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SIZE MATTERS: THE EFFECT OF THE SCRAMBLE FOR AFRICA ON INFORMAL INSTITUTIONS AND DEVELOPMENT

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Size Matters: The Effect of the Scramble for Africa on Informal Institutions and Development

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Abstract

We argue that the partition of ethnic groups following the Scramble for Africa does not itself matter for development in Africa. It matters only when the partitioned groups are relatively small because small groups lack political representation which may promote ethnic mobilization and foster support for informal (rather than formal) institutions which then may affect development. Furthermore, the analysis of data from the Afrobarometer shows that the persistence of informal/tribal institutions related to property rights and the rule of law is one of the possible channels through which the size of the partitioned group affects development

Keywords: Partition; Ethnic Groups; Institutions; Development

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1 Introduction

In the last few years there has been a large body of research trying to explain why some countries still lag behind while other countries have enjoyed steady long-term economic development. Among the several explanations which have been offered the institutional hypothesis has been the one which has dominated the economic arena. Poorly performing political and institutional structures together with inefficient legal and court systems are among the primary causes of poor development (Acemoglu, Johnson, and Robinson, 2001, 2002, 2005; Glaeser, La Porta, de Silanes, and Shleifer, 2004; La Porta, de Silanes, Shleifer, and Vishny, 1997, 1998; etc.). With regard to political institutions, Acemoglu and Robinson (2012) distinguish between extractive and inclusive institutions. Opposite to inclusive institutions which are conductive to long term development, extractive institutions are designed to serve the interest of small elites by exploiting the rest of the population and for this reason they are highly detrimental to development.

Africa is one of the continents which has suffered most in terms of persistence of extractive institutions. Inefficient property rights, patronage politics, corruption, mistrust, and unstable democratic institutions have long been proposed as a source of poor development in Africa. Some of these institutions are the result of the slave trade (Nunn 2008; 2010). Others derive from the legacy of colonization and the subsequent Scramble for Africa which at time is considered even more harmful than colonization itself (Asiwaju 1985; Dowden, 2008).

Poorly speaking, the Scramble for Africa consists in the arbitrary and improper border design which partitioned a signicant fraction of the population belonging to existing ethnic groups. As a result, large shares of the population belonging to different ethnic groups have been forced to coexist in artificial states (Alesina, Easterly, and Matuszesky, 2010) where political borders do not always coincide with pre-existing tribal institutions (Englebert, 2000a). The discontinuity between pre- and post-colonial institutions has caused illegitimacy (Englebert, 2000a), civil conflicts (Fearon and Laitin, 2003; Fearon, 2004), ethno-political mobilization (Posner 2004a, 2004b), and particular rather than collective policies (Miguel, 2004). A somewhat more sophisticated interpretation of the effect of the Scramble for Africa is provided by Posner (2004a). Focusing on the partition of the Chewa and Tumbukas people between Malawi and Zambia, he argues that *"the political, social, and cultural salience of the cleavage depends on the sizes of the group that the cleavage defines relative to the sizes of the political and social arenas in which the groups are located"* (Posner, 2004a, p. 543). As a result, the idea that the political salience of a cultural cleavage results from the arbitrary imposition of boundaries in itself is not completely

correct.

In this paper we build on the hypothesis in Posner (2004a) and on empirical evidence about political representation and positions in ministerial offices across ethnic groups in Africa provided by Rainer and Trebbi (2012) and Francois, Rainer and Trebbi (2012). We argue that the partition itself does not matter for development in Africa. What matters is the way that groups have been split by the imposition of artificial boundaries (i.e. the size of the resulting group). Groups which are relatively small have a higher risk of being under-represented by national institutions (i.e. being in office) which in turn fosters support for informal/tribal institutions (i.e. through ethno-mobilization). Such informal/tribal institutions may represent a transaction cost given that they may promote uncertainty about enforcement of property rights which then may affect investment decisions and therefore development.

From a theoretical point of view the idea is quite simple and can be summarized as follows. The lack of representation of small groups in terms of national politics and positions in the government affects ethno-mobilization and the development of an ethno-culture and ethno-institutions (Rainer and Trebbi, 2012; Francois, Rainer and Trebbi, 2012; Posner, 2004b; Norris and Mattes, 2003). These groups are more likely to reject national institutions (because considered illegitimate) providing support for informal/tribal institutions rather than formal institutions (i.e. the central or local government). The inability to enforce formal institutions may create uncertainty. The perceived institutional uncertainty then may affect international investors who may decide to shift investment and FDI to areas which are institutionally safer. The lack of investment then has a direct effect on development.

To analyse the effect of partitioned groups (and their relative size) on development we use data at group level from Murdock (1959, 1967) which we merge with ethno-country estimates on GDP from satellite imagery of light density at night from the NOAA/NGDC (National Geophysical Data Center). After establishing in a cross-group analysis that the effect of the partition is not significant, we exploit the variation within groups (similar to Michalopoulos and Papaioannou, 2012) in order to estimate the effect of the size of the group on development. This estimated effect is unlikely to be affected by ethno-omitted variable biases given that partitioned groups belonging to the same historical tribe start from the same level of income per capita, share the same culture, and institutions which then neutralizes biases of this kind. Using this sort of matching estimator we find a strong support for our hypothesis about the relationship between the size of the partitioned group and development. Finally we use survey data from the Afrobarometer to show that the persistence of informal/tribal institutions is one of the possible channels through which

the size of the group may have affected development. Among the several institutional indicators provided by the Afrobarometer, we find that the support for informal institutions related to property rights and the rule of law are possibly the two institutional channels which matter most. By contrast, there is no significant effect of the size of the resulting group on the persistence of informal institutions regarding tasks related to schooling, health, the collection of taxes, etc. This result is consistent with the part of the literature that identifies property rights and the rule of law as the main institutional features which matter for development.

Therefore, consistent with our hypotheses we find that the partition matters only because it may have created small ethnic groups which in probability are more likely to provide support for informal institutions rather than formal institutions. At the same time, the partition has no effect when the resulting groups are large enough to ensure representation within national politics.

2 Related Literature

A significant part of the literature in political science has focused on ethnic politics and the impossibility of developing a nation building process when several ethnic cleavages have ensued in a country (Horowitz, 1985; Huntington, 1996). The presence of ethnic cleavages leads to ethno-politic mobilization (Posner, 2004b) and because of that politicians find it easier to build electoral support along ethnic lines (Eifart, Miguel and Posner, 2010). The result of ethno-politics is to foster ethno-culture and ethno-institutions leading to a lack of confidence in national political institutions (Norris and Mattes, 2003).

This process seems to be particularly severe for most countries in Africa (Mattes and Gouws, 1999; Mattes and Piombo, 2001; Norris and Mattes, 2003) where the current ethnic diversity, the resulting weak institutions, and ethno-politics seem to be the result of the Scramble for Africa followed by the arbitrary imposition of state boundaries (e.g. Ajala, 1983; Asiwaju, 1985; Barbour, 1961; Bello, 1995; Brownlie, 1979; Davidson, 1992; Kum, 1993; Nugent and Asiwaju, 1996; Touval, 1966, Englebert, 2000a, 2000b). Building on this idea, authors have used data on whether state boundaries are represented by a straight line and the length of these straight lines in order mainly to find a possible effect of artificial state boundaries on civil conflict (e.g. Clapham, 1996; Odugbemi, 1995; Ottaway, 1999; Touval, 1969; Bach, 1999; Nugent, 1996; Barbour, 1961; Bayart, 1996; Griffiths, 1996; Young, 1996; Herbst, 2000; Englebert, Tarango and Carter, 2002). However the evidence is a bit mixed.

The effect of ethnic divisions has also been widely debated in the economic literature (Easterly and Levine, 1997; Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg, 2003; Fearon, 2003; Montalvo and Reynal-Querol, 2005; Esteban and Ray, 2008; Michalopoulos, 2012). Most of this literature has focused on the effect of ethnic divisions on development, public goods and civil conflict. However the link between ethnic divisions, the Scramble for Africa and development has not been fully explored until the last few years. Gennaioli and Rainer (2006) show a significant cross-country relationship between pre-colonial centralization and measures of institutional development. Heldring and Robinson (2012) compare differences in the administration of African colonies in order to evaluate the effect of colonization on development[1]. Englebert (2000a) looks at the continuity between pre- and post-colonial institutions and finds that institutional continuity explains the Africa dummy effect in a cross-country growth analysis. Alesina, Easterly and Matuszesky (2010) use measures for whether there are partitioned groups within the country and whether the ethnic group is close to a straight line to proxy artificial states. With respect to this literature, the paper shows that it is not the imposition of arbitrary boundaries that matters for development and persistence of tribal institutions. What is important is the way in which boundaries sketched during the colonial period have divided existing groups, given that the partition matters only when these boundaries have created small ethno-country groups (i.e. small fringes of larger groups) which have no voice in national politics and which have then fostered support for informal/tribal rather than formal/national institutions. Therefore if a group has been unevenly split by state boundaries such that one represents a large share of the country's population while the other only represents a small fraction, then the effect on development is likely to be more severe for the latter rather than the former. In addition, with respect to Alesina, Easterly and Matuszesky (2010) the paper focuses on ethnic groups rather than countries because it is normal to expect that the group which has been partitioned is the one which is most affected by the partition itself.

The paper is also closely related to the literature on the persistence of institutions and the effect of institutions on development (Acemoglu, Johnson and Robinson, 2001, 2002; Rodrik, Subramanian and Trebbi, 2004, Alesina and Spoloare, 2003; Spoloare and Wacziarg, 2005). Instead of looking at formal institutions, we focus on informal/tribal institutions, which, following North (1990) and Brinks (2003), are considered to be *"socially shared rules, usually unwritten, that are created, communicated and enforced outside of officially sanctioned channels"* (Helmke and Levitsky, 2004 p. 727). However, consistent with

[1]The three sorts of colony are: (1) those which coincide with a pre-colonial centralized state; (2) those of white settlement; (3) the rest.

Acemoglu, Johnson, and Robinson (2001, 2002) and Rodrik, Subramanian, and Trebbi (2004) we find that the sort of institutions which matter for development are property rights and the rule of law. The analysis of limited national institutions, weak states and the inability to disseminate power is also central to Acemoglu (2005), Acemoglu, Ticchi and Vindigni (2011), Besley and Persson (2010, 2011).

From a methodological point of view the paper builds on the literature on matching models (Angrist and Pischke, 2008) and county-pair analysis (Dube, 2009; Naidu, 2010). With regard to development in Africa this methodology has been pushed forward by Michalopoulos and Papaioannou (2012) who match partitioned groups in order to neutralize biases coming from ethno-omitted variables. In their analysis they focus on the effect of the rule of law and control of corruption within similar ethnic groups and find no significant effect of national institutions on development in Africa. With regard to their analysis the paper provides and explanation of why national institutions may not be conducive to development in Africa. The explanation is consistent with the idea that *"it is the interaction between institutions and organizations*[2] *that shapes the institutional evolution of an economy"* (North, 1994, p. 361). Therefore institutions alone may not affect development unless citizens and political actors support these institutions.

Nunn and Wantchekon (2011), who use data from the Afrobarometer to evaluate the effect of the slave trade on mistrust represents another source which we consider in order to carry out our empirical analysis. Similar to their analysis we merge data from the Afrobarometer with data on ethnicities from Murdock (1959, 1967) and then we control for individual, regional and country fixed effects in order to identify the effect of the partition on the persistence of informal institutions.

The paper is structured as follows. In the next Section (Section 3) we discuss sources we use to collect data and the way that these sources have been used in order to carry out our analysis. In Section 4 we provide evidence in support of the idea that it is not the imposition of arbitrary boundaries which matters. On the other hand, we show a positive and significant effect of the share of the partitioned groups on development. In Section 5 we show that the reason why the share of the partitioned group matters is because of its effect on the support for informal/tribal institutions. Relatively large groups provide more support to formal institutions (because they have more voice in national politics) while small groups provide a large support for tribal leaders which then affects the transaction cost and therefore development. The paper ends with short conclusions.

[2]By Organizations North (1994) refers mainly to political actors.

3 Data Description

3.1 Data on Ethnic Groups

In common with most of the recent research on development in Africa (i.e. Michalopoulos and Papaioannou, 2011a, 2011b, 2012, 2013, 2014) we use data on ethnic groups from the Ethnographic Atlas (Murdock 1959; 1967) which provides information on economic activity and institutional organizations for almost 862 societies[3] in each of 412 cultural clusters. For each group the Atlas reports the geographical coordinates and maps which were added later by Douglas White (1987). This source is merged with spatial data on African administrative boundaries from GADM (Global Administrative Database) in order to map ethnic groups into national boundaries. The intersection between ethnic location and national boundaries determines the partitioned groups.

Figure 1 shows all the possible partitioned groups within Africa. A group which has been partitioned is considered a new ethno-country group even though it shares the same culture, institutions and economic dependence as the original group. After considering all the possible partitions, the number of ethno-country groups in Africa increases to 1300, and among these groups there are 830 groups which in some way have been affected by the partition. Appendix 3 reports these groups and the number of countries between which the group has been partitioned. Of course it is possible that migration and the displacement of people after conflicts have changed the spatial distribution of groups, which may cause a limit to our analysis. However, statistical investigation by Michalopoulos and Papaioannou (2012) shows that such an effect is not particularly severe and the conjectured change of spatial distribution is not such as to affect the empirical analysis

Figure 1: Ethnic and Partitioned Groups

Figure 2 shows the effect of the partition for a typical ethnic group. As a result of the Scramble for Africa, the Aulliminden group has been split into three new ethno-country groups, which we refer to as Mali-Aulliminden, Niger-Aulliminden and Algeria-Aulliminden. These groups represent respectively 14.9 percent, 10.7 percent and 0.007 percent of the total country surface area (which we use as a proxy of the share of the countrys population). According to the existing literature (i.e. Alesina, Easterly and Matuszesky, 2010) these three groups should be affected by the partition in the same way given that it is the partition which matters. However, if we consider the empirical evidence

[3]In these 862 societies there are 8 uninhabited regions which will be dropped from the analysis.

on political representation and ministerial offices in Africa from Rainer and Trebbi (2012) and Francois, Rainer and Trebbi (2012), then each of these three groups has a probability of entering in a winning coalition (and being represented in the government) in proportion to its size. This means that the Algeria-Aulliminden group has almost no chance of affecting national politics. The lack of representation can affect ethno-mobilization (Posner 2004b; Cederman, Wimmer and Minn, 2010) and therefore the support for national institutions and legitimacy of the state

Figure 2: Partition of the Aulliminden Group

3.2 Data on GDP

Looking, as we do, at the level of development across groups implies that the measure of development must be at an ethic group-level. However there are no sources which can provide such information directly. Therefore, in order to overcome this limitation we use estimates about total economic activity from Nighttime Lights satellite imagery provided by the NOAA/NGDC (Ghosh, Powell, Elvidge, Baugh, Sutton and Anderson, 2010). This source provides spatially disaggregated 1 km^2 data on total economic activity which is recorded using a thirty two bit floating number (ranging from 0 to 147.682). In order to create spatially disaggregated data on economic activity authors first estimate total economic activity for each administrative unit by multiplying the sum of lights (i.e., sum of brightness values of lights for all lit areas) of each administrative unit by a coefficient obtained from regressing GDP (Gross Domestic Product) and GSP (Gross State Product) on lights[4]. Then they spatially distribute *"the estimated total economic activity of each administrative unit into 1 km^2 grid cells based on the percentage contribution of agriculture, the nighttime lights image, and the LandScan population grid"* (Ghosh, Powell, Elvidge, Baugh, Sutton and Anderson 2010, pg 151). Using light density to obtain sub-national estimates of economic activity has been quite popular in the last few years (i.e. Henderson, Storeygard and Weil, 2012; Elvidge, Baugh, Kihn, Kroehl and Davis, 1997; Doll, Muller and Morley, 2006). Henderson, Storeygard and Weil (2012) use a similar approach to obtain estimates of GDP growth at sub-national level for 188 countries over 17 years. They use these estimates to evaluate whether over the last 17 years coastal areas have grown faster than non-coastal areas; whether primate cities have grown faster than hinterlands;

[4]See Chen and Nordhaus (2010) and Henderson, Storeygard and Weil (2012) for a more detailed discussions of regressions used to map lights into a proxy of GDP.

and whether malarial areas have had a better growth experience compared to non-malarial areas[5]. They show that implications from using sub-national estimates of GDP growth are quite different from standard results from the cross-country analysis (i.e Mellinger, Sachs and Gallup, 2000).

The spatial distribution of economic activity in Africa is shown in Figure 3. Darker areas denote regions of more intense economic activity while lighter areas denote regions with a lower or absent economic activity (i.e. the Sahara Desert). The advantage of disaggregated data about economic activity map is to provide analytical flexibility given that data can be aggregated to units of different sizes. As a consequence we can use these disaggregated data in order to construct proxies of development for each ethnic group in our sample[6].

Figure 3: 1 km2 Data on Total Economic Activity (converted into a Shapefile)

In order to verify the reliability of our proxy for economic activity we compare data from the World Bank on GDP PPP adjusted (2005 US dollars) with estimates on economic activity aggregated at country level from our source. The plot of real GDP (from the WB) against estimates of economic activity from our source is shown in Figure 4. The plot shows an almost perfect relationship between the GDP data from the World Bank and estimates of economic activity from the NOAA/NGDC. In fact the correlation between the two sources is 0.99 which provides enough support for our choice about the dependent variable

Figure 4: Plot of Real GDP (WB) and Estimated Economic Activity (NOAA)

As a further check Table 1 shows the pairwise correlation between our measure of mean economic activity[7] and a measure of mean light density from Michalopoulos and Papaioannou (2013) for the 679 observations in their sample. The correlation between the two variables

[5]One of the reasons why estimates of economic activity are normally preferred (rather than using straight light data) relates to measurement errors in light density related to cross-country cultural differences in the use of night-lights, gas flares, differences in lights sensitivity across satellites, blooming and bleeding, attenuation of lights for areas with low economic activity, etc. (Chen and Nordhaus, 2010; Henderson, Storeygard and Weil, 2012)

[6]The proxy for GDP is constructed using the Zonal Statistics in Qgis 2.01

[7]The mean economic activity represents the mean value at a $1km^2$ cell within a polygon (ethnic tribe). Intuitevily this is nothing else that the total economic activity within a polygon (ethnic tribe) divided by the total number of $1km^2$ cells within the polygon.

is almost 0.89 which provides further evidence of the validity of our proxy for GDP per capita.

Table 1: Pairwise Correlation between Economic Activity and Light Density

3.3 Data on Informal Institutions

The Afrobarometer (2008) Fourth Round is our main source for formal and informal institutions[8]. Different from the Third Round (Afrobarometer, 2005) which provides data on the ethnicity of individuals (variable Q79), the Fourth Round does not provide a variable which directly indicates the ethnicity of individuals. However, each individual in the survey is asked to report his native language. Therefore in order to match individuals in the Afrobarometer with data on ethnic groups in Murdock (1959, 1967) we rely on information on native languages[9]. For each individual in a country-region-district we check which ethnic group in such country-region-district speaks such a language and then we match these individuals with ethnic groups in Murdock. Of course, there are practical issues related to the fact that languages in the Afrobarometer do not always match with names of ethnic groups in Murdock. Therefore to understand which ethnic group in a given country-region-district speaks a given language we rely on information from the Ethnologue and from the Joshua Project.

There are three main indicators of *"language/ethnicity"* in the Fourth Round which matter for our analysis. The first one is the language of the respondent (variable Q3); the second indicator is the language of the interview (Q103); and the third indicator is a question related to the spoken languages (Q88E). We use the information from these variables together with the data on country (COUNTRY) and regional bases of each group (REGION and DISTRICT) in order to merge the data on ethnicity from the Afrobarometer with the data on ethnic groups from Murdock. We first try to match the language of the respondent (variable Q3) with Murdock's data on ethnicity, though this is not always straightforward. In fact, in some cases the reported language is French, English or Portuguese. For those individuals who report a European language as a spoken language

[8]The 20 countries covered by the fourth round (Afrobarometer, 2008) are the following: Benin, Botswana, Burkina Faso, Cape Verde , Ghana, Kenya, Liberia, Lesotho, Madagascar, Malawi, Mali, Mozambique, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda, Zambia, Zimbabwe

[9]Nunn and Wantchekon (2011) use the same matching strategy. The only difference is that they use data on ethnicity of individuals (Q79) which is available for the Third Round but not available for the Fourth Round.

we then check if the interviewer reports the language in which the interview is conducted (variable Q103) and if this language is different from French, English or Portuguese. If the language in which the interview is conducted is different from the three European languages above then we use this additional information to match data. If the language of the interview is not reported (or not different from English, French or Portuguese), then we finally look at the spoken languages and we merge the spoken language with the related ethnicity (this is done for fewer than 50 obs.) We assume that individuals within a country-region-district speaking the same language belong to the same ethnic group.

4 Partition and Development

4.1 Empirical Strategy

We start our investigation using a cross-group analysis in order to estimate the effect of the partition on development. The basic model estimated to evaluate such an effect can be written as:

$$y_{i,c} = \delta_c + \beta_1 Partition_{i,c} + \beta_2 Grp\_Share_{i,c} + \beta_3 X_{i,c} + \epsilon_{i,c} \tag{1}$$

where $y_{i,c}$ is our proxy for GDP for group i in country C normalized by the surface area for group i; δ_c denotes country-specific effects; $Partition_{i,c}$ is the dummy for whether the group has been partitioned or not; $Grp\_Share_{i,c}$ represents the share of the group i in country C; and $X_{i,c}$ is a set of control variables. The error $\epsilon_{i,c}$ is double clustered in order to capture potential auto-correlation within ethnicities and countries.

Then we restrict our analysis to partitioned groups only, controlling for ethnic fixed effects in order to flush out biases related to ethnic characteristics. Therefore the model to be estimated in this case can be written as:

$$y_{i,e,c} = \delta_e + \delta_c + \beta_1 Grp\_Share_{i,e,c} + \beta_2 X_{i,e,c} + \epsilon_{i,e,c} \tag{2}$$

where δ_e now captures ethnic-specific effects and $y_{i,e,c}$ is a measure of development for group i, in tribe e, and country C. The inclusion of ethnic fixed effects allows us to deal with omitted variables related to group-specific characteristics (i.e. pre-colonial institutions, pre-colonial development, etc.) which in some way may be correlated with the share of partitioned groups. From a certain point of view the estimator compares measures of development for group i in country C_1 with exactly the same group i but in country C_2. Therefore, similar to Michalopoulos and Papaioannou (2012), groups are

matched based on similar unobservable characteristics which may affect the estimates.

The variable of interest is $Grp\_Share_{i,c}$. If the effect of the partition on development is through political representation then we should expect a significant effect of the share of the group ($Grp\_Share_{i,c}$). However, if it is the partition that matters, then the share of the resulting group should not matter given that groups resulting from the partition should be affected in a similar way independently of their size (same as in Alesina, Easterly and Matuszesky, 2010). Of course, the case in which both effects (partition and group share) matter is also possible.

Table 2 provides descriptive statistics for some of the main variables in our data set[10]. Almost 64 percent of the groups in our dataset have been affected by the partition (Partition Dummy). The mean size of a typical group is smaller than 4 percent of the country's surface area and the mean economic activity for the representative ethnic group is close 0.08. Following Michalopoulos and Papaioannou (2013) we transform this variable adding a small number (0.01) to the log of mean economic activity in order to correct for the fact that the distribution is skewed toward zero[11]. The current population density is in average close 51 inhabitants per 2.5 by 2.5 arc-minutes (approximately 25 sq km at the Equator) and the average suitability to malaria is close to 0.6 (on a 0-1 scale).

Table 2: Descriptive Statistics

4.2 Results

Table 3 shows results from the cross-section analysis in which all groups (partitioned and not) are pooled together in order to evaluate whether the partition matters. In the first model (Model 1) we control only for the dummy for partitioned groups, the share of the group, population density estimated from the Gridded Population of the World, and a set of geographical controls. We also use a full set of country-dummies in order to capture country specific effects which can affect the level of development for each group.

As expected, in Model 1 we find a positive and significant effect of the share of the group ($Grp\_Share_{i,c}$) on development which increases income by almost 1.12 percent per one standard deviation in the share of the group. On the other hand, the dummy for whether

[10]Observations with a population density, GDP, and group share equal to 0 are dropped from the analysis. For this reason the number of observations in following Tables drops.

[11]In Table A1 in Appendix 1 we show that estimates are not sensitive to this transformation and results still hold when we use a different transformation (i.e. $log(x)$).

the group has been portioned or not does not exert any significant effect on development. The latter is in line with the insignificant effect of partitioned ethnic homeland on conflict in Michalopoulos and Papaioannou (2013).

In following models we enter additional controls for settlement types (Model 2), dependence on gathering (Model 3), and jurisdictional hierarchy beyond local community (Model 4). Murdock (1959, 1967) represents the source for these additional controls. Even after entering these additional controls results are almost unchanged. There is still an insignificant effect of the partition on development, while the share of the group ($Grp\_Share_{i,c}$) exerts a significant and positive effect in all models.

Table 3: Cross-Group Analysis

Given that the cross-group analysis is likely to be affected by ethnic-omitted variables in following specifications we restrict our analysis within partition ethnic homeland in order to have more consistent estimates. Specifically, we confine estimates to same groups residing on both sides of states' borders, controlling for ethnic-fixed effects. Matching groups who share same unobservable characteristics (controlling for ethnic fixed effects) allows us to compare the level of development for the same group on both sides of the border which from a practical point of view means that the estimator compares measures of development for group i in country C_1 with exactly the same group i in country C_2. Therefore the estimator will represent a sort of quasi-experiment and because of that it will flush out all potential ethnic-related effects which may affect estimates.

Of course, the identification of the effect is conditional to the fact that state boundaries are randomly drawn (as the Africa-literature seems to suggest). However, if for some unknown reason groups selected themselves in different countries following the imposition of state boundaries (maybe because of available land) then the identification is likely to be affected. To test this sort of selection into areas with lower population density in Table 4 we regress the share of partitioned groups against population density in 1800[12] controlling for ethnic fixed effects in order to exploit the variation within groups. If small splinter groups selected themselves in areas with low population density then within groups we should find a significant relationship between population density before colonisation and the share of the group (i.e. smaller groups should be located in areas with lower population density in 1800). However, the relationship between these two variables is not significant which provides some basic evidence of the randomness of state boundaries.

[12]Spatial data on population density in 1800 is from the History Database of the Global Environment (HYDE).

Table 4: Selection of Groups into Regions

When we confine estimates to partitioned groups only (Table 5) the coefficient on the size of the group ($Grp\_Share_{i,e,c}$) increases quite significantly (from 1.02 to 1.3 in Model 1). In Model 2 we enter additional geographical controls and the variable is still significant at a 5 percent though the estimated effect drops to 1 percentage change in income per a one percent change in the share of the group. In Model 3 we enter additional controls for crop suitability, onshore oil fields, environmental suitability to malaria[13], and population density in 1800 which we use as a proxy of initial development. The coefficient on the size of groups slightly increases (to 1.05) and as a result the variable is still significant at a 5 percent level.

Table 5: Matched-Groups

Spillover effects related to the spatial distribution of groups sharing the same ethnicity represent a further violation of OLS properties given that the error term is likely to be spatially correlated. In order to deal with this additional problem in Table 6 we use Conley (2008) spatial HAC estimator to adjust OLS standard errors for spatial correlation. We use two different distance thresholds in order to test the robustness of results. In Model 1 we use a distance threshold equal to 100km which is then increased to 200km in Model 2. Standard errors after controlling for spatial correlation decrease almost by one-half. As a result the effect of the size of partitioned groups is now significant at a 1 percent level. In addition, increasing the distance threshold from 100km to 200km does not seem to have a large effect on the standard error which actually slightly decreases.

Table 6: Conley Robust Standard Errors

Michalopoulos and Papaioannou (2014) argue that problems in the definition of ethnic boundaries in Murdock (1959, 1967) can affect estimates and because of that groups which are relatively small should not be used when evaluating levels of development across partitioned groups. In order to deal with this problem they restrict their analysis to groups with at least 10 percent of their ethnic homeland belonging to more than one country. For this reason in Table 7 we also confine estimates to groups with at least 10 percent of the

[13]See the Data Appendix for a description and sources of these additional controls.

ethnic homeland belonging to more than one country. When we drop these small groups the number of observations drops to 612 (Model 1) and as a consequence the standard error increases quite significantly given that the degrees of fredom drop to less than 200. The coefficient on the size of the partitioned group also increases (from 1.05 to 1.16). As a result the effect of the size of groups on development remains signifiicant at a 1 percent level. In Model 2 we exclude additional five groups which in our dataset have a share well above the rest of the sample (above 50%). These groups may represent potential outliers which then can affect the slope of the estimator. When these potential outliers are excluded the coefficient on the size of groups increases further (to 1.49). In both models our independent variable is significant at a 1 percent level.

Table 7: Dropping Small Groups

To test the robustness of results to alternative measures of development in Appendix 1 we show estimates using mean light density at night in 2007 from the Defence Meteorological Satellite Program (DMSP) as an alternative measure of development. Mean and standard deviation for this variable (reported in Table A2) are extremely close to the ones in Michalopoulos and Papaioannou (2013) though some marginal differences exist because of the different size of the sample. The average light density in our full sample (1297 observations) is 0.33 (compared to 0.37 in MP) with a standard deviation of 1.37 (compared to 1.53 in MP). In Table A3 we confine estimates to groups with at least 5 percent and 10 percent of their ethnic homeland belonging to more than one country and for all estimated models our proxy for the size of the group is significant at a 5 percent level at least. In addition the coefficient increases quite significantly when we confine estimates to group with at least 10 percent of the ethnic homeland belonging to more than one country (same as in Table 7).

5 Partition and Informal Institutions

In the previous section we have shown a significant effect of the share of partitioned groups on development. In this section we look at a possible institutional channel through which the size of groups may affect the level of development. The Afrobarometer provides exactly the sort of data we need to conduct our analysis, given that it offers information about the level of support citizens provide to formal and informal/tribal institutions. The question we use to proxy support for informal/formal institutions is: *"Who do you think has primary responsibility for managing each of the following tasks. Is it the national government,*

the local government, traditional leaders, or members of your community?" (Afrobarometer Fourth Round, p. 34 Questions Q58A-H). The tasks covered are: 1) Keeping the community clean; 2) Managing schools; 3) Managing health clinics; 4) Collecting income taxes; 5) Solving local disputes; 6) Allocating land; 7) Protecting rivers and forests; and 8) Maintaining law and order.

This question is well-adapted for capturing our hypothesis about the importance of the strength of informal/tribal institutions (vs formal) and for evaluating the persistence of such institutions given that traditional leaders represent *"tribal leaders/rulers occupying communal political leadership positions sanctified by cultural mores and values and enjoying the legitimacy of particular communities to direct their affairs ..... Their basis of legitimacy is therefore tradition, which includes the whole range of inherited culture and way of life; a people's history; moral and social values and the traditional institutions which survive to serve those values"* (Adewumi and Egwurube 1985: p. 20).

Table 8: Descriptive Statistics

Table 8 reports the distribution for each of the tasks covered by the question. The central government seems to receive a large support for tasks related to collecting taxes, managing health clinics and maintaining law and order. On the other hand, traditional leaders (which we use as a proxy of informal/tribal institutions) have moderately strong support with regard to tasks related to the allocation of land and the resolution of local disputes.

To evaluate the persistence of informal/tribal institutions we estimate variants of the Nunn and Wantchekon (2011) model, which can be re-written as follows:

$$y_{i,e,c} = \delta_{i,e,c} + \beta_1 Partition_{e,c} + \beta_2 Grp\_Share_{e,c} + \beta_3 X_{i,e,c} + \gamma_{i,e,c} \quad (3)$$

where $y_{i,e,c}$ is our proxy for informal institutions (i.e. whether individuals provide support for traditional leaders) for individual i in group e and country C; $\delta_{i,e,c}$ denotes individuals, group and country fixed effects; $Partition_{e,c}$ is a dummy for whether group e in country C is either partitioned or not (supposedly random); $Grp\_Share_{e,c}$ represents the share of the partitioned group e in country C; $X_{i,e,c}$ is a set of control variables; and $\gamma_{i,e,c}$ is the error term. Consistent with Nunn and Wantchekon (2011) we use double clustered standard errors.

Variables of interest are $Partition_{e,c}$ and $Grp\_Share_{e,c}$. We expect a significant and negative effect of the share of the partitioned group given that the probability of contributing to national politics should increase with the share of the partitioned group which in

turn should provide less support for traditional leaders. At the same time, we expect that whether groups have or have not been partitioned should not matter much $Partition_{e,c}$.

The economic literature has stressed the importance of property rights and the rule of law for development (Acemoglu, Johnson and Robinson, 2002; Rodrik, Subramanian and Trebbi, 2004; Easterly and Levine, 2003). For this reason in Table 9 we initiate our analysis by looking at the effect of the partition on tasks related to law and order, and allocation of land. In Model 1 we regress the variable for the support for traditional leaders with regard to the allocation of land on the partition dummy ($Partition_{e,c}$), the share of the group ($Grp\_Share_{e,c}$), the ethnic group income normalized by the surface area, a dummy for whether individuals live in the urban area, sets of individual effects (including age, sex, trust in democracy, employment status, trust in peers, education, etc.) and country fixed effects. As expected the partition dummy does not significantly affect the support for tribal leaders while the share of the partitioned group has a significant and negative effect (Model 1). On average a one percentage increase in the share of the partitioned group reduces the support for informal institutions by almost 1 percent. In Model 2 we also control for regional provision of public goods (dummies for the provision of electricity, piped water, a sewage system, health clinics, paved terrains, schools, whether there are any police or soldier stations in the district, etc.) and the variable retains its significance.

In Model 3 we replace the dependent variable with the reported support for traditional leaders with regard to tasks related to maintaining law and order and results are largely confirmed. In Model 4 we control again for dummies related to the local provision of public goods and still the size of the group is what matters most. In average a one percentage increase in the share of the partitioned group reduces the reported support for informal institutions with regard to maintaining law and order by almost 0.32-0.37 percentage.

Table 9: Persistence of Informal Institutions

In Table 10 we use different dependent variables. In Model 1 we look at the support given to traditional leaders with regard to tasks related to keeping the community clean and the partition dummy is the only variable which has a marginal and positive effect. In Model 2 we evaluate the effect on the support for traditional leaders in terms of managing schools and both the variables for the partition and the shares of the groups are not significant. The same insignificant effect is found with regard to the support given to traditional leaders in terms of managing health clinics (Model 3) and collecting income tax (Model 4). Finally in the last two models we consider the support for traditional

institutions with regard to tasks related to solving local disputes (Model 5) and protecting rivers and forests (Model 6) and in both models the variable for the share of the group is negative, as expected, but only marginally significant.

Table 10: Persistence of Informal Institutions

As an additional test in Table 11 we replicate results shown in Table 9 but confining estimates to partitioned groups only and controlling for ethnic fixed effects. Therefore only individuals living in the same country and belonging to the same ethnic groups are compared allowing to flush away ethno-country specific effects. However results are largely confirmed and the size of the groups still maintains its significant effect on both measures of informal property rights and law and order.

Table 11: Confining the Estimates to Partitioned Groups and Group Fixed Effects

6 Conclusions

The economic and political science literature has always maintained that the arbitrary imposition of state boundaries is one of the several factors which explain poor development in Africa. However the analysis in this paper seems to suggest that it is not the partition itself that matters for development but the way in which groups have been partitioned. In fact there is a significant effect only in cases where the partition creates small ethnic groups which lack political representation. We also showed that the persistence of informal institutions across under-represented groups is one of the reasons for such a negative effect. From this point of view a more inclusive political system can be beneficial in reducing such an effect.

References

[1] Acemoglu, Daron, (2005): Politics and Economics in Weak and Strong States, Journal of Monetary Economics, vol. 52(7), pages 1199-1226

[2] Acemoglu, D. and S. Johnson (2005): Unbundling Institutions, Journal of Political Economy, 113(5), 949995.

[3] Acemoglu, Daron, (2005): Politics and Economics in Weak and Strong States, Journal of Monetary Economics, vol. 52(7), pages 1199-1226

[4] Acemoglu, D., S. Johnson and J. A. Robinson (2001): The Colonial Origins of Comparative Development: An Empirical Investigation, American Economic Review, 91(5), 13691401.

[5] Acemoglu, D., S. Johnson and J. A. Robinson (2002): Reversal Of Fortune: Geography And Institutions In The Making Of The Modern World Income Distribution, Quarterly Journal of Economics, 107(4), 12311294.

[6] Acemoglu, D., S. Johnson and J. A. Robinson (2005): Institutions as a Fundamental Cause of Long-Run Growth, in Handbook of Economic Growth, ed. P. Aghion and S. N. Durlauf, pp. 109139. Elsevier North Holland, Amsterdam, The Netherlands.

[7] Acemoglu, D., J. A. Robinson (2012): Why Nations Fail. The Origins of Power, Prosperity and Poverty. Crown Publishers, New York, NY.

[8] Acemoglu, D., D. Ticchi and A. Vindigni (2011): Emergence And Persistence Of Inefficient States Journal of the European Economic Association, 9(2): 177-208

[9] Adewumi, J.B. J Egwurube. (1980): Role of traditional rulers in historical perspective. In Aborisade, Oladimeji (Ed.). Local Government and the traditional rulers in Nigeria. Ile-Ife: University of Ife Press.

[10] Ajala, Adekunle (1983): The Nature of African Boundaries; Afrika Spectrum, 18, 177-188

[11] Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat and Romain Wacziarg (2003): Fractionalization, NBER Working Papers 9411

[12] Alesina, A. and E. Spolaore (2003): The Size of Nations. MIT Press.

[13] Alesina, A., W. Eastely and J. Matuszesky, (2011): Artificial States, Journal of the European Economic Association, 9(2), 246277.

[14] Angrist, J. and J.-S. Pischke (2008): Mostly Harmless Econometrics. Princeton University Press, Princeton, NJ

[15] Asiwaju, A. I. (1985): The Conceptual Framework, in A. I. Asiwaju (Ed.), Partitioned Africans (pp. 1-18). New York: St. Martins.

[16] Bach, Daniel (1999): Regionalisation in Africa: Integration and Disintegration. Bloomington: Indiana University Press

[17] Barbour, K. M. (1961): A Geographical Analysis of Boundaries in Inter-Tropical Africa. In K. M. Barbour R. M. Prothero (Eds.), Essays on African population (pp. 303-323). London: Routledge Kegan Paul

[18] Bayart, Jean-Franois. (1996): LHistoricit de lEtat Import, In J. Bayart (Ed.), La Greffe de lEtat (pp. 11-39). Paris: Khartala

[19] Bello, Adebayo (1995): The Boundaries Must Change, West Africa, p. 546

[20] Besley, T. and T. Persson (2010): State Capacity, Conflict and Development, Econometrica, 78(1), 134.

[21] Besley, T. and T. Persson (2011): Pillars of Prosperity. The Political Economics of Development Clusters. Princeton University Press, Princeton, NJ.

[22] Brinks, Daniel (2003): Informal Institutions and the Rule of Law: The Judicial Response to State Killings in Buenos Aires and So Paulo in the 1990s. Comparative Politics 36 (1): 119.

[23] Brownlie, Ian (1979): African Boundaries: A Legal and Diplomatic Encyclopedia, London: C. Hurst

[24] Cederman, L.E., Wimmer, A. and Min, B. (2010): Why Do Ethnic Groups Rebel? New Data and Analysis, World Politics 62(1): 87-119

[25] Chen, Xi, and Nordhaus, Williams D. (2010): The Value of Luminosity Data as a Proxy for Economic Statistics, NBER Working Paper 16317

[26] Clapham, Christopher (1996b): Boundary and Territory in the Horn of Africa. In Paul Nugent A. I. Asiwaju (Eds.), African boundaries (pp. 237-250). London: Pinter

[27] Conley, Timothy G. (2008): "Spatial Econometrics." The New Palgrave Dictionary of Economics. Second Edition. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan.

[28] Davidson, Basil (1992): The Black Mans Burden: Africa and the Curse of the Nation-State, New York: Times Book

[29] Doll, C. N., J.-P. Muller and J. G. Morley (2006): Mapping Regional Economic Activity from Night-Time Light Satellite Imagery, Ecological Economics, 57, 7592.

[30] Dowden, R. (2008): Africa: Altered States, Ordinary Miracle Portobello Books Ltd

[31] Dube, A., Lester, T. W. and Reich, M. (2009) Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties, Institute for Research on Labor and Employment Working Paper, 157:07.

[32] Easterly, William and Levine, Ross (1997): Africa's Growth Tragedy: Policies and Ethnic Divisions, The Quarterly Journal of Economics, vol. 112(4): 1203-50

[33] Easterly, William Levine, Ross (2003): Tropics, Germs and Crops: How Endowments Influence Economic Development, Journal of Monetary Economics, Elsevier, vol. 50(1), pages 3-39

[34] Elvidge, C., K. Baugh, E. Kihn, H. Kroehl and E. Davis (1997): Mapping of City Lights Using DMSP Operational Linescan System data, Photogrammetric Engineering and Remote Sensing, 63, 727734.

[35] Englebert, P. (2000a): Solving the Mystery of the Africa Dummy World Development, 28 (10):1821-1835

[36] Englebert, Pierre (2000b): Pre-Colonial Institutions, Post-Colonial States and Economic Development in Tropical Africa, Political Research Quarterly 53: 7-36

[37] Englebert, P., S. Tarango and M. Carter (2002): Dismemberment and Suffocation: A Contribution to the Debate on African Boundaries, Comparative Political Studies, 35(10), 10931118.

[38] Esteban, Joan and Debraj Ray (2008): Polarization, Fractionalization and Conflict, Journal of Peace Research, 45,163-182.

[39] Ethnologue (2005): Languages of the World, SIL International; Fifteenth edition.

[40] Fearon, James D (2005): Ethnic Mobilization and Ethnic Violence In Barry R. Weingast and Donald Wittman, Eds., Oxford Handbook of Political Economy. Oxford: Oxford University Press, 2006

[41] Fearon, James D (2003): Ethnic and Cultural Diversity by Country, Journal of Economic Growth, Springer, vol. 8(2), pages 195-222

[42] Fearon, James and David D. Laitin (2003): Ethnicity, Insurgency and Civil War. American Political Science Review 97(1): pp.75-90

[43] Francois, Patrick, Ilia Rainer and Francesco Trebbi (2012): How Is Power Shared In Africa?, NBER Working Paper No. 18425

[44] Gennaioli, N. and I. Rainer (2006): Precolonial Centralization and Institutional Quality in Africa, in Institutions and Norms in Economic Development, by M. Gradstein and K. Conrad, (Eds.) MIT Press

[45] Glaeser, E.L., La Porta R., de-Silanes F. L. and Shleifer A. (2004): Do Institutions Cause Growth? Journal of Economic Growth, Springer, vol. 9(3), pp. 271-303,

[46] Ghosh, T., Powell, R., Elvidge, C. D., Baugh, K. E., Sutton, P. C. Anderson, S. (2010): Shedding Light on the Global Distribution of economic Activity The Open Geography Journal (3), 148-161

[47] Griffiths, Ieuan. (1996): Permeable Boundaries in Africa, In Paul Nugent A. I. Asiwaju (Eds.), African Boundaries (pp. 68-83). London: Pinter

[48] Helmke G. and Levitsky S. (2004): Informal Institutions and Comparative Politics: A Research Agenda Perspectives on Politics, 2(4): 725-40

[49] Henderson, V. J., A. Storeygard and D. N.Weil (2012): Measuring Economic Growth from Outer Space, American Economic Review, 102(2): 994-1028

[50] Herbst, J. (2000): States and Power in Africa. Princeton University Press, Princeton, NJ.

[51] Horowitz, Donald L. (1985): Ethnic Groups in Conflict, University of California Press

[52] Huntington, S. P. (1991): The Third Wave: Democratization in the Late Twentieth Century, University of Oklahoma Press, 1991

[53] Keulder, C. (2000): Traditional Leaders, State, Society and Democracy: A Reader in Namibian Politics, Christiaan Keulder (Ed.) Macmillan Education Namibia

[54] Kum, Joseph M. (1993): The Central African Subregion, in Disarmament: Workshop on the Role of Border Problems in African Peace and Security (pp. 49-71). New York: United Nations

[55] La Porta, R. L., F. L. De Silanes, A. Shleifer and R. Vishny (1997): Legal Determinants of External Finance, Journal of Finance, 52(3), 11311150.

[56] La Porta, R. L., F. L. De Silanes, A. Shleifer and R. Vishny (1998): Law and Finance, Journal of Political Economy, 106(6), 11131155.

[57] Mattes, Robert B. and Amanda Gouws (1999): Race, Ethnicity and Voting Behavior: Lessons from South Africa, In Electoral Systems and Conflict in Divided Societies, Andrew Reynolds and Ben Reilly (Eds.) Washington, DC: National Academy Press.

[58] Mattes, Robert B. and Jessica Piombo (2001): Opposition parties and the voters in South Africas General Election of 1999, Democratization 8(3): 101-12

[59] Mellinger, Andrew D., Jeffrey D. Sachs, and John L. Gallup (2000): Climate, Coastal Proximity, and Development. In The Oxford Handbook of Economic Geography, edited by Gordon L. Clark, Maryann P. Feldman, and Meric S. Gertler, 16994. New York: Oxford University Press

[60] Miguel, Edward (2004): Tribe or Nation? Nation-Building and Public Goods in Kenya versus Tanzania World Politics, Volume 56, Number 3, pp. 327-36

[61] Michalopoulos, S.(2012): The Origins of Ethnolinguistic Diversity, American Economic Review 81(1): 1508-39

[62] Michalopoulos, S. and E. Papaioannou (2011a): Divide and Rule or the Rule of the Divided? Evidence from Africa, NBER Working Paper 17184.

[63] Michalopoulos, S. and E. Papaioannou (2011b): The Long-Run Effects of the Scramble for Africa, NBER Working Paper 17620

[64] Michalopoulos, S. and E. Papaioannou (2012): National Institutions and African Development: Evidence from Partitioned Ethnicities, NBER Working Paper 18275.

[65] Michalopoulos, S. and E. Papaioannou (2013): Pre-colonial Ethnic Institutions and Contemporary African Development Econometrica, 2013, 81(1): 113152.

[66] Michalopoulos, S. and E. Papaioannou (2014): National Institutions and Subnational Development in Africa Quarterly Journal of Economics, 2014, 129 (1): 151-213

[67] Montalvo, Jos G. and Marta Reynal-Querol (2005). Ethnic Polarization, Potential Conflict and Civil Wars American Economic Review, 95(3): 796816

[68] Murdock, G. P. (1959): Africa: Its Peoples and Their Culture History. McGraw-Hill Book Company, New York.

[69] Murdock, G. P. (1967): Ethnographic Atlas. University of Pittsburgh Press, Pittsburgh, PA

[70] Naidu, S., (2010): Suffrage, Schooling and Sorting in the Post-Bellum U.S. South, mimeo, Harvard University

[71] Norris, Pippa and Robert Mattes (2003). Does Ethnicity Determine Support for the Governing Party? Afrobarometer Paper no. 26

[72] North, Douglass C. (1990): Institutions, Institutional Change and Economic Performance. New York: Cambridge University Press

[73] Nugent, Paul (1996): Arbitrary Lines and the Peoples Minds: A Dissenting View on Colonial Boundaries in West Africa, in Paul Nugent A. I. Asiwaju (Eds.), African Boundaries (pp. 35-67). London: Pinter

[74] Nunn, N. (2008): The Long Term Effects of Africas Slave Trades, Quarterly Journal of Economics, 123(1), 139176.

[75] Nunn, N. and L. Wantchekon (2011): The Slave Trade and the Origins of Mistrust in Africa, American Economic Review, 101(7), 32213252.

[76] Odugbemi, Sina. (1995, April 3). Consensus and Stability. West Africa, 501-503.

[77] Ottaway, Marina. (1999, February 25). Keep out of Africa. Financial Times. Retrieved March 8, 1999, from http://www.ft.com/search9/cgi/vtopic

[78] Posner, Daniel (2004a), The Political Salience of Cultural Different: Why Chewas and Tumbukas are Allies in Zambia and Adversaries in Malawi, American Political Science Review (2004), 98: 529-545

[79] Posner, Daniel (2004b), Measuring Ethnic Fractionalization in Africa, American Journal of Political Science, 48: 849863

[80] Rainer, Ilia and Francesco Trebbi (2012): New Tools for the Analysis of Political Power in Africa, NBER Working Paper No. 18424

[81] Rodrik, Dani, Subramanian, Arvind Trebbi, Francesco (2004): Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development, Journal of Economics Growth 2(6): 131-165

[82] Spolaore, E. and R. Wacziarg (2009): The Diffusion of Development, Quarterly Journal of Economics, 124(2), 469529.

[83] Touval, Saadia (1969): The Sources of Status Quo and Irredentist Policies, in Carl G. Widstrand (Ed.), African Boundary Problems (pp. 101-118). Uppsala, Sweden: Scandinavian Institute of African Studies

[84] White, Douglas (1987): Cross-Cultural Instructional Atlas Cultural Diversity Data Base; World Cultures Journal Volume 3-2

Figures

Figure 1: Ethnic and Partitioned Groups

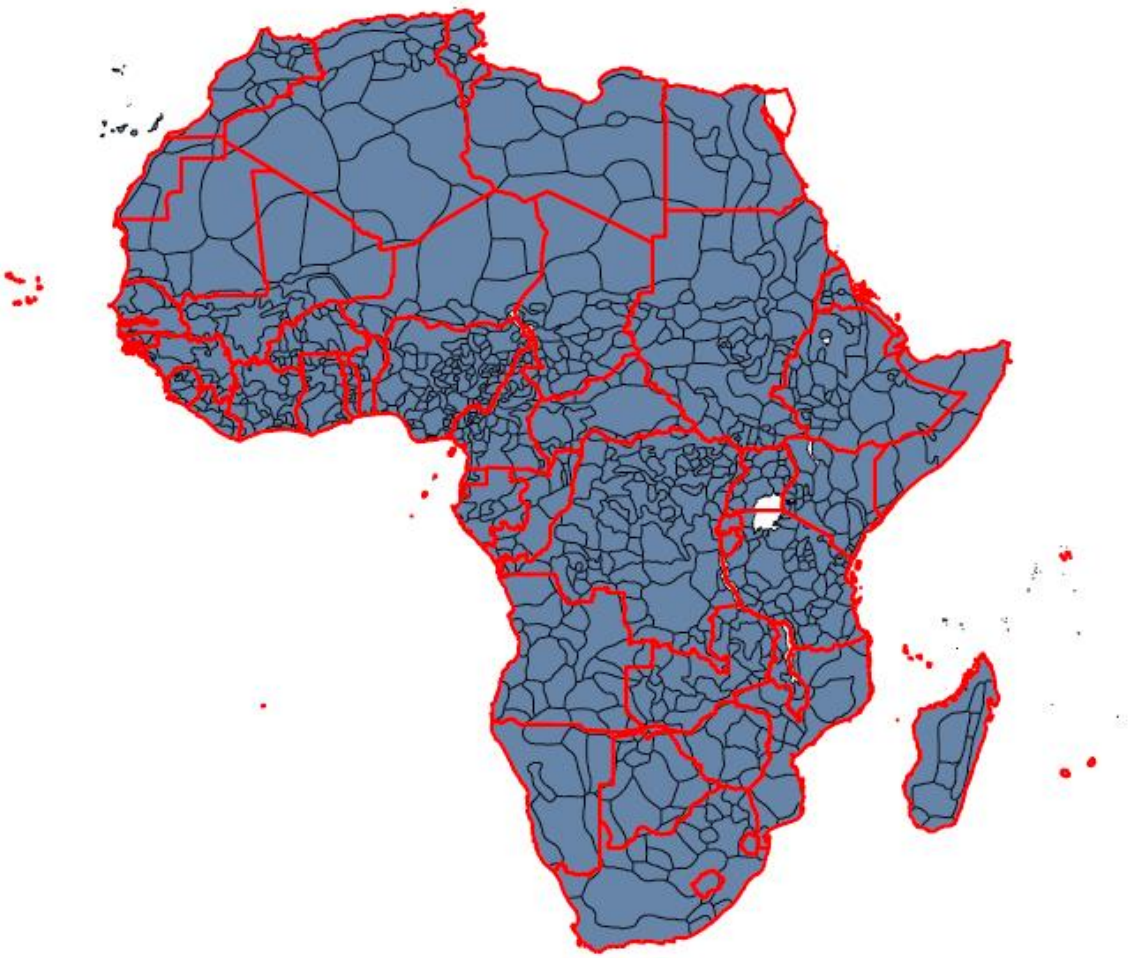


Figure 1: Ethnic and Partitioned Groups

Figure 2: Partition of the Aulliminden Group

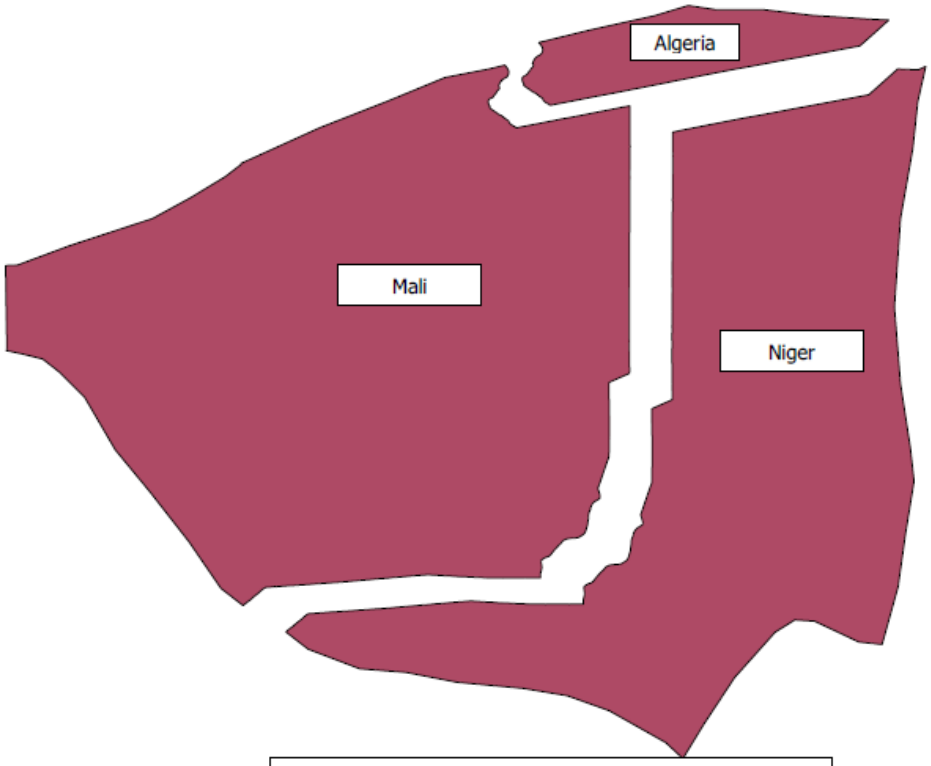


Figure 2: Partition of the Aulliminden Group

Figure 3: 1 km^2 Data on Total Economic Activity (converted into a Shapefile)

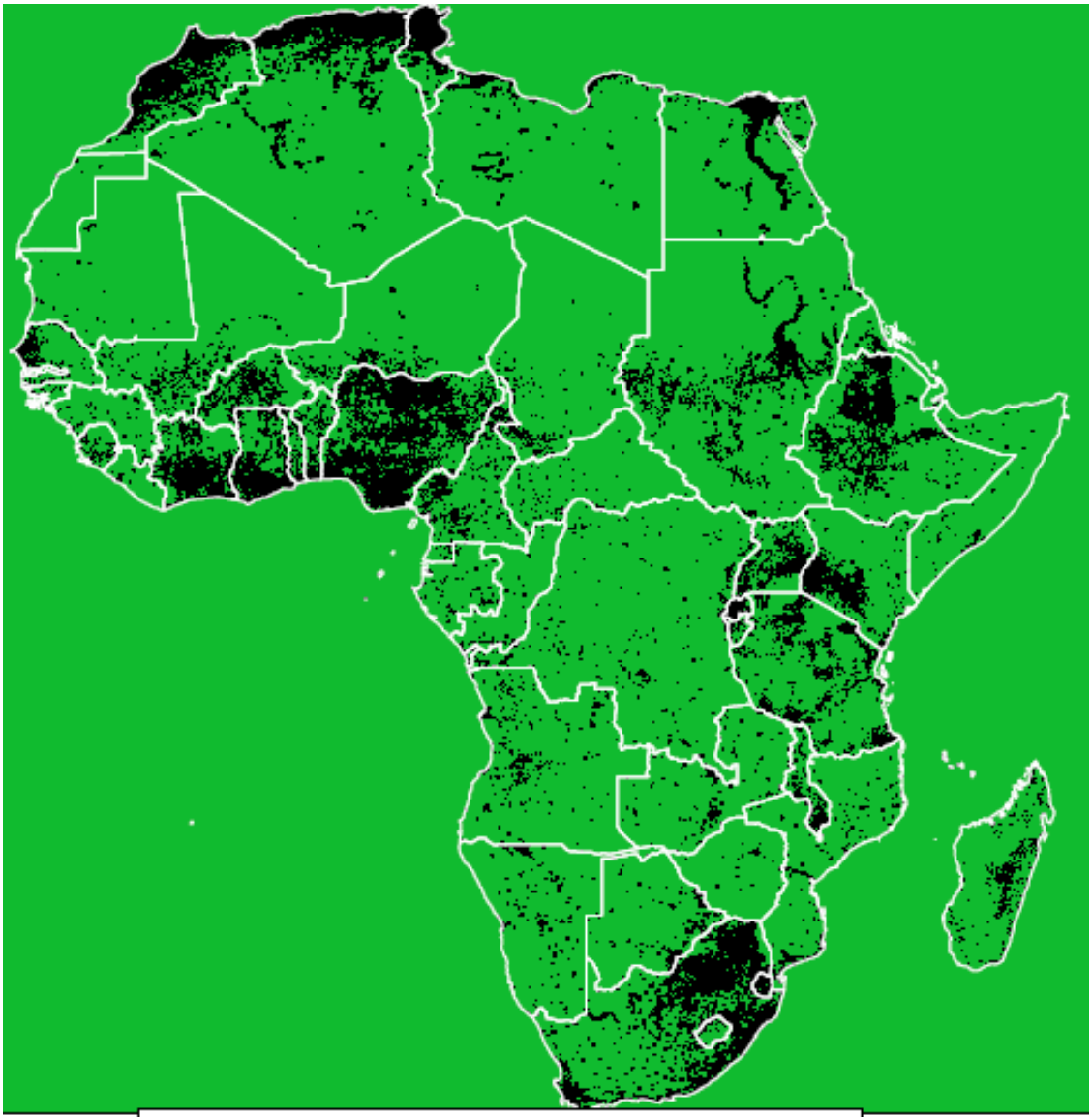
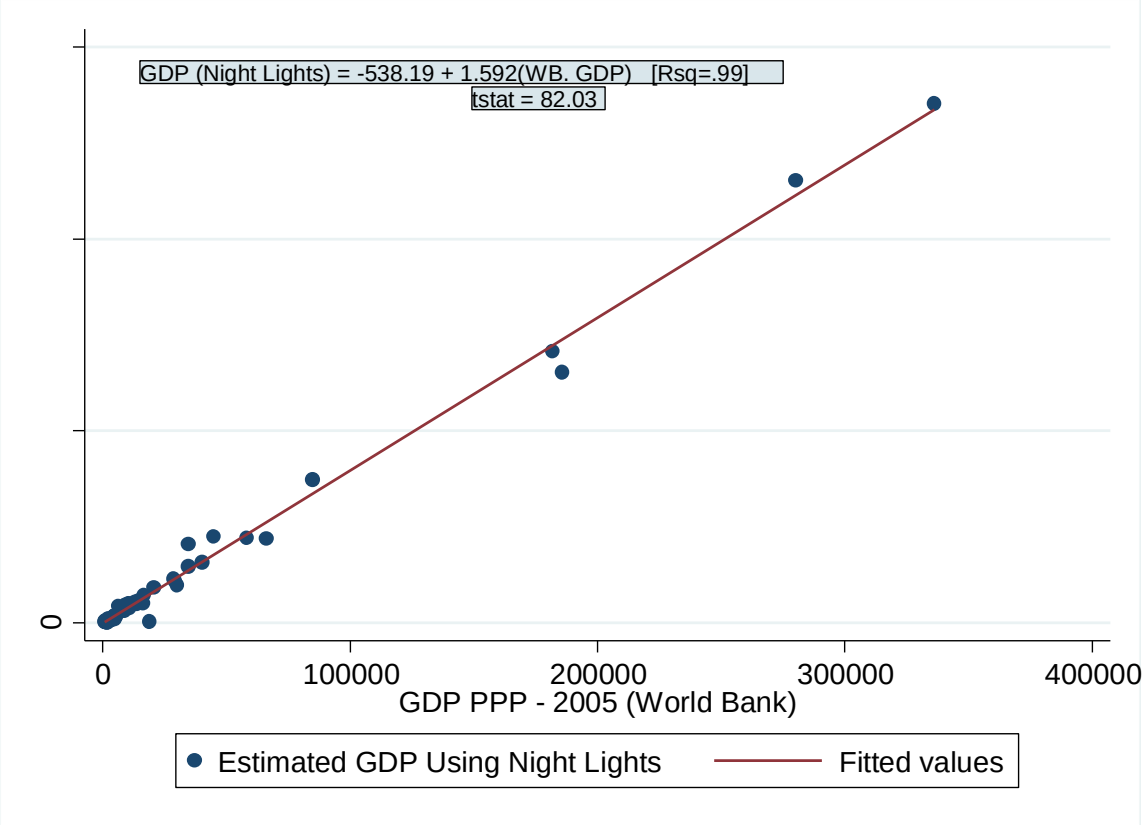


Figure 3: 1 km2 Data bout Total Economic Activity

Figure 4: Plot of Real GDP (WB) and Estimated Economic Activity (NOAA)



Tables

Table 1: Pairwise Correlation between Economic Activity and Light Density

	Mean Economic Activity	*Mean Light Density*
Mean Economic Activity	1.0000	
Mean Light Density (MP, 2013)	0.8899	1.0000

Table 2: Descriptive Statistics

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Mean Economic Activity	1292	.0797427	.3065981	0.0000015	7.251074
Log(0.01 + Mean Economic Act.)	1292	-3.358808	1.095653	-4.605155	1.982528
Population Density 2000	1292	51.10601	93.20523	.0259535	1840.406
Partition Dummy	1292	.6362229	.4812718	0	1
Group Share	1299	0.0376931	0.0815453	.00000001	0.9349209
Distance From the Sea (0-1 scale)	1292	.3451389	.2505322	0	1
Euclidean Distance from the Capital	1293	5.102033	3.612051	.0935305	19.72656
Mountainous Terrain (0-1 scale)	1292	.6024311	.0543366	0	1
Malaria Suitability (0-1 scale)	1292	.5971257	.2292412	0	1
Nr. Onshore Oil Fields	1158	.8186528	6.731543	0	148

Table 3: Cross-Group Analysis

	Dependent Var: Log (0.01+Mean Economic Activity)			
Estimation Method: OLS	Model 1	Model 2	Model 3	Model 4
Partitioned Group Dummy	-0.0488	-0.0914	-0.0896	-0.0679
	(0.0511)	(0.0685)	(0.0685)	(0.0690)
Group Share	1.023***	0.736**	0.809**	0.945**
	(0.291)	(0.373)	(0.376)	(0.441)
Country Fixed Effects	YES	YES	YES	YES
Observations	1,287	788	788	709
R-squared	0.738	0.765	0.768	0.767

Model 1 includes controls for population density in 2000, distance from the capital, mountainous terrain, and distance from the sea. Model 2 includes all the above controls plus dummies for settlement types from Murdock (1959). Model 3 includes also dummies for gathering dependence, and Model 4 dummies for jurisdictional Hierarchy. Double Clustered Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4: Selection of Groups into Regions

Estimator: OLS	***Dependent Variable: Share Partitioned Groups***
Population Density	-0.00253
	(0.00395)
Ethnic Fixed Effects	Yes
Observations	760
R-squared	0.41

Double Clustered Standard errors in parentheses

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

Table 5: Matched-Groups

Dependent Var: Log (0.01+Mean Economic Activity)			
Estimation Method: OLS	Model 1	Model 2	Model 3
Partitioned Group Share	1.327***	1.002**	1.049**
	(0.380)	(0.448)	(0.443)
Ethnic Fixed Effects	YES	YES	YES
Country Fixed Effects		YES	YES
Observations	822	817	817
R-squared	0.81	0.86	0.87
Sample	***Partitioned Groups***	***Partitioned Groups***	***Partitioned Groups***

Model 1 only includes population density in 2000 as an additional control. Model 2 includes controls for population density in 2000, distance from the capital, mountainous terrain, and distance from the sea. Model 3 includes controls in Model 2 plus population density in 1800, malaria suitability, nr. oil fields/surface area, soil suitability to crops. Double Clustered Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 6: Conley Robust Standard Errors

Dependent Var: Log (0.01+Mean Economic Activity)		
Estimation Method: Spatial HAC	Model 1	Model 2
Partitioned Group Share	1.049***	1.049***
	(0.238)	(0.224)
Ethnic Fixed Effects	YES	YES
Country Fixed Effects	YES	YES
Distance Threshold	100km	200km
Observations	817	817
R-squared	0.99	0.99
Sample	***Partitioned Groups***	***Partitioned Groups***

Controls for both models include: population density in 2000, distance from the capital, mountainous terrain, distance from the sea, population density in 1800, malaria suitability, nr. oil fields/surface area, soil suitability to crops. Conley (2008) HAC Spatial Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7: Dropping Small Groups

Dependent Var: Log (0.01+Mean Economic Activity)		
Estimation Method: Spatial HAC	Model 1	Model 2
Partitioned Group Share	1.163***	1.439***
	(0.438)	(0.480)
Ethnic Fixed Effects	YES	YES
Country Fixed Effects	YES	YES
Observations	612	607
R-squared	0.99	0.99
Sample	***Groups 10% of homeland***	***Groups 10% of homeland - 5 Outliers***

Controls include: population density in 2000, distance from the capital, mountainous terrain, distance from the sea, population density in 1800, malaria suitability, nr. oil fields/surface area, soil suitability to crops. Distance threshold = 100km. Conley (2008) HAC Spatial Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 8: Descriptive Statistics

	Clean	*Schools*	*Health*	*Taxes*	*Disputes*	*Land*	*Forests*	*Law*
Central government	2,989	13,696	14,837	14,043	4,907	7,470	12,254	17,483
Local government	8,594	8,528	8,636	9,198	9,172	9,740	6,780	5,141
Traditional leaders	1,466	655	531	928	8,622	6,725	2,351	1,826
Members of the community	13,706	2,869	1,787	846	3,513	1,870	3,362	1,578
None of them	87	175	183	225	180	201	297	262
State government	376	1,130	1,047	807	495	576	632	512
Total	27,218	27,053	27,021	26,047	26,889	26,582	25,676	26,802

Table 9: Persistence of Informal Institutions

Dependent Variable:	***Allocation of Land***	***Allocation of Land***	***Law and Order***	***Law and Order***
Estimation Method: OLS	Model 1	Model 2	Model 3	Model 4
Partition Dummy	0.0262	0.0272	0.00948	0.00780
	(0.0198)	(0.0203)	(0.00728)	(0.00795)
Group Share	-0.0108***	-0.0116***	-0.00367***	-0.00321**
	(0.00280)	(0.00265)	(0.00138)	(0.00158)
Constant	0.379***	0.416***	0.127***	0.157***
	(0.0598)	(0.0653)	(0.0233)	(0.0224)
Observations	21,548	18,938	21,649	19,000
R-squared	0.17	0.17	0.08	0.05

Model 1 and Model 3 include the following controls: GDP/Surface Area per group, a Urban Dummy, Individual fixed effects (i.e. age, sex, trust in democracy, employment status, trust in peers, education, etc), and country fixed effects. Model 2 and Model 4 also include dummies for regional provision of public goods (i.e. provision of electricity, piped water, a sewage system, health clinics, paved terrains, schools, whether there are any police or soldier stations in the district, etc). Double Clustered Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 10: Persistence of Informal Institutions

Dependent Variable:	***Cleaning***	***Manag. Schools***	***Manag. Health***	***Income Tax***	***Solving Disputes***	***Prot. Rivers***
Estimation Method: OLS	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Partition Dummy	0.0115*	0.00617	0.00387	0.0110	0.0124	0.00698
	(0.00678)	(0.00398)	(0.00420)	(0.00672)	(0.0265)	(0.00881)
Group Share	-0.00139	0.000202	-0.000251	-0.00066	-0.00529*	-0.00343*
	(0.00110)	(0.00102)	(0.000662)	(0.00109)	(0.00281)	(0.00177)
Constant	0.116***	0.0253	0.0265	0.062***	0.488***	0.285***
	(0.0196)	(0.0201)	(0.0180)	(0.0227)	(0.0814)	(0.0275)
Observations	19,205	19,151	19,143	18,585	19,056	18,493
R-squared	0.03	0.02	0.02	0.03	0.17	0.08

Controls included are the following: GDP/Surface Area per group, a Urban Dummy, Individual fixed effects (i.e. age, sex, trust in democracy, employment status, trust in peers, education, etc), country fixed effects, and dummies for regional provision of public goods (i.e. provision of electricity, piped water, a sewage system, health clinics, paved terrains, schools, whether there are any police or soldier stations in the district, etc). Double Clustered Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 11: Confining the Estimates to Partitioned Groups and Group Fixed Effects

Dependent Variable:	***Allocation of Land***	***Allocation of Land***	***Law and Order***	***Law and Order***
Estimation Method: OLS	Model 1	Model 2	Model 3	Model 4
Partitioned Group Share	-0.0524***	-0.0532***	-0.0273***	-0.0199***
	(0.00789)	(0.0118)	(0.00628)	(0.00514)
Constant	-0.209	-0.108	0.159	0.148
	(0.229)	(0.261)	(0.104)	(0.124)
Observations	14,347	12,902	14,349	12,914
R-squared	0.154	0.165	0.097	0.07

Model 1 and Model 3 include the following controls: GDP/Surface Area per group, a Urban Dummy, Individual fixed effects (i.e. age, sex, trust in democracy, employment status, trust in peers, education, etc), and country fixed effects. Model 2 and Model 4 also include dummies for regional provision of public goods (i.e. provision of electricity, piped water, a sewage system, health clinics, paved terrains, schools, whether there are any police or soldier stations in the district, etc). Double Clustered Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Appendix I

Table A1: Re-estimating Results in Table 5 Changing the Dependent Variable from Log (0.01+Mean Economic Activity) to Log(Mean Activity)

Dependent Var: Log (Mean Economic Activity)			
Estimation Method: OLS	Model 1	Model 2	Model 3
Partitioned Group Share	2.904***	2.862**	2.949**
	(1.112)	(1.354)	(1.388)
Ethnic Fixed Effects	YES	YES	YES
Country Fixed Effects		YES	YES
Observations	822	817	817
R-squared	0.8	0.86	0.86
Sample	***Partitioned Groups***	***Partitioned Groups***	***Partitioned Groups***

Model 1 only includes population density in 2000 as an additional control. Model 2 includes controls for population density in 2000, distance from the capital, mountainous terrain, and distance from the sea. Model 3 includes controls in Model 2 plus population density in 1800, malaria suitability, nr. oil fields/surface area, soil suitability to crops. Double Clustered Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A2: Mean Light Density Descriptive Statistics

Descriptive Statistics					
Variable	Obs	Mean	Std. Dev.	Min	Max
Mean Light Density (MP, 2013)*	679	.3702544	1.532257	0	25.1403
Mean Light Density (DMSP, 2007)	1297	.3308202	1.377083	0	25.1403

*Mean Light Density (MP, 2013) is the measure of mean light density in Michalopoulos, S. and E. Papaioannou (2013).

Table A3: Robustness Check using Mean Light Density as a Dependent Variable

Dependent Var: Log (0.01+Mean Lights)				
Estimation Method: Spatial HAC	Model 1	Model 2	Model 3	Model 4
Partitioned Group Share	3.313***	2.749***	3.217***	2.929***
	(0.749)	(0.699)	(0.873)	(0.777)
Ethnic Fixed Effects	YES	YES	YES	YES
Country F.E.	YES	YES	YES	YES
Observations	665	660	612	607
R-squared	0.973	0.976	0.973	0.979
Sample	***Groups 5% of homeland***	***Groups 5% of homeland***	***Groups 10% of homeland***	***Groups 10% of homeland***

Model 1 and Model 3 only include population density in 2000 as an additional control. Model 2 and Model 4 include: population density in 2000, distance from the capital, mountainous terrain, distance from the sea, population density in 1800, malaria suitability, nr. oil fields/surface area, soil suitability to crops. Distance threshold = 100km. Conley (2008) HAC Spatial Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix II: Data Description

Data Source		
Variables	Description	Source
Ethnic Groups Map		Murdock (1959,1967)
State Boundaries		Global Administrative Database (GADM)
Economic Activity	Satellite Imagery of light density from the National Geophysical Data Center (NOAA/NGDC)	Ghosh et al. (2010)
Population Density		Gridded Population of the World (GPW) - SEDAC
Partition Dummy	Intersection between state boundaries and ethnic groups location	Murdock (1959,1967) + GADM
Group Share	Group Area/Country Area	
Mountains /Terrains	Digital Elevation Model	FAO-GeoNetwork
Water Availability	Water Basins	FAO-GeoNetwork
Distance from the Sea	Distance to the Nearest Coast	NASA Ocean Biology Processing Group
Distance from the Capital	Euclidean Distance from the Capital	CEPII (cepii.fr)
Population Density in 1800	History Database of the Global Environment	HYDE
Onshore Oil Fields	Number of Oil Fields/Group Surface Area	UCDP/PRIO
Environmental Suitability to Malaria	1km^2 Spatial Data from a biological model which incorporates the effect of climate on 1) vector lifespan and 2) the duration of *P. falciparum* sporogeny.	Oxford Atlas Malaria Project
Crop Suitability	Digital Soil Map	FAO GEONETWORK
Settlement Types, Dependence on Gathering and Juridical Hierarchy		Murdock (1959, 1967)
Proxies for Informal Institutions		The Afrobarometer (IV Round)
Regional Provision of Public Goods	Dummies for the provision of electricity, of piped water, a sewage system, health clinics, paved terrain, schools, whether there are any police or soldier stations, etc.	The Afrobarometer (IV Round)
Individual Effects	Dummies for age, sex, trust in democracy, employment status, trust in peers, education, urban, etc.	The Afrobarometer (IV Round)

Appendix III: Partitioned Ethnic Groups and Number of Countries

Name	Countries	Name	Countries
ABABDA	2	LAMBYA	3
ACHOLI	2	LENDU	2
ADAMAWA	3	LIGBI, DEGHA (SE)	2
ADARAWA	2	LIMBA	2
ADELE	2	LIPTAKO	2
AFAR	3	LOBI	2
AHAGGAREN	2	LOGO	2
ALGERIANS	2	LOMWE	2
ALUR	2	LOTUKO	2
AMBA	2	LUAPULA	2
AMBO	2	LUCHAZI	2
AMER	2	LUGBARA	3
AMHARA	2	LUMBO	2
ANA	2	LUNDA	2
ANUAK	2	LUNGU	2
ANYANG	2	LUO	3
ANYI	2	LUVALE	3
ARAD	2	MABA	2
ASBEN	2	MADI	2
ASSINI	2	MAKONDE	2
ATTA	2	MAKUA	2
ATYUTI	2	MALINKE	6
AULLIMINDEN	3	MAMBILA	2
AUSHI	2	MAMPRUSI	2
AVATIME	2	MANDARA	2
AZANDE	3	MANGA	2
AZJER	3	MANYIKA	2
BABUKUR	2	MASA	2
BAJUN	2	MASAI	2
BAKWE	2	MASALIT	2
BALANTE	2	MASHI	2
BAMBARA	2	MASINA	3
BANDA	3	MATAKAM	2
BANGI	2	MATENGO	2
BANYUN	2	MBAGANI	2
BANZIRI	2	MBERE	3
BARABRA	2	MBUKUSHU	3

BARARETTA	3	MBUNDA	2
BARGU	4	MEBAN	2
BASARI	2	MENDE	3
BASHI	3	MERARIT	2
BATA	2	MIJERTEIN	2
BAYA	2	MINIANKA	3
BERABER	2	MITTU	2
BERABISH	2	MOBA	4
BERIBERI	2	MOBER	2
BERTA	2	MOMBERA	2
BIAFADA	2	MOSSI	2
BIDEYAT	4	MPEZENI	2
BIRIFON	3	MUNDANG	2
BOBO	2	MUNDU	2
BOKI	2	MURLE	2
BONDJO	2	MUSGU	2
BONI	2	NAFANA	2
BORAN	2	NALU	2
BRONG	2	NAMA	2
BUDUMA	2	NARON	2
BUEM	2	NAUDEBA	2
BULOM	2	NDAU	2
BUSA	2	NDEBELE	2
BUSANSI	3	NDEMBU	3
BWAKA	3	NDOGO	3
CHAAMBA	2	NDUKA	2
CHAGA	2	NEFUSA	2
CHAKOSSI	3	NGALA	2
CHAMBA	2	NGAMA	2
CHEWA	3	NGBANDI	2
CHIGA	3	NGERE	3
CHOKWE	2	NGUMBA	2
CHUABO	2	NGWAKETSE	2
COMORIANS	2	NGWATO	3
DAFI	2	NKOLE	3
DAGARI	2	NSENGA	3
DAGOMBA	2	NSUNGLI	2
DAN	2	NUER	2
DARI	2	NUKWE	4
DAZA	2	NUSAN	3

DELIM	2
DENDI	3
DIALONKE	3
DIDINGA	3
DIGO	2
DIOLA	3
DOGON	2
DRAWA	2
DUI-MENIA	2
DUMA	2
DZEM	3
EGBA	3
EKOI	2
ESA	3
EWE	2
FAJULU	3
FANG	4
FIGIG	2
FILALA	2
FON	3
FOUTADJALON	4
FUNGON	2
FUR	2
GADAMES	3
GANDA	2
GERI	2
GIL	2
GISU	2
GOBU	2
GOLA	2
GOMANI	2
GREBO	2
GRUNSHI	2
GUDE	2
GUIN	2
GULA	2
GULE	2
GUMUZ	2
GUN	2
GURENSI	3
NYAKYUSA	2
NYANGIYA	2
NYANJA	2
NYASA	3
NYORO	2
NZANKARA	2
ODODOP	2
OGADEN	2
PANDE	2
PARE	2
POPO	2
PUKU	3
REGA	2
REGEIBAT	2
RENDILE	2
RESHIAT	3
RIYAH	3
ROLONG	2
RONGA	3
RUANDA	5
RUFFA	2
RUNDI	4
RUNGA	3
SAADI	2
SAB	2
SABEI	2
SAHO	2
SAMO	2
SANGA	3
SANUSI	2
SEGEJU	2
SEKE	2
SENUFO	3
SERER	2
SHAMBALA	2
SHASHI	2
SHEBELLE	2
SHILA	2
SHUWA	3
SIA	2

GURMA	4	SILA	2
GUSII	2	SINZA	2
HA	2	SIWA	2
HABBANIA	3	SOKOTO	2
HADENDOWA	2	SOMBA	2
HAMAMA	2	SONGHAI	3
HAMYAN	2	SONINKE	3
HAUSA	2	SONJO	2
HAWIYA	2	SOTHO	2
HAYA	3	SUBIA	4
HEMAT	2	SUNDI	2
HERERO	2	SURI	2
HIECHWARE	2	SUSU	3
HLENGWE	3	SWAZI	3
HOLO	2	TABWA	2
IBIBIO	2	TAJAKANT	4
IFORA	2	TAMA	2
IMRAGEN	3	TAWARA	2
ISHAAK	2	TEDA	3
IWA	2	TEKE	3
JERID	2	TEKNA	2
JIE	2	TEM	2
KABRE	2	TENDA	2
KAKA	2	THONGA	3
KANEMBU	3	TIENGA	3
KANURI	2	TIGON	2
KAONDE	2	TIGRINYA	3
KAPSIKI	2	TIV	2
KARA	2	TLHARU	2
KARAMOJONG	2	TLOKWA	3
KARE	2	TOMA	2
KEBU	2	TONGA	2
KENTU	2	TOPOTHA	3
KGALAGADI	2	TORO	2
KGATLA	2	TRIBU	2
KHARGA	2	TRIPOLITANIANS	2
KISI	2	TUBURI	2
KISSI	3	TUKULOR	2
KOBA	2	TUMBUKA	2
KOMA	2	TUNISIANS	2

KOMONO	2
KONGO	3
KONJO	2
KONKOMBA	2
KONO	2
KONYANKE	2
KORANKO	2
KOREKORE	3
KOTA	2
KOTOKO	2
KOTOPO	2
KOYAM	2
KPELLE	3
KRAN	2
KREISH	2
KUKU	2
KULANGO	3
KUNDA	3
KUNG	2
KUNTA	2
KUNYI	2
KWANGARE	2
LAKA (ADAMAWA	3
LALA	2
LAMBA	2
TURKANA	2
UDALAN	3
VAI	2
VENDA	2
VERE	2
VILI	4
WAKURA	2
WANGA	2
WIDEKUM	2
WOLOF	2
WUM	2
XAM	2
YAKA	2
YAKOMA	2
YALUNKA	2
YAO	3
YOMBE	3
ZAGHAWA	2
ZEKARA	2
ZENEGA	2
ZERMA	2
ZIMBA	2
ZULU	2
ZUMPER	2
Total	830