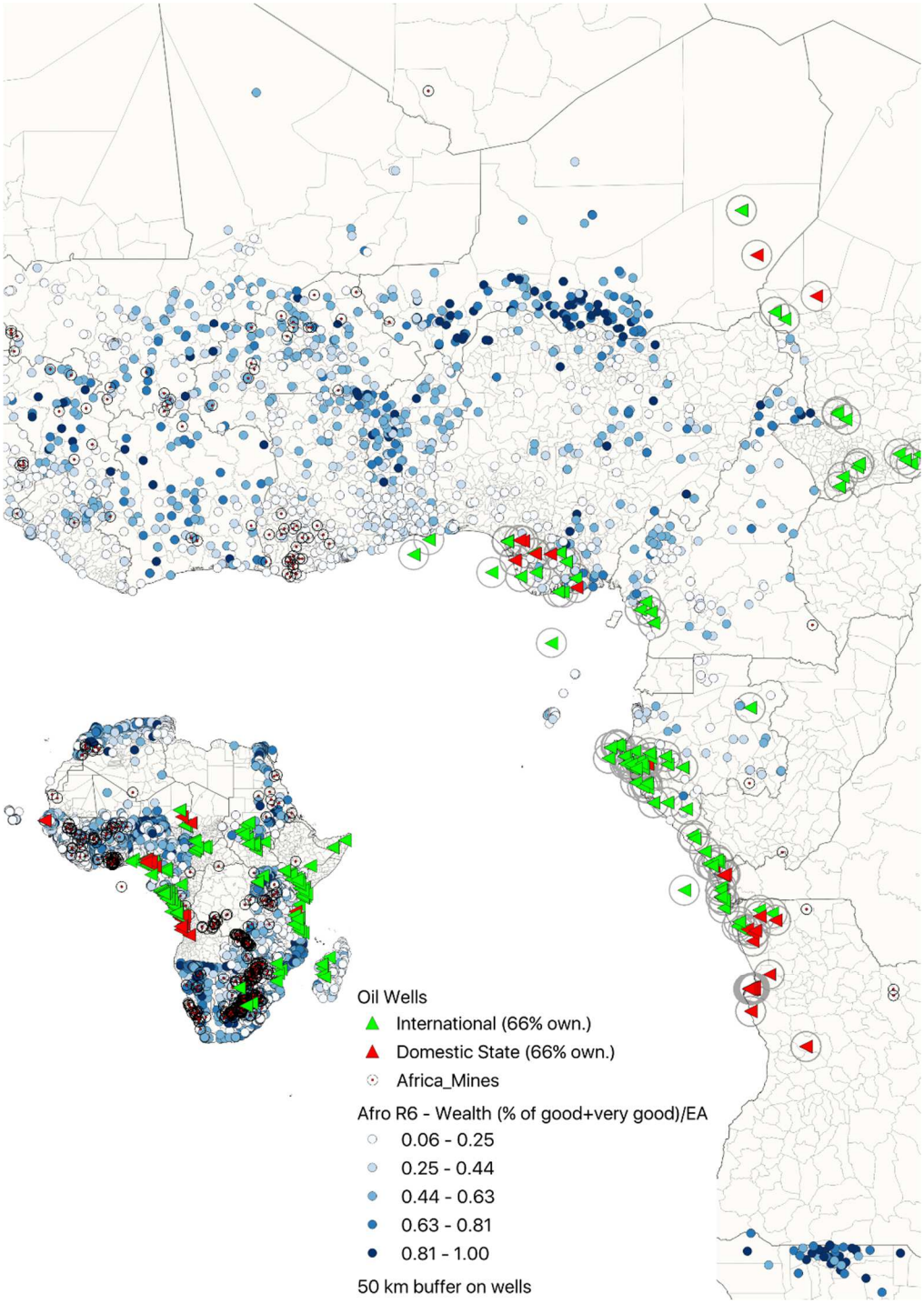
[10] When assembling the graph, we used average figures for the period 1997-2014.

Figure 1: Oil Control Rights and Nightlights Emission in sub-Saharan Africa



For the cross-sectional estimation of oil control rights on individuals' living conditions, we rely on round five and six from the Afrobarometer survey. Relying on this data, we can further disaggregate our level of analysis, since it allows us to calculate the distance of respondents to individual oilfields. We matched point coordinates from our oilfield-level dataset with the geo-location of Afrobarometer respondents through spatial proximity using QGIS. In line with Knutsen et al. (2017), we create 50km buffer zones around respondents. This distance seems a suitable cut-off point, as oilfields are often located in remote areas (Le Billon, 2001; Ross, 2006a) and African residents that depend on extractive industries are known to commute large distances (Bryceson et al., 2003). The chosen threshold also assures a good geographical match of the local population with nearby oilfields. In our sample employing Afrobarometer's round six, more than 3'000 Afrobarometer respondents (of almost 54'000) live within a range of 50km to an oilfield. We then calculated the number of oilfields inside the 50 km buffer zones. Since round six contains information from the years 2014 to 2015, we calculated mean control shares for each oilfield between 1997 and 2015 and then applied the threshold for majority control. For round five (2011-2013), we used mean control shares for each oilfield over the period 1997 and 2013. Figure illustrates the 50 km buffer zones for an excerpt of Africa. The buffers show the share of interviewees perceiving their living conditions as being "fairly good" or "very good". In addition, the graph locates oilfields operated by either international or state-owned companies.

Figure 2: Oil Control Rights and Respondents Living Conditions in sub-Saharan Africa



Control Variables

We include several control variables in our regression models. For our district-level estimations using nightlight emission as the dependent variable, we draw on different Demographic Health Survey (DHS) indicators that were obtained from 52 DHS surveys. Since DHS sampling procedures ensure representativeness at both the national and subnational levels, we created a disaggregated panel dataset with a panel structure considering countries that underwent at least two survey waves

between 1997 and 2015 and for which the geo-location of respondents was available. Applying this benchmark, we could include 21 sub-Saharan countries.

For each district-year we compute the proportion of DHS respondents reporting to be unemployed and having no formal education (i.e. having not completed primary schooling) as well as districts' percentage of population living in urban areas. To assess districts' level of infrastructure and local state capacity, we also calculate the share of the population with access to electricity. We linearly interpolate the values for years in which DHS surveys were not conducted.[11]

We also use controls sourced from the PRIO-Grid 2.0 dataset. Since this dataset is based on quadratic grid cells, we convert the values to the district level by assigning the mean value of all intersecting grid cells to each district in a given year. Given the close relationship between political power and economic position within the political economy of the Sub-Saharan countries, we include an indicator for the average number of population within a district that is politically discriminated as measured by the geo-referenced Ethnic Power Relations Dataset (GeoEPR-ETH) (see Wucherpfennig et al., 2011) and a conflict variable measuring the acts of one-sided violence perpetuated by government or rebels against civilians with at least 25 casualties.[12] Furthermore, we control for the level of democracy in the country by including the Polity 2 score for political regimes from the Polity project (Gurr et al., 1989).

Most of these control variables are also employed for the grid-level analysis (number of politically discriminated groups and acts of one-sided violence within a grid as well as level of democracy and the coverage of urban areas in each cell). Following the recommendation of other authors (e.g. Fjelde and Ostby, 2014), we control for institutional capacity and outreach of state institutions using the spherical distance in kilometers from the cell centroid to the national capital city in the corresponding country.[13]

For the cross-sectional, individual-level estimations, we rely on a set of controls derived from the Afrobarometer survey. We include a dichotomous measure depicting whether the EA is located in a rural or an urban area. Moreover, we use indicators that show respondent's views on criminality (whether they experience "some" or "a lot" of crime in their vicinity), democracy (assessment of countries' level of democracy on a scale from 0 to 10), local corruption (most or all of the officials within local government council perceived as corrupt), unemployed (respondent currently unemployed and looking for a job), education (whether respondents have completed secondary or higher education). To reflect the influences of discriminatory policies, we also incorporate an indicator conveying individual perceptions of unfair group treatment by the government. Finally, we enclose controls for the level of infrastructure and state capacity proxied by respondents' access to sanitation and piped water.

[11] For anonymization purposes, DHS does not convey the exact location of individual households. The geo-location of a household is therefore combined with those of others by assigning it to the centroid point coordinate of the enumeration area (EA) or survey cluster the household sample belongs to. In most cases each cluster hosts 200 to 300 households, of which between 20 and 30 are sampled.

[12] Data are available from UCDP-GED database.

[13] Unfortunately, we currently cannot rely on grid-cell level information on educational attainment and levels of unemployment as well as more direct indicators of state capacity such as infrastructure provision.

Estimation Technique and Results

To estimate the effects of resource-control rights on districts' nightlight emissions, we draw on a multilevel framework. Multilevel statistical models are specifically designed for hierarchical data structures, and therefore well suited for our analysis, since they allow us to account for the fact that individual districts are nested within countries (Hox et al., 2010). Thereby, heterogeneity among lower-level units of analysis can be modelled as a function of higher-level units by implementing random effects at the different levels. With a two-level mixed-effects approach we are therefore able to allow for non-independence of economic activity between districts located within the same country. More specifically, we estimate a random-intercept model, whereby each country has its own mean level of nightlight emissions. To assess the robustness of our models, we also run GLS estimations with year and country fixed effects and standard errors clustered around countries.

Table 1 reports estimates of multilevel models for the effect of oil control rights on districts' economic activity over the period 1997–2014. Results for an all-district sample show that districts hosting oilfields controlled by the state exhibit increased nightlight emissions. In contrast, oil extraction undertaken predominantly by international companies is not associated with more regional economic growth (see Model 1). Model 2 compares the effect of control structures only between and within districts in which oil is actually extracted. A direct comparison between oil-extracting districts further illustrates that only NOCs seem to promote economic welfare at the local level.

To ensure that our results are not a mere artifact of the chosen threshold for oil control rights, models 3 and 4 present multi-level estimations in which oilfields are coded as majority controlled by either domestic state-owned or international companies if the relevant firm holds at least 66 per cent of the shares. As can be observed, similar results are achieved with this alternative operationalization of the main independent variables. The control variables are largely in line with our expectations. While higher levels of democracy and state capacity (as proxied by respondents' access to electricity) promote local economic wealth, poor education has a detrimental effect on growth. The remaining covariates do not reach conventional statistical significance levels (see Models 1 and 3).

TABLE I: Effects of number of state- versus internationally controlled oilfields on districts' level of economic activity (DHS data)

	(1) All districts (51% threshold)	(2) Oil-producing districts (51% threshold)	(3) All districts (66% threshold)	(4) Oil-producing districts (66% threshold)
VARIABLES				
Nr. state oilfields	0.156***	0.323***	0.333***	0.516
	(0.0315)	(0.045)	(0.062)	(0.042)
Nr. international oilfields	0.093	-0.123	0.106	-0.275
	(0.161)	(0.118)	(0.213)	(0.240)
unemployment	-0.083	0.005	-0.097	-0.977
	(0.685)	(2.535)	(0.693)	(2.618)
no formal education	-1.251**	-3.672	-1.258**	-2.717
	(0.388)	(3.589)	(0.395)	(2.959)
% urban areas	-0.197	-1.038	-0.198	-1.102
	(0.391)	(0.691)	(0.390)	(0.707)
access to electricity	2.787***	1.689	2.800***	2.409
	(0.786)	(1.664)	(0.778)	(1.507)
armed conflict	0.0718	-1.071***	0.082	-0.974
	(0.216)	(0.291)	(0.210)	(0.251)
exluded groups	-0.556	-3.943***	-0.547	-3.746
	(0.310)	(2.251)	(0.304)	(1.172)
Country level variable				
democracy	0.230***	0.027	0.230***	0.0357
	(0.063)	(0.102)	(0.063)	(0.106)
Constant	0.809	4.455*	0.811	4.567
	(0.476)	(2.251)	(0.478)	(2.326)
Radom effects				
Ln_sd(cons)	0.934***	1.98e-09***	0.935***	1.63e-10***
	(0.165)	6.86e-09	(0.165)	(1.29e-08)
Ln_sd(residual)	6.144***	11.886***	6.145***	11.900***
	(0.716)	(1.456)	(0.716)	(1.463)
Observations	24,973	463	24,973	463
Number of groups	21	7	21	7

NOTE: Two-level mixed-effects models with random intercept and nightlight emission as dependent variable. Robust standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05

We re-estimate the models reported above using GLS panel estimations with time and country fixed effects. As Table A1 in the appendix shows, our essential findings remain qualitatively unchanged: while the number of state-controlled oilfields is associated with increased growth within districts, IOCs do not provide for enhanced regional economic well-being.[14] To further check the robustness of our findings, we employ an alternative measure of local economic activity and rely on a different unit of analysis. Table 2 shows the impact of oil control rights on gross cell product (PPP, current USD) for all available grid-cells. Model 1 provides evidence that only oilfields controlled by NOCs are associated with increased local economic performance. This result is corroborated when only grids with actual oil

[14] Note that the effect of the variable *state oil* (employing a 51% ownership threshold) is non-significant in Model 2 that includes only oil-extracting districts. For the same sub-sample, however, the effect of *state oil* is highly significant when we use a 66% ownership threshold.

extraction are considered as unit of analysis (Model 2) or when GLS panel estimations using year and country fixed effects are applied (Table A2 in the appendix).[15]

TABLE II: Effects of number of state- versus internationally controlled oilfields on grids' level of economic activity (PRIO-GRID data)

	(1) All grids	(2) Oil-producing grids
VARIABLES		
nr. of state oil fields	0.048***	0.015**
	(0.005)	(0.004)
nr of international oil fields	-0.023	-0.052
	(0.017)	(0.045)
excluded groups	-0.020*	0.188*
	(0.010)	(0.093)
armed conflict	0.008	0.079
	(0.028)	(0.062)
distance to capital	-0.0002*	-0.000
	(0.00008)	(0.000)
% of urban areas	0.323***	0.275
	(0.028)	(0.156)
Country-level variable		
democracy	0.003	0.037
	(0.002)	(0.020)
Constant	-0.233***	0.460
	(0.063)	(0.280)
Random effects		
Ln_sd(cons)	0.309**	1.134**
	(0.126)	(0.486)
Ln_sd(residual)	0.558**	0.790**
	(0.223)	(0.283)
Observations	111,269	1,488
Number of groups	38	17

NOTE: Two-level mixed-effects models with random intercept and gross cell product as dependent variable. Robust standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05

Finally, Table 3 below depicts logistic regression results with country dummies and clustered standard errors estimated from cross-sectional data of round five and six from Afrobarometer. The results indicate that while state-controlled hydrocarbon production have a positive effect on respondents' perceived living condition, internationally-controlled fields show no significant effect. Expressed in odds ratios, an increase of one state-controlled oilfield within a 50 km radius of a respondent increases his/her likelihood of reporting to enjoy fairly good or very good living conditions by nearly 2% (Model 1 and 3). These findings are largely in line with our previous results using alternative district-level data.

[15] Note that both state as well as internationally-controlled oil production is associated with more economic growth in the all-unit sample of Table A2 (Model 1). However, when the effects of ownership patterns are directly compared employing an oil-producing sub-sample, only *state oil* remains statistically significant.

TABLE III: Effect of state- versus internationally-controlled oilfields (66% ownership threshold) within 50km of respondent on respondents' present living conditions using Afrobarometer data round 5 and 6

	Afrobarometer 5		Afrobarometer 6	
	All Sample	Oil Sample	All Sample	Oil Sample
Number of state oilfields	0.019***	0.027***	0.017**	0.008**
	(0.003)	(0.003)	(0.007)	(0.004)
Number of international oilfields	-0.032	-0.005	-0.085	-0.039
	(0.026)	(0.018)	(0.065)	(0.045)
democracy	0.093***	0.100***	0.801***	0.621***
	(0.014)	(0.028)	(0.057)	(0.158)
Local corruption	-0.178***	-0.079	-0.238***	-0.078
	(0.047)	(0.102)	(0.041)	(0.118)
Discriminated group	-0.142***	-0.224*	-0.379***	-0.200*
	(0.053)	(0.134)	(0.070)	(0.110)
Urban area	0.028	0.049	-0.134	-0.055
	(0.053)	(0.169)	(0.083)	(0.234)
Unemployed	-0.149***	-0.219**	0.046	0.016
	(0.051)	(0.091)	(0.057)	(0.200)
Access to piped water	0.123***	-0.008	-0.014	0.009
	(0.042)	(0.147)	(0.087)	(0.179)
Incidence of crime	-0.247***	-0.377**	-0.352***	-0.070
	(0.050)	(0.165)	(0.063)	(0.086)
Access to sanitation	0.465***	0.204**	0.545***	0.555***
	(0.051)	(0.102)	(0.045)	(0.084)
Secondary or higher education	0.393***	0.346	0.183***	-0.113
	(0.057)	(0.211)	(0.064)	(0.145)
Constant	-1.686***	-1.423***	-0.776***	-2.241***
	(0.126)	(0.224)	(0.115)	(0.283)
Log Ps. Likelihood	-19872.994	-1244.065	-18358.148	-1217.471
Pseudo R^2	0.095	0.115	0.130	0.076
Observations	35287	2361	33073	2281

NOTE: Logistic regressions with country dummies and respondents' present living condition (dummy variable that equals "1" if a respondent considers his/her current living conditions as being "fairly good" or "very good") as dependent variable. Clustered standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

The control variables are largely in line with our expectations: while perceived level of democracy, good state capacity (as proxied by access to piped water and sanitation) and education increase respondents' chance of enjoying good living conditions, local corruption, perceived discrimination, unemployment and an unsafe vicinity decrease it.

A Test of Causal Mechanisms

We find consistent and robust empirical evidence for our core claim that – compared to multinational companies – state-controlled oil firms are more capable in promoting local economic wealth. As argued in the theoretical part, we assume that state-controlled oil extraction promotes regional economic activity particularly under local institutions characterized by high political accountability, good governance and low levels of corruption. Under these institutional conditions, politicians are more likely to, for instance, to enhance infrastructural capacity building and promote local content policies (rather than diverting resource revenues to patronage or embezzlement).

To test whether NOCs are particularly likely to promote regional economic wealth under sound political institutions, we interact our oil ownership variables with three measures of institutional quality. First, we assess how countries' levels of democracy (proxied the Polity 2 index) conditions the relationship between oil ownership and economic wealth. Second, we test to what extent the impact of NOCs or IOCs are contingent on quality of government relying on the quality of government indicator from the International Country Risk Guide.[16] Finally, we examine how oil control rights affect economic activity depending on countries' level of corruption. For this purpose, we employ an indicator measuring freedom from corruption from the Heritage Foundation.[17]

Table 3 below shows that the welfare-enhancing effect of state-controlled oil extraction is largely contingent on the institutional quality. As expected, the interaction term between *level of democracy* and *state oil* is positive and highly significant, while the variable *state oil* by itself or the interaction term between *international oil* and *level of democracy* remain non-significant. This finding suggests that local politicians use oil windfalls to foster regional wealth (e.g. by providing schooling or infrastructure) particularly under accountability-promoting democratic institutions (Model 1).

Good governance seems to be another key precondition to promote local economic development under state-controlled oil production. While the effect of *state oil* is negative by itself, it becomes positive when interacted with the quality of government variable (Model 2). A similar conditioning effect exists for corruption: the effect of state oil ownership is only positive and significant within countries exhibiting lower levels of corruption (Model 3). Note that, under corruption control, international-controlled oil extraction also increases regional economic weath. Table A3 in the appendix shows that these findings remain qualitatively unchanged when pooled GLS estimations using country and year fixed effects are applied.

[16] The variable ranges from 0 to 1, with higher values indicating higher quality of government. See http://www.prsgroup.com/about-us/our-two-methodologies/icrg.

[17] This measure relies on Transparency International's Corruption Perceptions Index (CPI) from Transparency International and ranges between 0 and 100, with higher values indicating less corruption. See https://www.heritage.org/index/freedom-from-corruption.

TABLE III: Interaction effects on oil ownership and institutional quality on districts' level of economic activity (DHS data)

	(1) Level of Democracy	(2) Quality of Government	(3) Freedom from Corruption
VARIABLES			
nr. of state fields	-0.181	-0.676***	-0.102
	(0.152)	(0.096)	(0.085)
nr of international fields	1.060*	0.161	-1.894**
	(0.533)	(0.419)	(0.648)
democracy	0.230***		
	(0.063)		
state fields x. democracy	0.027*		
	(0.011)		
international fields x. democracy	-0.068		
	(0.037)		
quality of government (QoG)		-0.703	
		(2.071)	
QoG x state fields		3.165***	
		(0.411)	
QoG x. international fields		-0.050	
		(1.369)	
control of corruption (CoC)			0.040
			(0.028)
CoC x. state fields			0.015***
			(0.004)
CoC x. international fields			0.097**
			(0.035)
unemployment	-0.076	-0.036	-0.076
	(0.683)	(0.644)	(0.720)
no formal education	-1.239**	-1.017**	-1.330*
	(0.387)	(0.384)	(0.524)
% of urban areas	-0.198	-0.032	-0.227
	(0.391)	(0.363)	(0.458)
access to electricity	2.785***	2.649***	2.858**
	(0.784)	(0.742)	(0.912)
armed conflict	0.077	-0.137	-0.029
	(0.215)	(0.177)	(0.217)
exluded groups	-0.548	-0.676*	-0.944*
	(0.307)	0.313	0.388
Constant	0.800	1.275	-0.350
	(0.475)	(0.769)	(0.614)
Observations	24,973	23,222	23,299
Number of Groups	21	19	21

NOTE: Two-level mixed-effects models with random intercept and nightlight emission as dependent variable. Robust standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05

Addressing Potential Endogeneity Issues

While our analyses find consistent correlational evidence for the paper's core claim that state-controlled oil extraction is more conducive to local economic wealth compared to internationally-controlled production, the analysis cannot rule out that the reported relationships are endogenous. Regional control rights structures could be largely driven by the availability of inputs (skilled labor, capital, infrastructure) and difficulty of extraction. Governments could grant oil concessions to IOCs in economically less-developed areas while favoring extraction through NOCs in regions with a more educated workforce and better infrastructure.

Exploring the time dynamics in our dataset, we start investigating the possibility of endogeneity by comparing the levels of education and economic activity prior to openings of oil fields operated by either international or state-domestic companies. The descriptive statistics displayed by the two boxplots below (Figure 3 and 4) indicate that the levels of districts' nightlights emission and secondary education were not higher before the opening of oilfields controlled by NOCs compared to wells exploited by IOCS. While this first descriptive exercise suggests that our reported relationships may be truly causal and not driven by endogeneity, further tests (e.g. through instrumental variable estimation) have to be applied to confirm that our correlations are not spurious.

Figure 3: Districts' levels of nightlights emission before and after oilfield openings (DHS data)

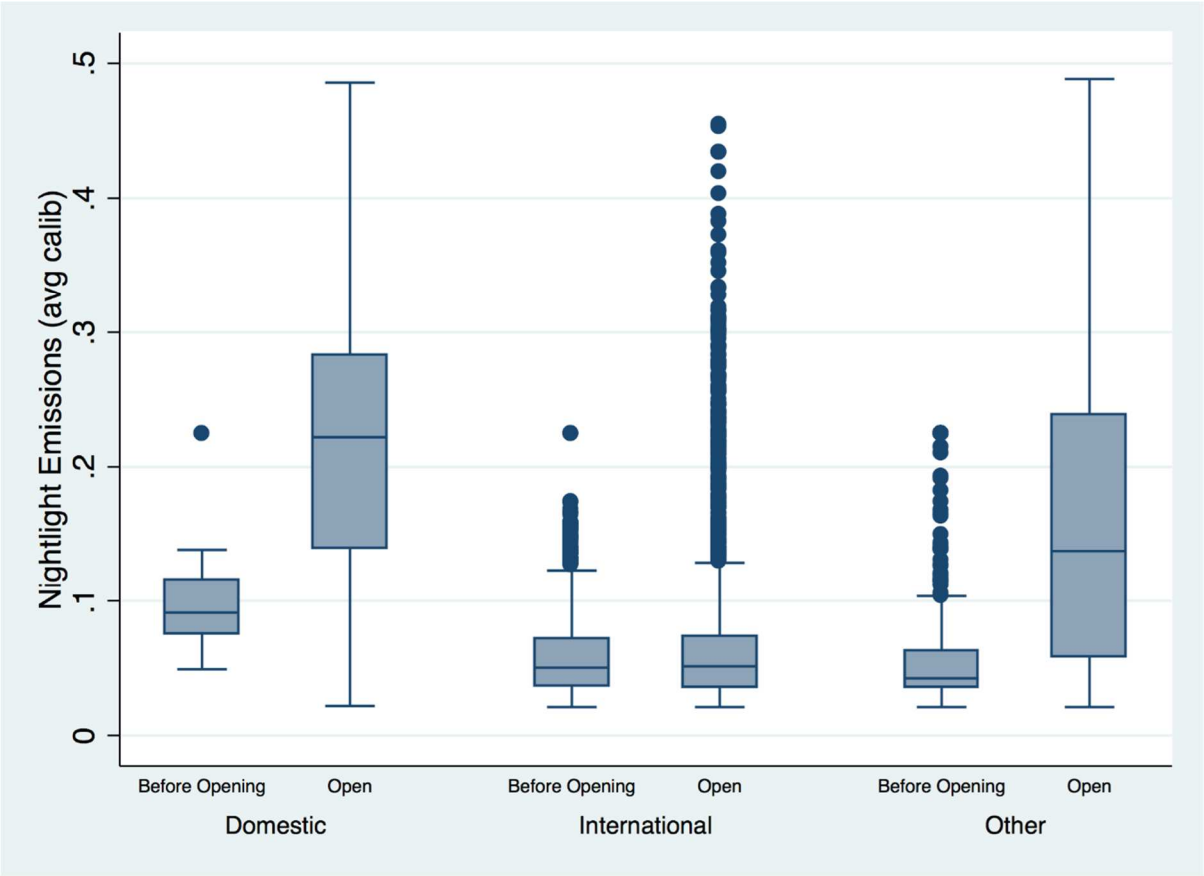
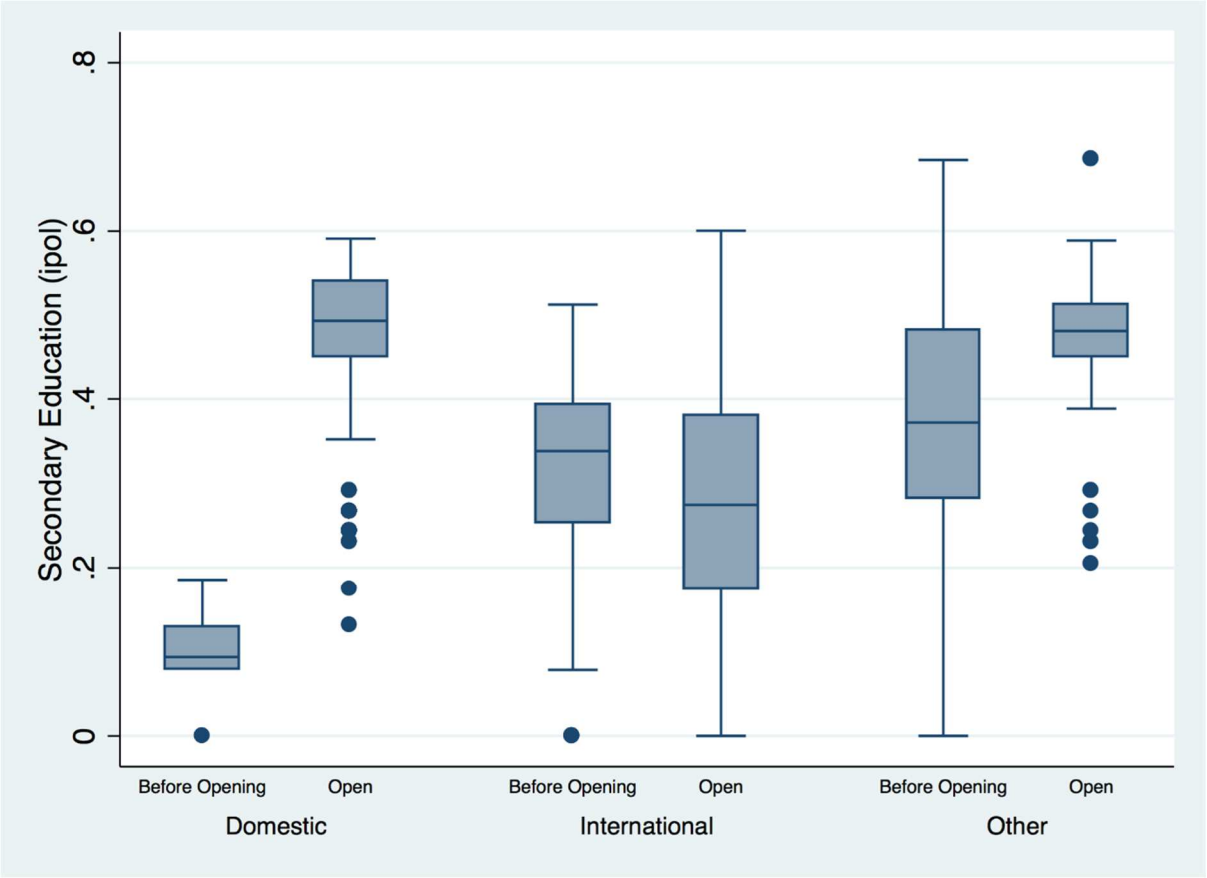


Figure 4: Districts' levels of seconday education before and after oilfield openings (DHS data)



Conclusion

In line with recent quantitative case study research (Aragón and Rud, 2013; Chuhan-Pole et al., 2017; Lippert, 2014), our disaggregated study on sub-Saharan Africa shows that resource extraction can in fact promote regional economic development. Under specific governance and institutional arrangements, extractive industries may constitute a regional economic blessing. Results of our multilevel, pooled GLS and logistic estimations indicate that – contrary to internationally-controlled oil extraction – oil production in the hands of the state furthers regional economic wellbeing.

We explain this finding by arguing that NOCs are more capable of encouraging backward and forward linkages for example by promoting local skill development and overseeing local content policies. However, our empirical analysis also shows that NOCs enhance regional economic activity only under democratic institutions, good governance or low corruption. Under these conditions, as we have argued, local politicians are more likely to use oil revenues for fostering local development (rather than diverting rents to embezzlement and providing private goods to a narrow constituency).

The implications of our research are manifold. First, we underline that studying the resource-growth nexus without considering the institutional or regulatory context yields misleading results. As we

demonstrate at the disaggregated level of analysis, the identity of resource extracting-companies – in combinational with the institutional framework - determines whether natural resource extraction is an economic curse or, rather, a blessing. Second, our study contradicts previous claims that state control over resource extraction inevitably leads to poorer fiscal outcomes and potentially reduced economic growth (Luong and Weinthal, 2006, 2010). General calls for privatizing extractive industries in Africa or Latin America, as commonly made by various scholars and international lenders such as the IMF or the World Bank, appear shortsighted.

Third, our study provides a plausible explanation for recent findings that – compared to state-led mineral or oil production – internationally-controlled resource extraction leads to more social conflict at the local level (Haslam and Tanimoune, 2016; Wegenast and Schneider, 2017). It seems that expectations of improved economic conditions held by extractive communities are more commonly frustrated under multinational resource operations. Finally, our findings highlight the necessity of better understanding the complex interplay between natural resource governance structures and the institutional, regulatory and legal context. Given that several African and Latin American countries have increasingly intensified state interventions within their resource sectors, we need to focus more thoroughly on how to design institutional arrangements such as local content laws or wealth sharing agreements, in order to guarantee enhanced local livelihoods.

Future research should more carefully look at the potential channels through which state-led resource extraction may lead to economic development. Although we presented plausible mechanisms through which state-controlled oil extraction may economically benefit local communities (i.e. fiscal transfers and the promotion of economic linkages), we need to better understand which instruments are better suited for encouraging local growth. Furthermore, it is important to note that by focusing exclusively on local economic activity, we do not account for other resource-related determinants of development including environmental degradation or dispossession. As these and other negative externalities of extractive industries have a direct impact on the livelihoods of local populations, it will be essential to analyze how resource ownership structures relate to other dimensions of development.

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Appendix

TABLE AI: **Effects of number of state- versus internationally controlled oilfields on districts' level of economic activity (DHS data)**

	(1) All districts (51% threshold)	(2) Oil-producing districts (51% threshold)	(3) All districts (66% threshold)	(4) Oil-producing districts (66% threshold)
VARIABLES				
nr. state oilfields	0.184***	0.155	0.364***	0.351**
	(0.036)	(0.110)	(0.064)	(0.124)
nr. international oilfields	-0.080	-0.471	-0.115	-0.819*
	(0.111)	(0.333)	(0.112)	(0.352)
democracy	0.005	-0.412*	0.005	-0.380**
	(0.013)	(0.162)	(0.013)	(0.170)
unemployment	-0.582**	4.329	-0.592**	3.988
	(0.187)	(2.303)	(0.188)	(2.161)
no formal education	-0.486***	-0.611	-0.491***	0.893
	(0.124)	(2.651)	(0.123)	(2.553)
% of urban areas	0.161	-0.393	0.157	-0.492
	(0.123)	(0.968)	(0.124)	(0.964)
Access to electricity	1.853***	-0.599	1.869***	-0.343
	(0.161)	(1.453)	(0.162)	(1.356)
armed conflict	-0.032	0.297	0.020	0.335
	(0.108)	(0.728)	(0.107)	(0.724)
excluded groups	-0.239**	-3.527**	-0.228**	-3.733*
	(0.069)	(1.032)	(0.068)	(1.064)
Constant	0.612***	2.272	0.608***	-2.684
	(0.163)	(1.891)	(0.162)	(2.378)
Observations	24,973	463	24,973	463
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

NOTE: GLS estimations with country and year fixed effects and nightlight emission as dependent variable. Robust standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05

TABLE AII: **Effects of number of state- versus internationally controlled oilfields on grids' level of economic activity (PRIO-GRID data)**

	(1) All grids	(2) Oil-producing grids
VARIABLES		
nr. state fields	0.021*	0.018*
	(0.009)	(0.009)
nr. international fields	0.029*	-0.023
	(0.012)	(0.023)
democracy	-0.001***	0.001
	(0.000)	(0.004)
excluded groups	-0.013***	-0.029
	(0.001)	(0.019)
armed conflict	-0.000	-0.002
	(0.003)	(0.040)
distance to capital	-0.0002***	0.0001
	(0.00006)	(0.0007)
% of urban areas	0.324***	0.264*
	(0.052)	(0.114)
Constant	0.012	-0.275
	(0.014)	(1.257)
Observations	111,269	1,488
Country fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

NOTE: GLS estimations with country and year fixed effects and gross cell product as dependent variable. Robust standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05

TABLE AIII: Interaction Effects on Oil Ownership and Institutional Quality on districts' level of economic activity (DHS data)

	(1) Level of Democracy	(2) Quality of Government	(3) Freedom from Corruption
VARIABLES			
nr. of state fields	-0.382***	-0.339**	-0.104*
	(0.082)	(0.109)	(0.053)
nr of international fields	0.865	0.561*	-0.828
	(0.516)	(0.232)	(0.479)
democracy	0.004		
	(0.013)		
state fields x. democracy	0.046***		
	(0.008)		
international fields x. democracy	-0.067*		
	(0.034)		
quality of government (QoG)		5.984***	
		(0.714)	
QoG x state fields		1.915***	
		(0.450)	
QoG x. international fields		-1.922**	
		(0.717)	
control of corruption (CoC)			0.005
			(0.004)
CoC x. state fields			0.015***
			(0.004)
CoC x. international fields			0.0344
			(0.025)
unemployment	-0.573**	-0.515**	-0.220
	(0.185)	(0.191)	(0.183)
no formal education	-0.447***	-0.422**	-0.659***
	(0.123)	(0.125)	(0.133)
% of urban areas	0.160	0.241	0.219
	(0.122)	(0.126)	(0.131)
access to electricity	1.853***	1.768***	1.730***
	(0.161)	(0.163)	(0.166)
armed conflict	-0.022	-0.073	-0.052
	(0.108)	(0.112)	(0.125)
excluded groups	-0.228**	-0.212**	-0.327
	(0.068)	(0.071)	(0.077)
Constant	0.614***	-2.776***	0.443
	(0.163)	(0.353)	(0.228)
Observations	24,973	23,222	23,299
Number of groups	1,469	1,366	1,469
Country dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes

NOTE: GLS estimations with country and year fixed effects and gross cell product as dependent variable. Robust standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05