OIL AND ETHNIC INEQUALITY IN NIGERIA

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Abstract. Oil prices experienced in early life predict differential adult outcomes across Nigerian ethnic groups. Our difference-in-difference approach compares members of southern ethnicities to other Nigerians from the same birth cohort. Greater prices in a southern individual's birth year predict positive relative outcomes, including reduced fertility, delayed marriage, higher probabilities of working and having a skilled occupation, and greater schooling. By contrast, health outcomes suffer, including reduced height and increased BMI. These microeconomic impacts can be explained by macroeconomic responses to greater oil prices. Relative Southern incomes increase, food production declines, maternal labor intensifies, and Southern conflict rises.
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1. Introduction

In this paper, we ask whether members of African ethnic groups benefit differentially from positive commodity price shocks in resource producing countries. The division of revenues from commodity production is central to whether or not natural resources contribute to development and growth (Mehlum et al., 2006; Sachs and Warner, 2001). We focus on Nigeria. Nigeria is dependent on oil; oil rents accounted for 26.8% of GDP in 2012 (World Bank, 2012) and oil provided 70% of government revenues in 2011 (NRGI, 2013). Nigeria is well known for failing to convert its resource windfall into development. From 1960 to 2000, more than $350 billion in oil revenue in 1995 dollars was collected by the Nigerian government while real income per capital fell (Marwah, 2014). During the oil boom of the 1970s, government spending and access to international capital increased, but agriculture declined (Pinto, 1987). Further, the distribution of incomes and power across ethnic groups

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in diverse countries is an important component of Africa's growth tragedy (Easterly and Levine, 1997; Posner, 2004). Ethnic inequality drives poor policy choices, limits provision of public goods, seeds conflict, encourages mistrust, weakens institutions, and leads to state capture (Alesina et al., 2012).

By testing whether members of Southern ethnic groups benefit differentially from positive oil shocks, we assess what the distributional impacts of oil price changes are across regions and ethnicities and help explain the poor macroeconomic performance of the most populous country in Africa. This task is made difficult by the absence of nationally-representative sub-national data on individual's living standards over long periods of time. Further, tracing the relative impacts of changing oil prices is not as simple as measuring the distribution of government spending over space, since many macroeconomic responses to oil are not driven by government actions. We focus, then, on final outcomes for individuals. Our approach is to test whether real oil price shocks experienced in early life affect human capital outcomes of members of Nigeria's ethnic groups. This allows us to recover the ultimate distribution of the relative impacts of changes in oil prices.

We use individual data on women from the nationally representative 2008 Nigeria Demographic and Health Survey (DHS). We employ a difference-in-difference approach that exploits variation over time within ethnic groups and that compares members of Southern ethnic groups to other Nigerians born in the same year, allowing for ethnicity-specific time trends. Although oil is important to Nigeria, the country is a small producer and part of the "competitive fringe" that does not coordinate its production quantities with OPEC (Griffin, 1985). World oil prices, then, can be taken as exogenous from the Nigerian perspective. Our baseline distinction between North and South mirrors several economic, political, and religious cleavages in the country.

We find a set of positive relative changes with oil prices for Southern groups: positive oil price shocks increase years of education, make a woman more likely to have a skilled occupation and to be in work, reduce fertility, and raise age at first marriage compared to a woman from a Northern ethnic group born in the same year. However, we find two negative

health effects: positive oil price shocks reduce height and increase BMI. The effects we find are economically meaningful. Across our outcome variables, a one standard deviation movement in early-life oil prices changes the outcome variables by roughly 0.05 to 0.10 standard deviations, magnitudes that are similar to other early life treatments in the literature.

Our results can be understood as microeconomic responses to the macroeconomic changes prompted by the Nigeria's oil booms. The existing literature has argued that oil revenues spurred a decline of agriculture, volume growth in the oil sector, and increasing urban employment in services and manufacturing (Bevan et al., 1999, p. 186). These changes were greater in the South than in the North, and the gap between the richer South and the poorer North grew during the oil boom of the 1970s (Bevan et al., 1999, p. 107). Our results support a similar story. Southern households benefit economically relative to the North from positive oil price shocks, and use this advantage to invest in more, better-educated children. Adverse health effects result because Southern households face a greater opportunity cost of time and reduce many early-life investments in their children, particularly vaccinations. These negative effects are reinforced by higher food prices and greater conflict in the South.

Using additional waves of the DHS data, we show that indeed Southern households have more assets and women are more likely to work when oil prices are higher. Our results are consistent, then, with other studies that have found children's health to be counter-cyclical and have emphasized greater maternal labor force participation as a mechanism (Dehejia and Lleras-Muney, 2004; Miller and Urdinola, 2010). Our paradoxical results for height and BMI may be further explained by poorer nutrition and intensified conflict, despite higher incomes. We show a strong negative correlation between Nigerian per capita food production and oil prices. We also find that men in southern Nigeria are relatively less likely to work in agriculture in years of high oil prices. Southern women, particularly the unskilled, are more likely to have children in years of higher oil prices. We find some limited evidence of selective mortality. Southern mothers also make a mix of greater and fewer investments in their children before and after birth in response to contemporaneous price increases. In particular, relative vaccination rates decline while breastfeeding duration increases. Conflict

increases in the South in response to high oil prices. The fact that these adverse effects are not confined only to members of Niger Delta ethnic groups suggests that pollution associated with oil production (e.g. Okonta and Douglas (2003)) is unlikely to be an important mechanism driving our results, though it will have had adverse health effects in that region.

There is little evidence that the results we find are due to government redistribution across regions. We use additional sources of data to show that these positive effects at the individual level exist despite lower government investment in primary schooling and greater violence in the South relative to the North when oil prices are high. Contrary to the idea that oil rents are used by national rulers to favor their ethnic group, we find that sharing an ethnic group with the President attenuates the effects of oil prices. We also find that democracy moderately reduces the differential impacts of oil price shocks.

We subject our results to several robustness checks. Our results are not sensitive to controls or trends. We limit our sample to the period of greatest Nigerian oil production, and we exclude outlier years of very high prices. We use multiple alternative measures of oil price shocks. We account for age heaping by removing individuals whose ages may be rounded and by collapsing years of birth into five-year bins. We show that religious differences, which are highly correlated with the North/South divide, cannot explain away our results. Separating out the northern and southern ethnicities into finer categories, we show that no single group in either the North or South dominates our results. Rather, the Yoruba, Igbo, Delta, and other Southern ethnic groups move together, while the Hausa and other Northern groups move together. The Fulani show an even greater divergence from the Southern pattern than do other Northern groups.

1.1. **Related Literature.**

We contribute to the literatures on ethnic inequality, early life shocks and investments, and the effects of commodity price shocks in general and natural resource windfalls in particular.

The importance of ethnic divisions for outcomes such as government quality, conflict and public goods provision is not limited to Africa (Alesina and Zhuravskaya, 2011; Baldwin

and Huber, 2010; Esteban et al., 2012; Montalvo and Reynal-Querol, 2005). Large intra-country differences in economic development exist across ethnic groups in much of Africa (Michalopoulos and Papaioannou, 2013a). The importance of Africa's ethnic divisions for outcomes such as the distribution of political power (Francois et al., 2012), the provision of public goods (Glennerster et al., 2013; Miguel and Gugerty, 2005), and the incidence of conflict (Desmet et al., 2012; Michalopoulos and Papaioannou, 2013b) has been the subject of considerable quantitative research. Most of the literature has focused on the consequences of ethnic politics on macroeconomic outcomes. Alesina et al. (2012), for example, suggest that inequality across ethnic groups reduces growth through civil conflict, limited public goods provision, lower social capital, and distrust of market economies. An exception to this macroeconomic focus is Franck and Rainer (2012), who find that infant mortality is lower and education is improved for individuals that share an ethnic group with their country's leader during critical ages.

Our study adds to this literature by considering whether positive commodity price shocks increase the relative power of specific ethnicities in a way that improves outcomes for their members. We thus add evidence on the time-varying sources of ethnic inequality, and on the importance of shocks other than the distribution of political power that can alter the relative fortunes of a country's ethnic groups. Like Burgess et al. (2013), we find that democracy attenuates ethnic bias in the division of resources. Our results are also consistent with the pattern highlighted by Chua (2004), in which external economic shocks can amplify existing ethnic differences within countries.

Existing research has looked at the impact of many different early life shocks, including disease burdens, weather shocks, and government assistance programs (Almond, 2006; Hoynes et al., 2012; Maccini and Yang, 2009). In particular, this literature has focused on the "fetal origins" of long-run health (Almond and Currie, 2011; Currie and Vogl, 2012). We assess a broad range of adult outcomes, including education and marriage behavior. Our contribution to this literature is three-fold. First, we add to the empirical evidence on whether parental investments mitigate or reinforce early life shocks and, if so, how effectively.

Recent work has suggested that parental investments are mostly reinforcing (Adhvaryu and Nyshadham, 2014; Almond and Mazumder, 2013) and that the investments made early in life are particularly productive (Bharadwaj et al., 2013; Cunha et al., 2010). We do not find strong evidence of reinforcing investments, as Southern mothers invest less in vaccination years of higher oil prices. Some investments do, however, move in the same direction as health outcomes, though breastfeeding duration increases in response to higher prices. Second, though the literature on early life circumstance is extensive, little of it has focused on the impact of strictly economic shocks such as commodity prices, notable exceptions being Adhvaryu et al. (2014a) and Cogneau and Jedwab (2012). This is despite the particular vulnerability of poor countries to movements in commodity prices (Deaton, 1999). Third, we follow Bhalotra and Venkataramani (2012) in considering how ethnicity and its interaction with political institutions affects individuals' vulnerability to shocks in their first years of life. While Bhalotra and Venkataramani (2012) find that political disenfranchisement limits the capacity for reinforcing parental investments, we find that the effects of oil price shocks are mitigated by co-ethnicity with the president and by democracy.

The third body of research our paper is related to concerns the political economy and human capital effects of commodity price shocks. Existing work has considered the importance of these shocks for outcomes such as conflict (Brückner and Ciccone, 2010), health spending (Acemoglu et al., 2013), government fiscal positions (Arezki and Brückner, 2012a,b), household enterprize (Adhvaryu et al., 2014b), and child outcomes such as survival, schooling and labor (Kruger, 2007; Miller and Urdinola, 2010). The literature has recognized that commodity prices will have heterogeneous effects on outcomes such as conflict and child mortality, depending on commodity characteristics such as the labor-intensiveness of their production (Dube and Vargas, 2013; Wu, 2014). Oil is a capital-intensive "point source" resource, and so price increases might be expected to have adverse effects on conflict and health outcomes. Existing studies have found that oil rents may reduce democracy (Tsui, 2011), increase corruption (Arezki and Brückner, 2011), and reduce the status of women (Ross, 2008). These claims are not without their critics (Alexeev and Conrad, 2009). We

add to this literature by considering the long-run effects of these shocks, heterogeneity in responses to these shocks at the sub-national level, the degree to which these shocks are mitigated by political economy, and the degree to which short-term responses help explain long-run outcomes.

The remainder of the paper is organized as follows. Section 2 provides background on oil production and the political economy of economic growth in Nigeria. Section 3 explains our identification strategy and outlines our sources of data. Section 4 presents results and robustness checks. Section 5 tests between potential mechanisms. Section 6 concludes.

2. Background

Oil production in Nigeria began in December 1957, increasing rapidly thereafter. From 1970, crude oil has been Nigeria's main export, accounting for over 90% of Nigeria's exports over the past four decades (Udosen et al., 2010). The oil boom of the 1970s was one of rapid capital accumulation, declining total factor productivity, and shrinking capacity utilization. Since oil has become dominant, Nigerian growth has been exceptionally volatile (Sala-i-Martin and Subramanian, 2013). As a consequence, the size of government has also been volatile (Ross, 2003). Though there is no evidence that the relative price of tradable goods to non-tradable goods followed the classic "Dutch Disease" pattern, it is clear that the agricultural sector declined in favor of services, especially government services (Sala-i-Martin and Subramanian, 2013). Ross (2003) identifies four channels through which oil has failed to reduce poverty in Nigeria: economic volatility, crowding out manufacturing and agriculture, fostering inequality, undermining democracy, and sparking violent conflict.

Oil revenue accrues to the central government through its ownership of the Nigerian National Petroleum Corporation, which operates the contracts for oil production between the Nigerian government and the private oil companies that are in charge of production. Taxes are collected on the profits from petroleum production, and government revenue is sensitive to the price of oil. Nigerian politics are dominated by access to oil revenues (Sala-i-Martin and Subramanian, 2013). Since the beginning of oil production, there has been considerable

fluctuation in the fraction of oil revenues that remain in the producing state. Between 1946 and 2003, the rules for revenue allocation were changed eighteen times (Ross, 2003). Until 1975, states kept up to 45% of oil revenues, falling to 20% from 1975 to 1979 and then to less than 5% until 1999. Under the 1999 constitution, at least 13% of revenue must be transferred to oil-producing states, which has resulted in an upward jump in the fraction of oil revenues going to oil-producing regions (Nigeria UNDP, 2006).

Government revenues during the high oil prices of the 1970s are largely understood to have been misspent. Spending on the military and education maintained a large non-productive population (Freund, 1978). Although some of the revenues were invested in projects such as school building (Osili and Long, 2008), some two thirds of officially recorded "investment" was not in fact investment; much of this spending instead went to projects that were paid for but never completed (Marwah, 2014). This "ghost construction" peaked after the 1979 election and declined after the 1983 military coup, and involved large cash payments that were difficult for the public to monitor.

Oil exploration and production activities in Nigeria are concentrated in the Niger Delta. Conflict over the distribution of resources between regions has marked Nigeria since independence. Seven years after independence from the United Kingdom in 1960, the south-eastern states of Nigeria, which included the Niger Delta, declared independence as the Republic of Biafra. A three year civil war followed that ended in defeat for Biafra. The presence of oil in the Delta encouraged this conflict (Ross, 2003). The Delta region has been prone to violence again since 1990 (Abidoye and Calí, 2014). In the mid-1990s, Nigeria's highest rates of poverty were experienced in the Delta region (Ross, 2003). Minorities' demands for control of oil revenues have been central to violence in the Delta (Ross, 2003). During the late 2000s, violence from rebel groups in the Niger Delta intensified as oil prices rose (Abidoye and Calí, 2014). Oyefusi (2007) links oil to violence in the Delta through weak institutions that promote laws that are badly designed and enforced, and to state repression of host communities in the interest of oil companies. Further, low incomes and education levels in the Delta have lowered the opportunity cost of engaging in conflict (Oyefusi, 2008).

Politics in Nigeria since independence have been mostly dominated by the North, with the most successful Southern politician of the period, Olusegun Obasanjo, considered to be friendly to the North (Falola and Heaton, 2008). The civilian administration that lasted from 1960 until 1963 was headed by Abubakar Balewa, a Northerner, as prime minister. During the same administration Nnamdi Azikiwe, a Southerner, served first as Governor General and later as President. Johnson Aguiyi-Ironsi, a Southerner, became president in 1966 following a military coup, but was overthrown the same year by a coup that gave the presidency to Yakubu Gowon, a Northerner. Gowon was removed in a 1975 coup that brought Murtala Muhammed, a Northerner, to power. His assassination in 1976 led Olusegun Obasanjo, a Southerner, to assume the presidency. Nigeria returned to civilian rule in 1979 with the presidency of Shehu Shagari, a Northerner. Civilian rule was ended with another coup in 1983. Muhammadu Buhari, a Northerner, was made president. Excepting a brief interim civilian administration under the Southerner Ernest Shonekan in 1993, Nigeria remained under military rule until 1999. Presidents Babangida (1985-1993), Abacha (1993-1998) and Abubakar (1998-1999) were all Northerners. Civilian rule began again in 1999 under the second Obasanjo administration. Umaru Musa Yar'Adua, a Northerner, became president in 2007, and was succeeded by Goodluck Jonathan, a Southerner, in 2010. The Polity IV index has given Nigeria scores above zero for the periods 1960-65, 1979-83, and from 1999 to the present. Nigeria received scores of zero and below from 1966 to 1978 and from 1984 to 1998.

3. Identification strategy and Data

3.1. **Identification strategy.** Our identification strategy attempts to isolate the effects of oil price changes on members of Southern ethnic groups relative to members of Northern groups through a difference-in-difference approach. Changes in the oil price can be safely assumed to be exogenous, as Nigeria accounts for less than 4% of world oil production.[1] Our regression equation is as follows:

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

$$(1)\quad Outcome_{igt} = \beta \ln(RealOilPrice_t)_{MA(3)} \times SouthEthnicity_g + x'_{igt}\gamma + \phi_t + \eta_g + \eta_g \times t + e_{igt}.$$

Here, $Outcome_{igt}$ is the outcome for individual i of ethnic group g born in year t. The outcomes we consider are height, BMI, number of years of education, a dummy for working, age at first marriage, age at first birth, and number of children. $\ln(RealOilPrice_t)_{MA(3)}$ is the three year moving average of the logarithm of the West Texas Intermediate oil price, deflated by the US consumer price index (CPI). $SouthEthnicity_g$ is a dummy variable that takes a value of one if the individual is part of an ethnic group for which over half the sampled population lives in the South of Nigeria.[2] Since state of birth is not registered in our data, our use of ethnicity is a proxy for region of birth and is not susceptible to migration in response to oil prices. A positive coefficient on this variable indicates that the outcome responds positively to positive oil price shocks. Unless otherwise indicated, it is this composite variable $\ln(RealOilPrice_t)_{MA(3)} \times SouthEthnicity_g$ that we refer to as the oil price "shock" in our tables and discussion.

x_{it} is a vector of controls that includes a constant. In our base specification, our controls include dummy variables for urban residence, female household head, region of residence, religion and survey month. These controls are chosen because they are plausibly exogenous, though our results are not sensitive to whether we include them. ϕ_t and η_g are fixed effects for year of birth and ethnic group, respectively. Our baseline specification also includes an ethnicity-specific time trend $\eta_g \times t$, which allows us to demonstrate that our results are not driven by regional trends correlated with oil prices. Standard errors are clustered at the ethnicity level.

Figure 2 visually captures the identifying variation underlying our empirical strategy. Each data point plots the detrended South-North gap in each of our dependent variables for women from a given birth cohort against the three year moving average of the log real oil

[2]As a robustness check we consider excluding Lagos in determining our definition, as it is the recipient of immigration from across the country. Only a few small ethnic groups that each make up less than 1% of our sample are no longer defined as Southern according to this definition.

price in that year. It is apparent from the figure that the South-North gap widens in years when the price of oil is high.

3.2. **Data.**

3.2.1. *Outcomes.* The main source of data for this study is the Nigerian DHS, carried out by the Nigerian National Population Commission. For 2008, the DHS interviewed a nationally representative sample of 33,385 women aged 15 to 49. Our data, then, covers women born between 1958 and 1993. Nigeria was, then, an oil-producing country for all the years of birth covered by the DHS data. The survey questionnaire for women asks about a wide variety of health and fertility indicators that we consider. In Table 1, we show summary statistics for our variables of interest for Nigeria as a whole and for members of Southern ethnicities. A little over 40% of our sample consists of women from Southern ethnic groups. Respondents from Delta ethnic groups make up 10.7% of the sample of women.

3.2.2. *Oil prices.* The oil price used is the West Texas Intermediate price in 1984 US dollars taken from Federal Reserve Economic Data (FRED). In Figure 1, we plot the real oil price and Nigerian oil production in millions of barrels. The graph shows considerable fluctuation in oil prices from the first oil crisis in 1973, with both large increases and declines being observed within the period we analyze. This allays concerns that we are identifying the consequences of one large temporary shock to the oil price or that our identification is based on a smooth trend. Oil production in Nigeria starts from a low base in our sample period, but increases considerably before the oil crisis and then fluctuates thereafter. For the majority of the sample period there is considerable oil production in Nigeria, but our results are robust to excluding the period before 1970, when the dominance of oil relative to all other exports begins.

3.2.3. *Mechanisms.* We gather data on *selective survival* and *selective fertility* from the births recode section of the DHS. Every mother in the sample is asked to provide a complete history of the children that have ever been born to her, and whether the child died in the first year of life.

We gather data on *violence* from the Armed Conflict Location and Event Data (ACLED) database. These cover the years 1997 to 2011. The data contain locations and specific dates for reported instances of political violence. The location data allow us to easily assign events to Southern or Northern Nigeria. These data are compiled from a variety of primary sources, including secondary research, publications from of humanitarian agencies, media accounts, and country reports. Events are reported separately by type, for example as battles or as riots and protests. We consider these both separately and aggregated together.

We collect data on *agriculture* from the Food and Agriculture Organization's FAOSTAT website.[3] This source reports the real value of food production for Nigeria as a whole in 2004-2006 international dollars. We are not aware of panel data on Nigerian food production at a sub-national level that overlaps with the period of the oil boom, or that covers a period of more than two years. Though we will show that food production in Nigeria is negatively correlated with world oil prices, we will be unable to show whether food production was more responsive to prices in the South, though the secondary literature does suggest several reasons (discussed below) why this is likely. Further, we show that relative male employment in agriculture drops in the South relative to the North in times of high oil prices.

We collect data on *investments* from the children's recode section of the DHS. For each standard DHS survey, women are asked multiple questions about children born in the past five years, such as the vaccinations they received, how long they were breastfed, and the circumstances of their births. Three waves of the Nigerian DHS include ethnicity data that allow us to classify these recently-born children as "Northern" or "Southern": 1999, 2003 and 2008. Similarly, the individual recode portions of the DHS from these three waves also inform us about the status of women of child-bearing age. In particular, we consider an indicator for having an earth floor, an indicator for having electricity, the weight of the respondent, an indicator for whether she is currently working, and an indicator for whether her partner works in agriculture.

[3] `http://faostat3.fao.org/`.

Data on the *distribution of oil revenues and political economy* come from several sources. First, we use the Nigerian Annual Abstract of Statistics to provide state-level data on the number of schools, school enrollment rates, the number of health establishments, and the number of hospital beds in every state in every year.

We supplement these data on differential outcomes for states over time by using night-time lights over the period 1992 to 2008 as a proxy for economic activity. This follows work by Henderson et al. (2012) and Michalopoulos and Papaioannou (2013a), who provide more extensive descriptions of the data. These are taken from the Defense Meteorological Satellite Program's Operational Linescan System. Collected by satellite images of the earth between 20:30 and 22:00 local time and averaged over the course of the year, these data exist at a 30 second resolution, so that each pixel is roughly one square kilometer. Luminosity for each pixel is reported a number between 0 to 63. We measure luminosity as the average over all pixels in a given state in a given year.

In our individual-level data, we test for heterogeneous effects of oil prices by both the level of democracy and by co-ethnicity with the country's president. Democracy data come from the Polity IV project, available from the Center for Systemic Peace.[4] We have coded the ethnicities of Nigeria's leaders ourselves from available biographies.

4. Results

4.1. **Main results.** Table 2 summarizes our main results with the full set of controls for all outcomes. All our results are significant at the 1% level, and the relative magnitude of our results is quite consistent. A one standard deviation increase in the oil price in year of birth for women of Southern ethnic groups (around 0.5 log points) results in a change relative to Northerners of between 0.05 to 0.10 standard deviations of the outcome variables. In absolute magnitudes, this change represents 0.43 more years of education, and increase of 3.7% in the probability of having a skilled occupation, 0.23 fewer children born, a BMI 0.21 points heavier, a fall in height of 0.29 centimeters, a 0.34 year increase in the age at first marriage, and an increase of 5.3% in the probability of working.

[4] `http://www.systemicpeace.org/inscrdata.html`

Our results are consistent with oil price shocks leading to improvements in the income of Southern households relative to the North, thereby leading to greater investments in children and a decline in the relative return to agriculture. These together lead to more education and better skills, which in turn translates into later marriage and fewer children. All of these factors contribute to the higher probability of working observed. We provide direct evidence on these mechanisms in section 5. What remains to be explained are the negative results on height and BMI. Because we show below that the Southern response to oil prices is not limited to ethnic groups from the oil-producing Delta region, we do not believe pollution is a plausible mechanism. Southern women's relative labor supply increases with oil prices, and so women's time use is a plausible mechanism. The decline of Nigerian agriculture is also a likely channel; this raised food prices and made it more difficult to provide nutrition to children.

For comparison with other results in the literature, the relative decrease in years of education due to a one standard deviation fall in the oil price, 0.43 years, is larger in magnitude than that of being born in influenza pandemic year of 1919 in the US (0.15 in Almond (2006)). In a study of the effect of rainfall during year of birth on adult outcomes in Indonesia, Maccini and Yang (2009) find that a one standard deviation increase in rainfall increases grades completed by 0.33 and increases height by 0.86 centimeters. Our results are, then, of a plausible magnitude when compared to those found in previous studies in this literature.

4.2. **Robustness.** Our results are robust to several alternative estimation methods. In Figure 2 we address the fact that variation in oil prices is annual and make our identifying variation explicit. Following Angrist and Pischke (2008, p. 313), we collapse our data to the annual level. For each of our dependent variables of interest, we compute the mean difference between members of Northern and Southern ethnic groups by birth cohort. For each outcome, we regress this gap on the three year moving average of the real log oil price and a linear time trend. We show partial residual plots for each regression in Figure 2. We report the estimated coefficient on the oil price measure as well as its standard error in each figure. Except in the case of BMI, these results confirm our baseline findings: members of

Southern ethnicities born in years of high oil prices achieve greater levels of education, are more likely to have skilled occupations, have reduced fertility, lower heights, marry later, and are more likely to work compared to their Northern counterparts.

In Table 3, we show the effect of excluding certain controls for one outcome: years of education. Similar patterns occur for the other outcomes, though we omit these for brevity. Including ethnicity trends reduces the variance and increases coefficient values but is not necessary for our results to hold. Results are nearly identical for all outcomes if the urban dummy is removed from the controls (not reported).

Table 4 reports many of our main robustness checks. There was limited oil production in Nigeria before 1970. As a robustness check, we drop all respondents born before 1970 from our data. As we report in Table 4, coefficients are similar to the baseline and all results but BMI are significant at the 1% level, with BMI significant at the 5% level. We may also be concerned that our findings could be driven by the very high oil prices immediately following the second oil crisis. To account for this, we exclude observations for 1980 and 1981, the two highest prices observed in our time period and significant outliers in the series. We report results excluding these observations in Table 4. The magnitude of coefficients is similar to the baseline, with the exception of height and BMI which are smaller and less precisely estimated. Both remain significant. We obtain similar results if we exclude the four years with highest prices, but with the magnitude of the coefficients on height and BMI becoming smaller and insignificant at conventional levels.

There are strong signs of age heaping in the sample, as roughly 30% of respondents' ages are divisible by 5. To account for this, we exclude those respondents from our sample whose ages are divisible by 5. Results are reported in Table 4. For all our outcomes, coefficient values are larger but less precisely estimated if we account for heaping in this manner. As an alternative check, we group years of birth in bins of 5 years, and assign each individual to a bin. The dependent variable of interest is now the mean of the three-year moving average of the log real oil price in that bin interacted with Southern ethnicity. Results are reported in

Table 4. With the exception of the considerably smaller coefficient on age at first marriage, results are comparable with the baseline.

We also look at alternate specifications of the oil price. First, we take the logarithm of the oil price in a respondent's year of birth, as opposed the 3-year moving average of the logarithm. This is reported in Table 4. Results are similar to our baseline. Using the level of real oil price instead of the logarithm, we continue to obtain significant results for all our outcomes, reported again in Table 4. The relative magnitude remains similar. For instance, a one standard deviation increase in the oil price in year of birth (around \$11) results in 0.40 additional years of education as opposed to 0.42 when taking logs.

We report additional robustness checks in the appendix. First, in Table A1, we show that adding additional lags of the oil price shock has little effect on our baseline results, though the effect on height becomes insignificant ($t = 1.47$). Most of these additional lags are insignificant, and exceptions are not surprising given that oil prices are serially correlated. Second, a large literature exists that considers the macroeconomic effects of unanticipated changes in oil prices, rather than level effects (e.g. Hamilton (2003); Kilian (2009)). In Table A2, we re-define our shock variable as an indicator for whether the three year moving average of the log real oil price declined in an individual's year of birth, interacted with Southern ethnicity. In Table A3, we re-define our shock variable as the percentage change in the three year moving average of the log real oil price in an individual's year of birth, interacted with Southern ethnicity. In both cases, the results are consistent with our baseline findings; the dummy measure of price declines give effects that are opposite in sign to our baseline results, while the percentage change measure gives impacts that have the same sign as our baseline. These are significant except in the case of height.

Finally, in Table A4 we control for birth-year levels of rainfall and temperature in an individual's ethnic region and show that the results are nearly unchanged. Results also survive controlling for the interaction between oil prices and the level of ethnic fractionalization in a respondent's ethnic group's typical state of residence (not reported). Results are further

robust to controlling for oil prices at age 6, a proxy for the age at which schooling is likely to begin (not reported).

Throughout, we have interpreted our results as relative, rather than absolute effects of oil prices. In Table A5, we present suggestive evidence that our results are not driven by adverse effects of greater oil prices on Northern Nigeria, but by the greater beneficial effects in the South. We drop members of Southern ethnic groups from the sample and estimate a modified version of (1) that replaces $\ln(RealOilPrice_t)_{MA(3)} \times SouthEthnicity_g$ with $\ln(RealOilPrice_t)_{MA(3)}$ and that omits year of birth fixed effects. We find that, conditional on ethnic fixed effects, ethnic trends, and controls, greater oil prices predict positive and significant gains in skilled labor, height, age at first marriage, and working for Northerners. The effects on education and fertility are insignificant. The only adverse effect appears to that of greater BMI. The positive coefficient on Northern heights in Table A5 is larger than the differential reduction in Southern heights in Table 2. Though these results are only suggestive, they imply that Southern health outcomes are not actively harmed by greater oil prices, but that the benefits to members of Southern ethnic groups are muted in relative terms.

Several other robustness checks are reported in the appendix in Table A6. We include fixed effects for five year bins and ten year bins and interact these with $SouthEthnicity_g$, in order to show that our results hold even when looking for North-South divergence within narrow time windows. Within ten-year bins, all but two of our main results survive: BMI responds positively and insignificantly, while age at first marriage changes sign. With five-year bins, all results retain the same sign as in our baseline, though fertility, BMI, and height lose significance. This is to be expected, given the stringency of these tests. We also replace the real price of oil with the real value of Nigerian oil exports, so that the shock of interest becomes $\ln(RealExportValue_t)_{MA(3)} \times SouthEthnicity_g$. Results are similar to our baseline. Similarly, we replace the real price of oil with the real value of per-capita petroleum rents reported by World Bank (2012), so that the shock of interest becomes $\ln(RealPetroleumRents_t)_{MA(3)} \times SouthEthnicity_g$. Results are again similar to our baseline.

We deflate oil prices by the Nigerian CPI rather than the US CPI. Results are again similar to those in in Table 2.

A concern with our results is that they may be driven by religion as opposed to ethnicity or geography. The North of Nigeria is largely Muslim, whereas the South is mostly Non-Muslim, so our regressions may be identifying different responses to oil price changes based on religion. To exclude this possibility, we run a horse race between the interaction effect of oil prices and being Non-Muslim and the interaction of oil prices and being Southern. We also include the triple interaction term of Non-Muslim, Southern and oil prices:

$$
\begin{aligned}
(2) \qquad Outcome_{igt} =& \beta_1 \ln(RealOilPrice_t)_{MA(3)} \times SouthEthnicity_g \\
&+ \beta_2 \ln(RealOilPrice_t)_{MA(3)} \times NonMuslim_i \\
&+ \beta_3 \ln(RealOilPrice_t)_{MA(3)} \times NonMuslim_i \times SouthEthnicity_g \\
&+ x_{it}'\gamma + \phi_t + \eta_g + \eta_g \times t + e_{igt}
\end{aligned}
$$

Results are reported in Table 5 and support the thesis that the effects we have identified are caused by ethnicity and geography rather than religion. The coefficients on the interaction between oil prices and Southern ethnicity are of a broadly similar magnitude to those of the baseline and all are significant at the 5% level. We also find Non-Muslims in the North respond to oil prices with more education and lower fertility relative to other Northerners. They become less likely to have a skilled occupation relative to others in the North. Non-Muslims in the South respond to oil prices by becoming less fertile and taller than other Southerners, though they become less likely to be skilled or to be in work, relative to others in the South.

It is also possible that our results are driven by one or two large ethnic groups that are disproportionately aided or harmed by oil prices. To determine whether this is the case, we disaggregate our definition of Southern ethnic group into the two largest groups, Igbo and Yoruba, Niger Delta ethnicities taken together, and other Southern ethnic groups taken

together. We also divide the Northern ethnic groups into the two main groups, Hausa and Fulani, and other Northern ethnic groups. We interact all these new groupings with oil prices (with the exception of the Hausa who are our excluded category).

Results are reported in Table 6, and do not support the notion that our baseline results are driven by one ethnic group. For several outcomes, other Northern groups are indistinguishable from the Hausa. The Fulani diverge even more sharply from the southern ethnicities than do the Hausa. Table 6 also demonstrates that results are not localized to the oil-producing Delta region, as Delta ethnicities show patterns broadly similar to those of the other southern ethnicities in the sample.

Within the Southern ethnic groups, there are significant differences in coefficient values for all outcomes, since estimates for the interaction of Igbo and Yoruba with oil prices are very precise. However, the signs of the coefficients are always the same, and differences are rarely large in magnitude. Furthermore, none of our four divisions of Southern ethnic groups show consistently larger coefficients. The Yoruba, for instance, are the Southern ethnic group that benefits least from oil prices in terms of education, but most in terms of probability of working. Within the Northern groups, our regressions suggest the Fulani are the most comparatively disadvantaged group when oil prices increase. For all outcomes, including height, they perform worse than the Hausa. As for other Northern ethnic groups, women born in years of higher prices marry later and have fewer children compared to the Hausa.

5. Mechanisms

In this section we test between possible mechanisms through which early life increases in the oil price might affect outcomes for Southern ethnic groups relative to Northerners.

5.1. **Selective survival.** A possible explanation for our negative results on height and weight is selective survival. For instance, if higher oil prices were associated with lower mortality, this could be consistent with more investments being made in children. Higher oil prices might also differentially increase the likelihood that children born to deprived mothers survive their first year of infancy. The DHS births recode data record information on all

births experienced by mothers in our sample, and indicate whether these children died during the first year of life. We test whether oil prices predict selective mortality using equation (1), except that our outcome of interest is now whether the child died in its first year of life and the moving average of the oil price is measured in the year the child was born. The sample includes all past births to women in our baseline data. In addition to our baseline controls, we control for mother age and mother age squared. Results are reported in Table 7.

We find limited evidence that mortality for children of women of Southern ethnic groups changes relative to the North in years of higher oil prices. In some specifications, relative southern mortality rises significantly in response to higher oil prices, but this is only apparent when we interact oil prices with individual observable characteristics. When we interact the shock with whether the child's mother has a skilled occupation, we obtain a negative coefficient on the interaction, but it is insignificant. Re-estimating these results separately for male and female children, we find that any significance we find is driven by girls, not boys (not reported). We do not find evidence that the effect of oil prices is mediated by the schooling or skilled occupation of a woman's partner (not reported). Overall, mortality and selective mortality only appear to be minor explanations for our main results.

5.2. **Selective fertility.** Oil prices could also be associated with changes in fertility patterns. In periods of higher oil prices, better family conditions could lead to more children being born, possibly leading to lower investment per child. As was the case for mortality, there is also the possibility that fertility decisions are related to oil prices in different ways for more deprived women. The DHS births recode registers the year of birth of every child ever born to the women in the sample. We create an artificial panel of women that has one observation for each fertile year of each woman's life, with the years of fertility being defined as those between the ages of 16 and 45. We generate a dummy variable for birth, which takes the value of one if a woman had a child that year and zero otherwise. We test whether oil prices predict selective fertility using equation (1), except that our outcome of interest is now whether a woman had a child in a year and the oil price is measured in that year. We

control for a set of mother level characteristics that include our baseline controls as well as age and age squared. Results are reported in Table 7.

There is strong evidence that fertility is higher in years of higher oil prices for women of Southern ethnicities. A one standard deviation increase in our indicator of oil prices results in a more than 3% increase in the proportion of women from the South having children in that year, a substantial increase on the base probability of 22%. When we interact the oil price shock with being literate or having completed primary school, the interaction effect is negative, but mostly always insignificant at the 5% level. When the interaction is with having a skilled occupation, the interaction effect is significant but small. We do not find evidence that the effect of oil prices is mediated by the schooling or skilled occupation of a woman's partner (not reported). In response to a one standard deviation increase in our oil price indicator, a skilled Southern woman is slightly less likely to have a child than an unskilled woman. It is clear, then, that fertility responds to oil prices and may help explain our results. It is not evident that heterogeneous response to oil prices creates selective fertility that could further explain our main results.

5.3. **Violence.** Another possible explanation for our adverse weight and BMI results is that violence decreases in the North relative to the South during periods of higher oil prices. Conflict is known to have adverse long-run effects on exposed children (Akresh et al., 2012; Bundervoet et al., 2009). To study this question, we use data from the Armed Conflict Location and Event Data (ACLED) Project, which registers information on the specific dates and locations of political violence by type from 1997 to the present. We assign each event to a state of Nigeria, and then run a regression of the following form:

$$\begin{aligned} Events_{it} =& \alpha + \beta \ln(RealOilPrice_t)_{MA(3)} \times SouthState_i + \gamma Events_{it-1} \\ &+ \phi_t + \eta_i + \eta_i \times t + e_{it}. \end{aligned} \tag{3}$$

Here, $Events_{it}$ are the number of events that occur in state i in period t, $SouthState_i$ is a dummy variable for being a state of the Nigerian South, ϕ_t and η_i are year and state fixed effects, and $\eta_i \times t$ is a state time trend. In Table 8, we report results for all conflicts and for each specific type of conflict in the ACLED data. Overall we find evidence for increased conflict in Southern states in years in which oil prices are higher. In particular, we see significantly more battles and violence against civilians in years with higher oil prices, and no significant increase in riots and protests. The bulk of these increases in conflict in Southern states occur within the Delta-producing oil region. These results are robust to using using the log of violent events and using a Poisson estimator. Our results are not sensitive to the inclusion of lag conflict.

5.4. **Agriculture.** The existing literature emphasizes the negative effect of oil production on food security in Nigeria. During the oil boom, the share of agriculture in GDP fell dramatically, and food prices rose (Sala-i-Martin and Subramanian, 2013). The cost of food rose relative to non-food goods by 170% between 1968 and 1979, to the particular benefit of larger farmers who were surplus producers (Collier, 1983). Food production could not keep pace with urban demand (Scherr, 1989). Indeed, Collier (1988) estimates that food production per capita declined during the oil boom as government spending diverted labor out of agriculture. The small fraction of government spending that was directed at agriculture was targeted towards programs such as government plantations that benefitted richer farmers (Collier, 1983). Food imports rose with oil prices, propelled by real exchange rate appreciation and urbanization, while the agricultural sector was further harmed by erratic policies towards imports, pricing, and marketing (Freund, 1978; Pinto, 1987). Nominal exchange rates were kept constant on the belief that cheap imports would help preserve political stability by benefitting urban elites (Scherr, 1989; Watts, 2013).

We provide additional evidence for this mechanism using data from FAOSTAT. The FAO reports the Gross Production Value of food in Nigeria in constant 2004-2006 international dollars. We normalize this by population, also taken from the FAO. We show that Nigerian food production is negatively correlated with oil prices by estimating the following:

$$log(PerCapitaFoodProduction_t) = \alpha + \beta \ln(RealOilPrice_t)_{MA(3)} + \gamma year_t + \delta year_t^2 + \epsilon_t.$$

Variables are as defined above. We use ordinary least squares with robust standard errors in our baseline. Results are similar with Newey-West standard errors, or if we use a linear rather than a quadratic time trend. We report our results and plot both time series in Figure 3. The elasticity of per capita food production in response to oil prices is roughly -0.227. As in Collier (1988), this suggests that food production declined dramatically during the oil boom. Though our data do not allow us to show whether this response was greater in the South, Scherr (1989) argues that the effect of oil was greater on Southern agriculture, due to the particular labor intensiveness of root and tree crop production, the higher wages in oil and related urban sectors in this region, and the collapse of export markets for Southern agricultural exports.

Additional results support this interpretation. We show in Table A7 in the Appendix that, if we estimate (1) treating urban residence as the dependent variable rather than as a control, Southern individuals born in years of higher oil prices are relatively more likely to live in an urban area. Further, we will show below that Southern men are relatively less likely to work in agriculture when oil prices rise. Our finding is consistent with claims made in the secondary literature, and can help explain the adverse effects we find on health outcomes despite other indicators that are consistent with greater Southern incomes during times of high oil prices.

5.5. **Investments.** In this section we consider the direct evidence for there being greater investments made in children born in years of higher oil prices, by looking at investments in child health and household circumstances. For child health, the DHS asks mothers a set of questions about their children aged five and under. Aggregating data for the three waves of the DHS for which information on ethnicity is available (1999, 2003 and 2008) we have information available for a series health interventions for children born from 1996 to 2008. We use the specification in (1). Results are reported in Table 9.

There is mixed evidence that higher oil prices result in relatively fewer investments in child health by mothers of Southern ethnic groups. Higher oil prices result in more doses of the polio vaccine, but the incidence of other vaccinations falls. The anomalous result for polio may reflect both the degree to which polio vaccination has been encouraged by mass immunization campaigns and the resistance of political and religious leaders in Northern Nigeria to polio immunization after 2003 (Jegede, 2007). There is a positive correlation between our shock and the duration of breastfeeding, and a negative and insignificant correlation with the likelihood of having a doctor assist delivery or a prenatal doctor's visit. Re-estimating these results separately for male and female children, we find similar patterns for girls and boys (not reported).

To look at how the relative circumstances of Southern women of child-bearing age respond to oil prices, we use the individual recode data from the DHS, similarly aggregated across the three waves for which ethnicity is available. Using the same approach as in our main results, we ask how household circumstances change contemporaneously with oil prices in the three years we have available. Results are reported in Table 10. We find that Southern households have relatively better living conditions, as measured by greater access to electricity and reduced probability of having an earth floor. We also find that women are more likely to work in the South in years of higher oil prices. Women's partners, by contrast, are relatively less likely to work on a farm in the south, either as a laborer or in self-employment. Together, these results suggest a mixed pattern. Although the relative living standards of southern households improve with higher oil prices, greater labor time outside the home reduces time with children and some investments in children. Less direct work in agriculture is consistent with the more general relative decline of southern agriculture suggested by the secondary literature.

5.6. **Distribution of oil revenues and political economy.** We test for the effects of the distribution of oil revenues and political economy in four ways. First, we see how public investments, specifically the construction of schools and hospitals, respond to changes in oil prices. To analyze this, we take data on the number of primary and secondary schools,

primary and secondary school enrolment, hospital beds and the number of hospitals by state from the Nigerian Annual Abstract of Statistics. These series do, however, contain several gaps. We have been unable to find statistics for the period 1981-3 for our series of interest, and information about health establishments and hospital beds is unavailable during the 1980s. Further, we make the data consistent across time by aggregating the state level data to conform to the states that existed in 1976. In that year, there were 19 states, as opposed to the 36 in existence today. Our regression equations are of the following form:

$$\begin{aligned}(4) \qquad \ln(Outcome_{it}) =& \alpha + \beta \ln(RealOilPrice_t)_{MA(3)} \times SouthState_i + \gamma \ln(Outcome_{it-1}) \\ &+ \phi_t + \eta_i + \eta_i \times t + e_{it}\end{aligned}$$

Here, the dependent variable is the log of the outcome of interest in state i in year t and the variable of interest is the log of the three year moving average of the oil price interacted with a dummy variable for being a Southern State. We control for the lag of the log outcome, state fixed effects, year fixed effects, and state trends. Results are similar if the lag is omitted (not reported). Because of the long panel, the Nickell (1981) bias should be small in our context. Results are also similar if $\ln(Outcome_{it})$ is replaced by its first difference (not reported). Standard errors are clustered by state. As can be seen in Table 11, the number of primary schools and primary school enrolment is relatively lower in the South in years of higher oil prices, with all other effects being insignificant. A 10% increase in oil prices lowers primary enrolment by 2.1% and the number of primary schools by 1.5% in the South relative to the north.

Second, we extend the results in Table 11 by considering whether the concentration of population and economic activity together proxied by nighttime lights increases more in Southern states than in Northern ones when oil prices rise. Our dependent variable becomes the natural log of luminosity in state i in year t. We also add an additional term

$\ln(RealOilPrice_t)_{MA(3)} \times DeltaState_i$, as greater oil production in the Delta might mechanically affect luminosity. We find that economic activity does differentially increase in the South in years of higher oil prices, although not in the Delta region.

Third, we follow Kudamatsu (2012) and ask if the differential benefits of higher oil revenues are observed only during periods when Nigeria is a democracy. To test this, we interact our variable of interest with the Polity 2 score for Nigeria taken from the Center for Systemic Peace website. The estimating equation now includes a triple interaction term of the oil price, membership of a Southern ethnic group and Polity 2 Score. We also report a similar test using a dummy variable that takes the value of one if Nigeria is a democracy (Polity 2 Score greater than zero) and zero if not.

$$
\begin{aligned}
(5) \qquad Outcome_{igt} =& \beta_1 \ln(RealOilPrice_t)_{MA(3)} \times SouthEthnicity_g \\
&+ \beta_2 \ln(RealOilPrice_t)_{MA(3)} \times SouthEthnicity_g \times Polity_t \\
&+ x'_{it}\gamma + \phi_t + \eta_g + \eta_g \times t + e_{igt}
\end{aligned}
$$

As reported in Table 12, we find that the coefficient on the triple interaction is significant and has the opposite sign from the double interaction for all outcomes except height and BMI. The magnitude of the effect depends on the outcome: moving from autocracy to democracy reduces the effect of oil prices by less than 1% for the probability of working but by around 17% for fertility, with other results lying between these two extremes.

Finally, we test whether being a member of the ethnic group in power during the year a woman was born improves her later-life outcomes. To do this, we interact oil prices with a dummy that takes the value of 1 if the woman shares an ethnic group with the President in power in the year she was born, and include the interaction term in our estimating equation. We also include the triple interaction of log of the moving average of price, South ethnicity, and power:

$$
\begin{aligned}
(6)\quad Outcome_{igt} =& \beta_1 \ln(RealOilPrice_t)_{MA(3)} \times SouthEthnicity_g \\
&+ \beta_2 \ln(RealOilPrice_t)_{MA(3)} \times PowerEthnicity_{gt} \\
&+ \beta_3 \ln(RealOilPrice_t)_{MA(3)} \times PowerEthnicity_{gt} \times SouthEthnicity_g \\
&+ x'_{it}\gamma + \phi_t + \eta_g + \eta_g \times t + e_{igt}
\end{aligned}
$$

As reported in Table 12, we show that sharing an ethnic group with the President attenuates the beneficial effects of oil prices and worsens the negative effects, except for age at first marriage for which we find no significant interaction. This is in contrast with our results for the South which are generally positive with the exception of height and BMI. However, the coefficients are considerably smaller in size, being 6% to 25% of the value of those for belonging to a Southern ethnic group in absolute magnitude. The triple interaction term is insignificant except for the height outcome, where if the President is of a Southern ethnic group the baseline negative effect on height is largely eliminated.

6. Conclusion

In this paper, we have used a difference-in-difference approach to show that higher oil prices in an individual's year of birth predict more years of education, more likelihood to have a skilled occupation, shorter heights, higher BMI, later marriage, lower fertility and higher likelihood of working for women that belong to Southern ethnic groups relative to Northern groups from the same birth cohort. We also show that women of Southern ethnic groups are relatively more likely to have children in years of higher oil prices. The magnitudes of these effects are broadly in line with those found in similar early-life studies. Results are robust to different specifications of oil prices and disaggregating ethnicity, to excluding years of low oil production and very high oil prices, and to accounting for age heaping.

We interpret our results as consequences of the economic transformations that follow income gains for Southerners when oil prices are high. We find households in the South are relatively better off in periods of higher oil prices, but reduce some investments in their

children. This is consistent with an increase in women's working time and the movement of men out of agriculture. These mechanisms are also highlighted in the secondary literature (e.g. Bevan et al. (1999); Collier (1983)) that has stressed a greater transition away from agriculture in Southern Nigeria during the first and second oil booms than in the North. As southern households have responded to their changing circumstances, we have found limited evidence that our results are driven by selective mortality. For fertility, we find skilled Southern women are slightly less likely to have children in periods of high oil prices compared to unskilled Southern women. Overall, the relative fertility of Southern women increases. We find little evidence that our results are driven by improvements in public services. We find less construction of primary schools and lower primary enrolment, as well as more conflict in Southern states faced with a positive oil price shock. We also find the magnitude of our results is reduced when Nigeria is more democratic, and that ethnic groups in power benefit less from higher oil prices.

Our interpretation of our results is limited by the data available. With regard to both public and household investments, the data only cover portions of the period of interest. Still, our research contributes to the literature by combining several different approaches. Other studies have used commodity price shocks as means of identifying the consequences of changes in early life circumstances. To our knowledge ours is the first study that considers the interaction of ethnic politics with natural resource revenues, and traces their consequences at the individual level over the longer run.

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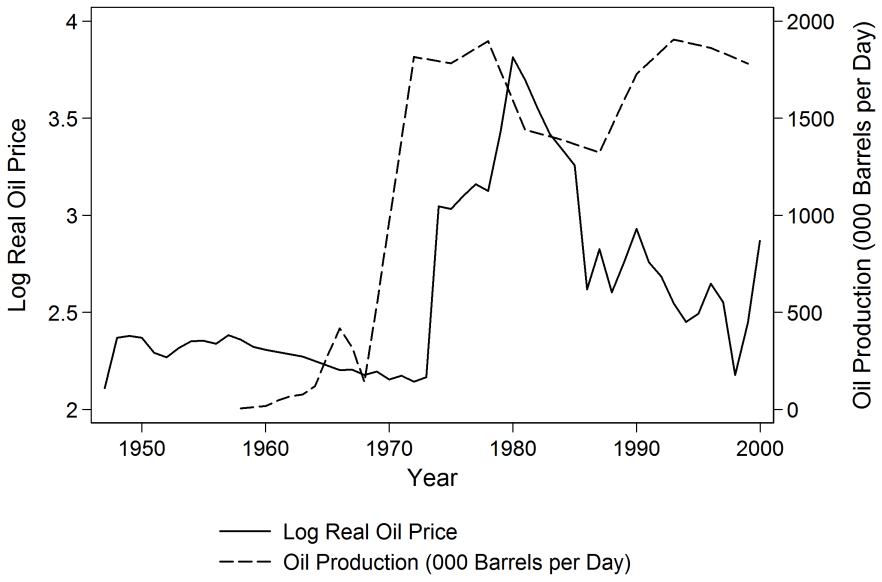

FIGURE 1. The Real Oil Price and Nigerian Oil Production

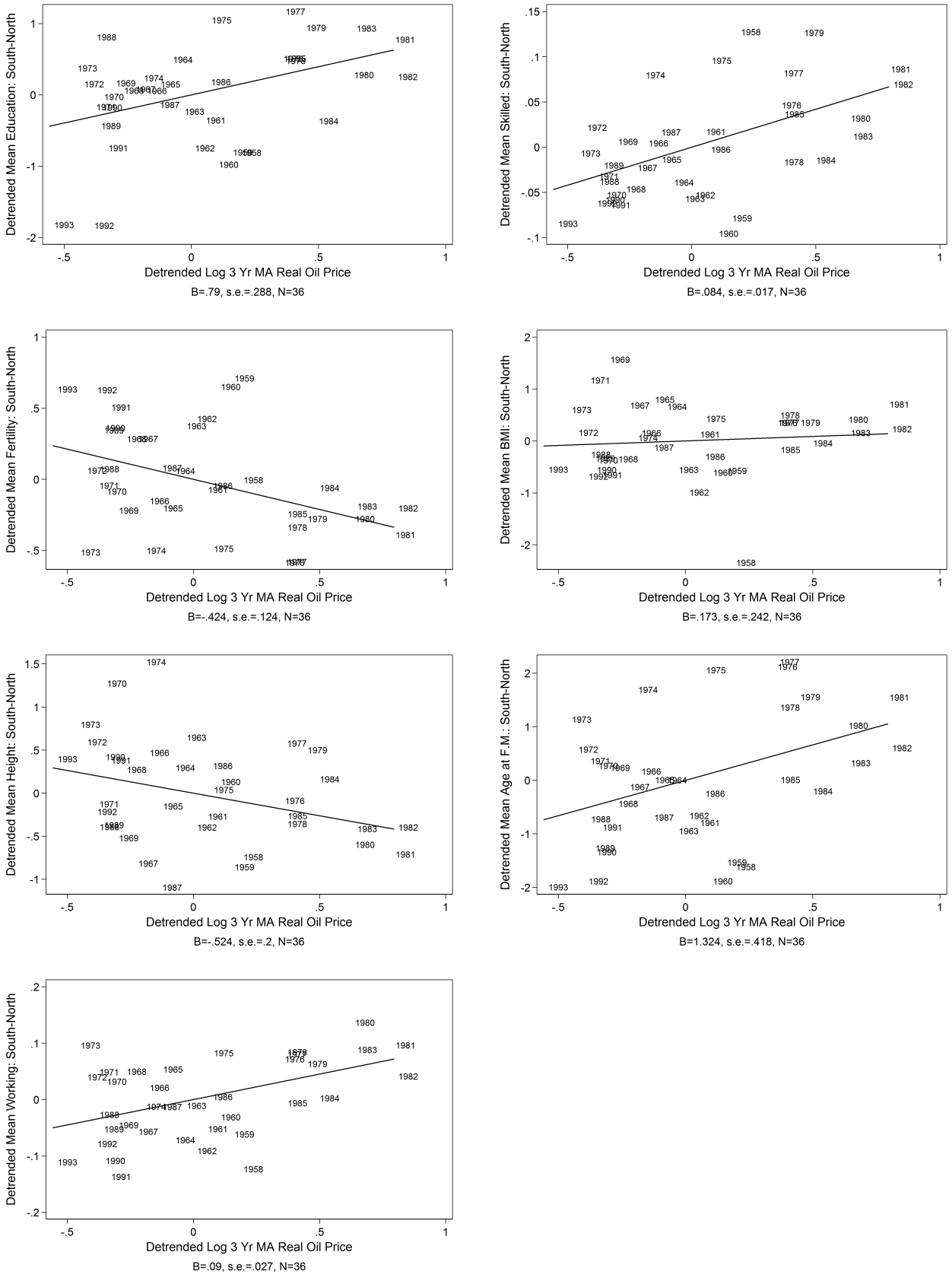

FIGURE 2. Results collapsed to annual means

B and s.e. refer to the coefficient and standard error on the log real oil price in a regression of the outcome listed on the y axis on the detrended three year moving average of the log real oil price, with robust standard errors. N is the sample size.

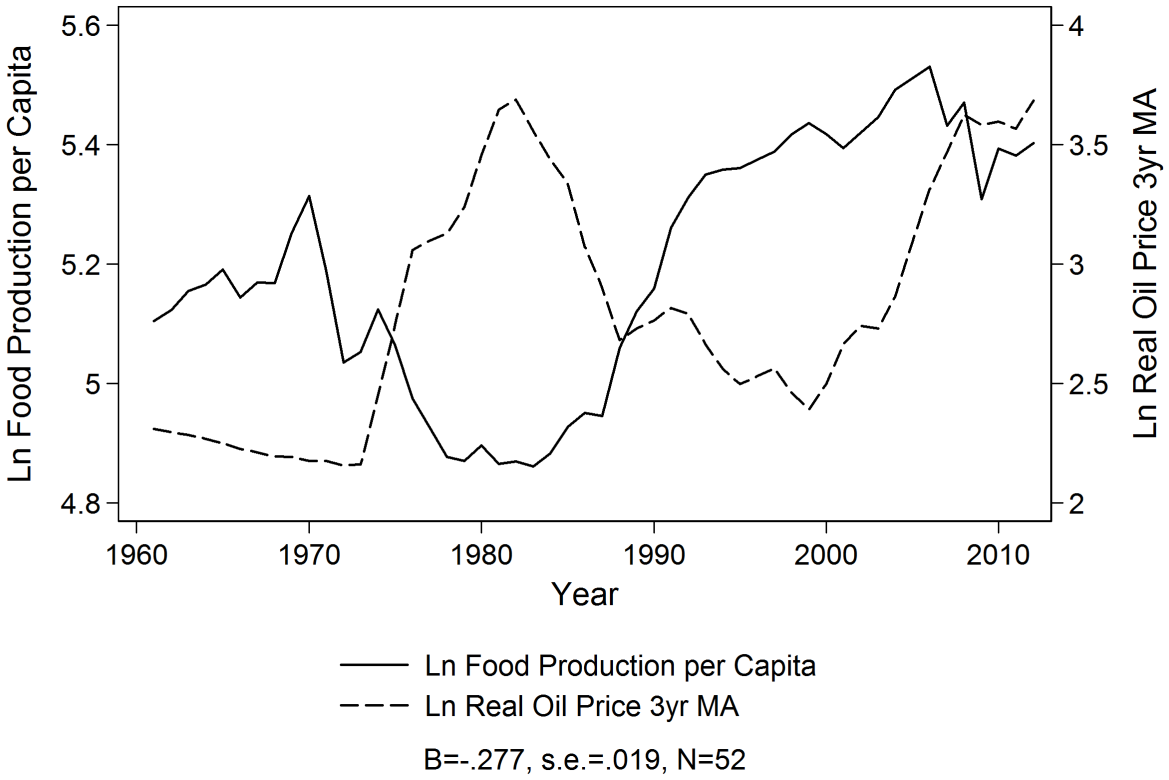

FIGURE 3. Food Production Per Capita

B and s.e. refer to the coefficient and standard error on the log real oil price in a regression of log per capita food production on the three year moving average of the log real oil price and a quadratic in year, with robust standard errors. N is the sample size.

Table 1: Summary Statistics

	Whole Sample			*Southern Ethnic Groups*		
	Mean	s.d	N	Mean	s.d	N
Age	28.648	9.493	33385	28.620	9.536	14169
Urban	0.314	0.464	33385	0.447	0.497	14169
Head female	0.169	0.375	33385	0.278	0.448	14169
Non muslim	0.537	0.499	33385	0.857	0.350	14169
Education in Years	5.596	5.323	33353	8.999	4.363	14162
Skilled Occupation	0.161	0.368	33385	0.207	0.405	14169
Total children ever born	3.139	3.080	33385	2.399	2.681	14169
BMI	22.698	5.435	32462	23.552	5.646	13873
Height in cm	157.579	7.545	32488	158.581	7.363	13884
Age at first marriage	17.541	4.578	25364	20.246	4.929	8869
Currently working	0.587	0.492	33132	0.649	0.477	14052

Table 2: Main Results

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
Shock	0.849***	0.0737***	-0.469***	0.415***	-0.573***	0.681***	0.106***
	(0.145)	(0.0109)	(0.0940)	(0.146)	(0.166)	(0.135)	(0.0211)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price in an individual's year of birth with an indicator for Southern ethnicity, unless otherwise indicated.

Table 3: Years of Education: Sensitivity to Controls

	(1)	(2)	(3)	(4)	(5)
	Dependent variable: Years of Education				
Shock	2.078***	1.146***	1.609***	0.728***	0.849***
	(0.228)	(0.151)	(0.153)	(0.207)	(0.145)
Observations	33,202	33,041	33,041	33,041	33,041
Ethnic F.E.	No	No	Yes	Yes	Yes
Y.O.B. F.E	No	No	No	Yes	Yes
Controls	No	Yes	Yes	Yes	Yes
Ethnic Trends	No	No	No	No	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price in an individual's year of birth with an indicator for Southern ethnicity, unless otherwise indicated.

Table 4: Robustness

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
	Panel A: Removing observations before 1970						
Shock	0.767***	0.0641***	-0.371***	0.382**	-0.679***	1.243***	0.0907***
	(0.134)	(0.0101)	(0.0833)	(0.172)	(0.141)	(0.178)	(0.0201)
Observations	26,679	26,706	26,706	25,965	25,987	18,792	26,500
	Panel B1: Removing two highest oil prices						
Shock	0.932***	0.0699***	-0.466***	0.346*	-0.455**	0.550***	0.0922***
	(0.156)	(0.0101)	(0.0986)	(0.180)	(0.213)	(0.156)	(0.0227)
Observations	30,749	30,779	30,779	29,940	29,963	23,099	30,542
	Panel B2: Removing four highest oil prices						
Shock	1.020***	0.0796***	-0.567***	0.283	-0.342	0.871***	0.0836***
	(0.171)	(0.00986)	(0.149)	(0.181)	(0.278)	(0.189)	(0.0188)
Observations	27,471	27,499	27,499	26,724	26,746	20,395	27,283
	Panel C1: Removing possible age heaping						
Shock	1.040***	0.0911***	-0.573***	0.403**	-0.535***	0.781***	0.123***
	(0.168)	(0.0150)	(0.104)	(0.174)	(0.181)	(0.206)	(0.0213)
Observations	23,361	23,379	23,379	22,733	22,751	16,608	23,199
	Panel C2: Grouping into age bins						
Shock	0.981***	0.0727***	-0.530***	0.435***	-0.546***	0.639***	0.104***
	(0.167)	(0.0112)	(0.0999)	(0.126)	(0.175)	(0.148)	(0.0227)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
	Panel D1: Use log of price						
Shock	0.800***	0.0747***	-0.467***	0.423***	-0.440***	0.979***	0.101***
	(0.142)	(0.0101)	(0.0907)	(0.139)	(0.152)	(0.106)	(0.0192)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
	Panel D2: Use level of price						
Shock	0.0360***	0.00340***	-0.0214***	0.0215***	-0.0211***	0.0432***	0.00499***
	(0.00658)	(0.000500)	(0.00394)	(0.00593)	(0.00694)	(0.00428)	(0.000891)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price in an individual's year of birth with an indicator for Southern ethnicity, unless otherwise indicated.

Table 5: Religion

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
PriceXSouth	0.829***	0.0782***	-0.343***	0.397**	-0.886***	0.597**	0.141***
	(0.171)	(0.0100)	(0.0677)	(0.165)	(0.214)	(0.276)	(0.0266)
PriceXNonMuslim	0.282*	-0.0291***	-0.333***	0.181*	-0.0103	0.258	0.0156
	(0.161)	(0.00849)	(0.0553)	(0.103)	(0.175)	(0.245)	(0.0173)
PriceXNonMuslimXSouth	-0.161	0.0137***	0.0669	-0.0975	0.384***	-0.0808	-0.0518***
	(0.155)	(0.00489)	(0.0408)	(0.0737)	(0.0927)	(0.0702)	(0.00802)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. "Price" refers to the three year moving average of the log real oil price in an individual's year of birth, unless otherwise indicated.

Table 6: Disaggregated Ethnicity

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
PriceXHausa Omitted							
PriceXOther South	0.736***	0.113***	-0.730***	0.813***	-0.393	1.300***	0.0893***
	(0.224)	(0.0199)	(0.105)	(0.283)	(0.651)	(0.317)	(0.0228)
PriceXYoruba	0.607***	0.0753***	-0.445***	0.108***	-0.646***	0.898***	0.157***
	(0.0246)	(0.00141)	(0.0145)	(0.0206)	(0.0217)	(0.156)	(0.00253)
PriceXIgbo	1.116***	0.0617***	-0.690***	0.534***	-0.175***	0.571***	0.0824***
	(0.0241)	(0.00181)	(0.0173)	(0.0239)	(0.0458)	(0.159)	(0.00251)
PriceXDelta	0.834***	0.0581*	-0.597***	0.670***	-0.839***	0.760**	0.0924***
	(0.0899)	(0.0301)	(0.0570)	(0.127)	(0.245)	(0.298)	(0.0163)
PriceXFulani	-0.255***	-0.0276***	0.131***	0.140***	-0.0975***	-0.206***	-0.00802***
	(0.0152)	(0.00176)	(0.00492)	(0.0112)	(0.0174)	(0.00656)	(0.00214)
PriceXOther North	0.0255	0.000297	-0.255***	0.0165	0.113	0.327**	0.0131
	(0.109)	(0.00912)	(0.0652)	(0.133)	(0.183)	(0.145)	(0.0133)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. "Price" refers to the three year moving average of the log real oil price in an individual's year of birth, unless otherwise indicated.

Table 7: Selective Mortality and Fertility

	(1)	(2)	(3)	(4)
	Panel A: Mortality. Dependent Variable: Child Died in Year			
Shock	0.0103	0.0131**	0.00883	0.0111*
	(0.00633)	(0.00631)	(0.00622)	(0.00643)
Shock X Primary		-0.00363		
		(0.00393)		
Shock X Literacy			0.00268	
			(0.00196)	
Shock X Skilled				-0.00427***
				(0.00146)
Observations	103,030	103,030	103,030	103,030
Mother Controls	Yes	Yes	Yes	Yes
Child Controls	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes
Y.O.B. FE	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes
	Panel B. Fertility. Dependent Variable: Child Born in Year			
Shock	0.0677***	0.0691***	0.0681***	0.0690***
	(0.00432)	(0.00454)	(0.00454)	(0.00461)
Shock X Primary		-0.00189		
		(0.00214)		
Shock X Literacy			-0.000839	
			(0.00150)	
Shock X Skilled				-0.00663**
				(0.00261)
Observations	436,666	436,666	436,666	436,666
Mother Controls	Yes	Yes	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes
YOB FE	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Mother controls are years of education, literacy, region of residence, religion, ethnicity, age, age squared, urban, household size and female head. Child controls are gender, twin, and preceding birth interval. All regressions include a constant. The “shock'” is the interaction of the three year moving average of the log real oil price with an indicator for Southern ethnicity, unless otherwise indicated.

Table 8: Conflict

	(1)	(2)	(3)	(4)
	Panel A1: OLS: Dependent Variable: All Conflicts		Panel A2: OLS: Dependent Variable: Battles	
Shock	19.42**	22.63***	8.435**	11.06**
	(7.268)	(7.563)	(3.385)	(4.661)
Observations	555	518	555	518
	Panel A3: OLS: Dependent Variable: Civilian Violence		Panel A4: OLS: Dependent Variable: Riots	
Shock	8.823**	11.35**	1.087	1.584
	(3.576)	(4.286)	(1.264)	(1.681)
Observations	555	518	555	518
	Panel B: OLS: Log of All Conflicts		Panel C: Poisson: Dependent Variable: All Conflicts	
Shock	2.410***	3.730***	4.594***	4.995***
	(0.728)	(1.018)	(0.933)	(0.982)
Observations	418	322	555	518
Year F.E.	Yes	Yes	Yes	Yes
State F.E.	Yes	Yes	Yes	Yes
State Trends	Yes	Yes	Yes	Yes
Lag	No	Yes	No	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by state in parentheses. All regressions are OLS unless otherwise noted. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price with an indicator for Southern state, unless otherwise indicated.

Table 9: Investments in Children

	(1)	(2)	(3)	(4)	(5)
	Early-life Investments (Child Recode)				
	No. of Polio doses received	No. of DPT doses received	Received Measles Vaccination	No. of Total Vaccinations	Duration of Breastfeeding
Shock	0.594***	-0.621***	-0.437***	-0.444*	5.860***
	(0.144)	(0.0907)	(0.0571)	(0.244)	(0.837)
Observations	33,038	32,899	32,782	32,526	31,728
	Antenatal and At-birth Investments (Child Recode)				
	Prenatal Doctor Visit	BCG Vaccination	Home Delivery	Attended Delivery	
Shock	-0.0505	-0.105***	-0.0260	-0.0352	
	(0.0475)	(0.0394)	(0.0516)	(0.0420)	
Observations	22,877	32,955	33,128	32,873	
Additional Regressors	Y.O.B & Ethnic Fixed Effects; Ethnic Trends; Controls				

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Mother controls are years of education, literacy, region of residence, religion, ethnicity, age, age squared, urban, household size and female head. Child controls are gender, twin, age at survey and preceding birth interval. All regressions include a constant. The “shock’” is the interaction of the three year moving average of the log real oil price in an individual's year of birth with an indicator for Southern ethnicity, unless otherwise indicated.

Table 10: Contemporary Effects of Oil Prices

	(1)	(2)	(3)	(4)	(5)
	Partner works on farm	Earth Floor	Has Electricity	Weight	Working
Shock	-0.744***	-0.438**	0.451***	4.426	0.778***
	(0.0984)	(0.169)	(0.156)	(4.456)	(0.102)
Observations	36,177	49,712	49,510	42,422	50,218
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes
Year F.E	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The "shock" is the interaction of the three year moving average of the log real oil price in the survey year with an indicator for Southern ethnicity, unless otherwise indicated.

Table 11: Oil Prices and Public Investment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Primary		Secondary		Health		
	Schools	Enrolment	Schools	Enrolment	Establishments	Beds	ln(Luminosity)
Shock	-0.152**	-0.227**	0.0450	0.0111	-0.105	0.00268	0.339**
	(0.0574)	(0.0985)	(0.0528)	(0.0611)	(0.117)	(0.0908)	(0.156)
Delta Shock							-0.360
							(0.227)
Observations	408	408	396	396	156	156	612
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by region in parentheses. All regressions are OLS and outcomes are in logs. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price in the survey year with an indicator for being a Southern state, unless otherwise indicated. The “Delta shock” is the interaction of the three year moving average of the log real oil price in the survey year with an indicator for being a Delta state.

Table 12: Political Economy

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M	(7) Working
	Panel A1: Interaction with Polity 2 Score						
Shock	1.274***	0.0947***	-0.790***	0.535***	-0.391**	1.810***	0.127***
	(0.219)	(0.0109)	(0.152)	(0.150)	(0.191)	(0.291)	(0.0239)
ShockXPolity2	-0.0153***	-0.000760***	0.0115***	-0.00406	-0.00643	-0.0273***	-0.000724**
	(0.00369)	(0.000183)	(0.00245)	(0.00321)	(0.00597)	(0.00649)	(0.000279)
Observations	32,443	32,474	32,474	31,588	31,613	24,500	32,229
	Panel A2: Interaction with Democracy						
Shock	1.245***	0.0886***	-0.808***	0.570***	-0.412**	1.674***	0.128***
	(0.225)	(0.0105)	(0.163)	(0.160)	(0.206)	(0.316)	(0.0252)
ShockXDemocracy	-0.165***	-0.00621**	0.141***	-0.0643	-0.0670	-0.334***	-0.00902**
	(0.0425)	(0.00273)	(0.0340)	(0.0477)	(0.0732)	(0.0937)	(0.00396)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
	Panel B: Interaction with Ethnicity in Power						
Shock	0.848***	0.0719***	-0.465***	0.463***	-0.614***	0.655***	0.101***
	(0.145)	(0.0104)	(0.0966)	(0.151)	(0.177)	(0.134)	(0.0177)
ShockXPower	-0.0653***	-0.00448***	0.0408**	0.0998***	-0.145***	-0.0170	-0.00748***
	(0.0193)	(0.00170)	(0.0161)	(0.0282)	(0.0263)	(0.0298)	(0.00263)
ShockXPowerXSouth	-0.0319	0.00552	0.00489	-0.154**	0.101	0.0705	0.0176**
	(0.0943)	(0.00554)	(0.0564)	(0.0612)	(0.0631)	(0.232)	(0.00878)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price in an individual's year of birth with an indicator for Southern ethnicity, unless otherwise indicated.

Appendix A. Not for publication

Table A1: Shocks before birth

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
Shock	1.365**	0.195***	-1.053***	1.105**	-0.970	2.338***	0.202***
	(0.529)	(0.0410)	(0.315)	(0.461)	(0.666)	(0.496)	(0.0494)
Shock Lag 1	-1.107	-0.154**	0.672	-0.744	1.955	1.288	-0.135
	(0.925)	(0.0656)	(0.440)	(0.784)	(1.241)	(0.877)	(0.0845)
Shock Lag 2	0.642	0.0255	-0.0462	-0.00517	-1.790**	-3.967***	0.0362
	(0.610)	(0.0364)	(0.224)	(0.454)	(0.841)	(0.641)	(0.0512)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price in an individual's year of birth with an indicator for Southern ethnicity, unless otherwise indicated.

Table A2: Shock is declining price

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
Shock	-0.384***	-0.0462***	0.324***	-0.282**	-0.103	-1.398***	-0.0497***
	(0.0781)	(0.00736)	(0.0594)	(0.115)	(0.174)	(0.153)	(0.0106)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is an indicator for whether the three year moving average of the log real oil price declined in an individual's year of birth interacted with an indicator for Southern ethnicity, unless otherwise indicated.

Table A3: Shock is change in price

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
Shock	2.727***	0.513***	-3.015***	2.971***	1.503	14.56***	0.470***
	(0.902)	(0.0812)	(0.584)	(0.911)	(1.743)	(1.819)	(0.0935)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the percentage change in the three year moving average of the log real oil price in an individual's year of birth interacted with an indicator for Southern ethnicity, unless otherwise indicated.

Table A4: Control for weather

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
Shock	0.844***	0.0705***	-0.448***	0.386***	-0.571***	0.644***	0.102***
	(0.149)	(0.0107)	(0.0917)	(0.146)	(0.160)	(0.137)	(0.0206)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Weather shocks	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price in an individual's year of birth with an indicator for Southern ethnicity, unless otherwise indicated.

Table A5: North Only

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
Shock	0.0631	0.0391***	0.0929	0.156**	1.273***	0.356***	0.0759***
	(0.0690)	(0.00585)	(0.0643)	(0.0690)	(0.0995)	(0.0687)	(0.00797)
Observations	18,919	18,943	18,943	18,333	18,347	16,247	18,809
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	No	No	No	No	No	No	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the three year moving average of the log real oil price in an individual's year of birth.

Table A6: Additional Robustness

	(1) Education	(2) Skilled	(3) Fertility	(4) BMI	(5) Height	(6) Age at F.M.	(7) Working
Panel A: Fixed effects for ten-year bins X South Ethnicity							
Shock	0.734***	0.0520***	-0.284***	0.181	-0.738**	-0.619*	0.0537**
	(0.268)	(0.0169)	(0.0828)	(0.221)	(0.339)	(0.347)	(0.0227)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Panel B: Fixed effects for five-year bins X South Ethnicity							
Shock	0.504***	0.0424**	-0.0649	0.0137	-0.291	0.436**	0.0432**
	(0.149)	(0.0184)	(0.0902)	(0.337)	(0.326)	(0.202)	(0.0209)
Observations	33,041	33,072	33,072	32,168	32,193	25,096	32,823
Panel C: Replace oil price with export value							
Shock	0.454***	0.0387***	-0.315***	0.306***	-0.0659	1.023***	0.0581***
	(0.0760)	(0.00495)	(0.0501)	(0.0531)	(0.0878)	(0.119)	(0.0101)
Observations	32,443	32,474	32,474	31,588	31,613	24,500	32,229
Panel D: Replace oil price with petroleum rents							
Shock	0.00230***	0.000368***	-0.00181***	0.00217**	-0.00236**	0.00731***	0.000464***
	(0.000680)	(7.52e-05)	(0.000414)	(0.000924)	(0.00100)	(0.00103)	(9.07e-05)
Observations	25,385	25,412	25,412	24,703	24,724	17,525	25,213
Panel E: Deflate oil price by Nigerian CPI							
Shock	0.779***	0.0606***	-0.437***	0.368***	-0.404***	1.383***	0.0902***
	(0.134)	(0.00849)	(0.0813)	(0.120)	(0.110)	(0.147)	(0.0170)
Observations	31,465	31,496	31,496	30,629	30,654	23,526	31,262
Ethnic F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Y.O.B. F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethnic Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for urban residence, female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the interaction of the three year moving average of the log real oil price in an individual's year of birth with an indicator for Southern ethnicity, unless otherwise indicated.

Table A7: Additional Results

	(1) Urban
Shock	0.0368***
	(0.00867)
Observations	33,072
Ethnic F.E.	Yes
Y.O.B. F.E	Yes
Controls	Yes
Ethnic Trends	Yes

*** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered by ethnicity in parentheses. All regressions are OLS. Controls are dummy variables for female household head, region of residence, religion and survey month. All regressions include a constant. The “shock” is the three year moving average of the log real oil price in an individual's year of birth interacted with Southern ethnicity.