How is Development Shared in Africa?

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Ethnic politics are widely understood to be a primary driver in many African states' development outcomes. In particular, the inclusion or exclusion of ethnic groups from access to state power has recently been subject of intensive study. Existing large-sample studies typically relate leader ethnicity to improvement in coethnic development outcomes, or provide case-study evidence. I provide the first systematic evidence for the importance of inclusion into government along the extensive and intensive margin for development outcomes. I further find strong evidence that group population size is a crucial moderating force for this development effect, and relate this finding to the theoretical literature on the importance of group size.

I. Introduction

Ethnic politics is widely understood to be a primary driver in many African states' development outcomes. In particular, the inclusion or exclusion of ethnic groups from access to state power has recently been subject of intensive study. Existing large-sample studies typically relate leader ethnicity to improvement in coethnic development outcomes, or provide case-study evidence. I provide the first systematic evidence for the importance of inclusion into government on the extensive and intensive margin for development outcomes. I further find strong evidence that group population size is a crucial moderating force for this development effect, and relate this finding to the theoretical literature on the importance of group size.

I first show using 40 African states and time variation of light density within ethnic regions that inclusion into the executive increases development in coethnic regions. I find group size is a crucial moderator to this effect. Next, I replicate these results with a subsample of 15 African states for which I have detailed data on cabinet ethnic composition. Using this subsample, I use both between- and within-group variation to show that the relationship between group size and the effect of inclusion is strengthened when intensity of inclusion, measured by proportion of cabinet shares allocated to coethnics, is considered. I interpret these findings as completing the 'missing link' from elite patronage to development outcomes put forward by Francois, Rainer and Trebbi (2015).

Although the link between ethnicity and development is an old question in political science, Easterly and Levine (1997) marks the seminal entry by economists. The authors posit that ethnic diversity works through social polarization to retard economic development. Work by Nunn and Wantchekon (2011) raised the importance of ethnicity as a mechanism through which intensity of enslavement

impacts contemporary development and later ethnic fractionalization. Alesina, Michalopoulos and Papaioannou (2015) finds that ethnic fractionalization has a significant negative impact on development outcomes, measured by satellite luminosity. Dimico (2016) find that while the quasi-random partition of ethnic groups by European colonizers had little impact on development outcomes, relative group size is positively related to later development outcomes.

Recently, Giacomo De Luca (2015) map leader ethnicity to coethnic development outcomes proxied by satellite luminosity and reject the salience of ethnic patronage in Africa. Franck and Rainer (2012) find a positive effect of leader coethnicity on health and education outcomes. Case studies in Kenya by Kramon and Posner (2016) and Burgess et al. (2015) find strong evidence for changes in the ethnic composition of government causing changes in coethnic education and infrastructure projects, respectively. These studies have in mind the 'Big Man' theory of African state governance, in which the leader is a relatively unconstrained autocrat who need only direct patronage to his own ethnic group to stay in power. Indeed, this theory is made formal in Padro i Miquel (2007), and returns in Burgess et al. (2015). In contrast, Francois, Rainer and Trebbi (2015) (henceforce FRT) develop a model where own-group support is generally insufficient to maintain power. Similar to the argument by Arriola (2009), FRT frame the leader problem as optimally allocating patronage to ethnic elites to balance extraconstitutional threats. These elites are assumed to be able to offer the loyalty of their coethnic citizens in exchange for state patronage. A key prediction of their model is that the amount of patronage offered to groups of coethnic elites is increasing but concave in the population size of the ethnic group they represent.

In this article I provide evidence that ethnic politics matter for development outcomes. I complement the evidence for elite patronage in FRT with on-the-ground development outcomes, and partially substantiate the predictions by FRT on the effects of group size.

The remainder of the paper is organized as follows. Section II discusses the data, Section III the empirical method, Section IV presents results, Section V discusses these results, and Section VI concludes.

II. Data

The use of satellite luminosity data as a proxy for development is a relatively recent innovation in development economics. The canonical reference for using these data to proxy growth at the subnational level is Henderson, Storeygard and Weil (2012). Following on their work, satellite light data has been used by several authors in conjunction with ethnic regional data, notably by Michalopoulos and Papaioannou (2013). Data collection is run by scientists at the National Oceanic and Atmospheric Administration (NOAA) and are made available to the public. These photographs have resolution of 30 arc-seconds (approximately one squared kilometer) and are available at yearly frequency from 1992 to 2013. I first overlay these raster satellite images over a vectorized map of ethnic regions in Africa,

then average light intensity spatially within each ethnic region. The validity of nighttime luminosity as a proxy for development due to ethnic patronage rests on two channels from the regime to regional development outcomes. The first channel is the direct effect of government investment: transportation minsters may favour coethnic regions for the building of roads, education and health ministers may build schools and hospitals in coethnic areas. Arguments for this channel are found in Posner (2005) and Burgess et al. (2015). Government infrastructure such as hospitals are often lit at night, making light luminosity particularly helpful for detecting differential government investment. The second channel is more indirect, and occurs when the state impose policies that differentially impact incomes across ethnic regions. This is the main channel in Padro i Miquel (2007) and Kasara (2007), who find that governments target taxation policies to differentially benefit ethnic groups, for example, providing a tax break or subsidy to a crop farmed primarily by coethnic groups. While both possibilities would generate a detectable effect of coethnic representation, they may have differential timing or longevity. For example, favourable economic policies may be easier to reverse than government infrastructure investments. Similarly, favourable economic policies may take a more immediate effect than building infrastructure, which may include policy lag. As such, I consider a range of lags to explanatory variables, to better catch one or both of these channels in operation.

To link development outcomes with political variables I use several spatial datasets of African ethnicities. For the main sample analysis, I use the Geographic Ethnic Power Relations dataset from Wimmer, Cederman and Min (2009). This dataset combines the Geo-Referencing of Ethnic Groups (GREG) dataset with Ethnic Power Relations data on politically salient coalitions of ethnicities. The EPR dataset further codes the status of each politically-relevant ethnic coalition's access to state power, from discriminated to monopolistic. Because coding the exact status differences within included or excluded groups is a complex task based on a variety of potentially subtle criteria, I aggregate this variable into a dummy variable simply indicating inclusion or exclusion from government.
[1]

There is a methodological distinction to be drawn between using self-reported ethnicity irrespective of place of residence with geographic regions corresponding to ethnic groups. The former approach makes use of the ethnicity information in the Demographic Health Survey (DHS). The DHS links each survey respondent to a group of linked ethnicities defined by the surveyors called a cluster. Development outcomes are then tracked according to how respondents of the same ethnic cluster fare. The latter approach, which I use in this article, is to identify geographic regions associated with different ethnicities, then track development outcomes of each geographic reason. The advantage of the former approach is that

[1] In particular I consider an ethnic group included in government if EPR codes it as a Junior Partner, Senior Partner, or Dominant. At the risk of boring the reader, this will code as excluded any group that is coded by EPR as Discriminated, Self-excluded, or Powerless. I exclude the 1% of state-years coded as state collapse.

a relative change in the development outcomes of an ethnic cluster measures the relative benefit of being a member of an ethnic cluster, rather than the benefit of living in a particular region. Furthermore, ethnic regions may change geographically over time, or represent more or less of a coethnic population living within a country. However, using self-reported ethnicity means the mechanism of how the state achieves this patronage is less clear. For example, how does the state target a particular ethnicity living in a diverse metropolis with excludable patronage? In contrast, the benefit of using ethnic regions instead of ethnic identity directly is that ethnic regions are themselves the proxy though which the state channels resources to its preferred ethnicity. For example, by building roads (see Burgess et al. (2015)), schools, or other infrastructure (Posner (2005). Spatial differentiation of ethnic groups helps solve the problem of non-excludability of public goods, or the difficulty targeting particular ethnicities with favourable economic policy.

In my subsample of 15 states where minster ethnicity data is available, I require a spatial dataset with a low-level definition of ethnic groups, unlike the aggregated ethnic clusters from EPR, to match individual minister ethnicities with geographic regions. For this, I use data from the Global Research Department of the International Mission Board, a nonprofit Evangelical Christian organization focused on missionary work. The research division has 3,700 field personnel and local evangelical partners. These researches collect data on population, development status, state capacity, and several religiosity measures. From these I retain only the spatial data on ethnic home regions and ethnicity name or group.

For minister ethnicity data, I use the sample from Francois, Rainer and Trebbi (2015). These data were collected by researchers on the universe of ministers from independence to 2004 from Benin, Cameroon, Cote d'Ivoire, Democratic Republic of Congo, Gabon, Ghana, Guinea, Liberia, Nigeria, Republic of Congo, Sierra Leone, Tanzania, Togo, Kenya, and Uganda. This subsample represents roughly 45% of the continent's population, and from these data I am able to match 90% with ethnic regions in the International Mission Board data. The majority of the 10% I was unable to match occurs when a ministers ethnicity listed as Other in the minister data, which I drop from the analysis.

I collect data on the ethnicity of African heads of state from two sources. The first, covering the period 1992 to 2004, is from Fearon, Laitin and Kasara (2007). The second source is Hodler and Raschky (2014), covering up to 2012. When the ethnicity recorded by these authors conflicted, I code a secondary ethnicity. All results are robust to using one or both ethnicities. I match this dataset of leader ethnicity to the ethnic clusters in EPR. When the match between an EPR ethnic cluster and leader ethnicity was not obvious, I consulted Morrison et al. (1972). In a minority of cases the match between an EPR cluster and leader ethnicity was sufficiently unclear that I dropped the leader from the analysis.

III. Method

A. EPR Sample: Extensive Margin

I first look for systematic evidence that inclusion of an ethnic group into executive power generates positive development effects for the included ethnicity. I use a difference-in-differences approach, comparing included groups with excluded groups before and after inclusion into government.

$$L_{rct} = \beta_1 inc_{r,c,t-1} + \delta_{rc} + \delta_t + \varepsilon_{rct} \tag{1}$$

Here r indexes ethnic region, c country, and t year. Dependent variable L_{rct} is the mean of satellite luminosity data within ethnic homeland r at time t, inc_{rct} is a dummy indicating inclusion of the ethnicity living in region r into country c's executive, and δ_{rc}, δ_t are region-country and time dummies. I consider a number of lags in the treatment variable to allow the observed effects of policies or development projects to be realized after a policy lag. I also present results with linear ethnic region time trends and country-time fixed effects to remove aggregate country shocks and thereby measure relative ethnic region performance.

I next include a leader coethnicity dummy into (1), to test whether the effect on development of leader coethnicity operates chiefly through inclusion into government. I use the same empirical approach as (1), but include a dummy for coethnicity of region r with the country head of state.

The threat to causal inference with this approach, as with all difference-in-differences models, is a failure of the parallel trend assumption, here represented by the possibility that groups which will be included in the future (or have a leader in the future) follow a different trend in satellite luminosity than those who will not be included or have a head of state elected. Perhaps the most obvious violation in this vein will occur when political inclusion and increased light density are both the result of a change in the internal power distribution between ethnicities. I address this possibility by including linear ethnic-group trends in light density. To the extent that the differential trend in development is observable before the inclusion into government, a linear time trend will resolve the threat to identification up to the first order.

Finally, I investigate whether the effects of patronage provided through representation in the government is more diffuse the larger the group population. For robustness I consider several alternative channels, including size of the government at the time of inclusion and ethnic region area.

$$L_{rct} = \beta_1 inc_{r,c,t-1} \times size_{r,c} + \beta_2 inc_{r,c,t-1} + \delta_{rc} + \delta_t + \varepsilon_{rct} \tag{2}$$

Note that time variation in group size is not available, so that the effect of size independent from inclusion is absorbed into fixed ethnic group effects.

B. FRT Sample: Intensive Margin

Next I consider the subsample of fifteen countries where individual minister ethnicity data are available. I first replicate the extensive margin results above on using within-country variation, where inclusion is defined as having at least one ministerial position filled by a coethnic.

$$L_{rct} = \beta_1 inc_{r,c,t-1} + \beta_2 inc_{r,c,t-1} \times popshare_{r,c,t-1} + \delta_c + \delta_t + \varepsilon_{rct} \tag{3}$$

I next look for evidence of a development premium along the extensive margin of inclusion. In particular, I examine whether a higher share of ministerial appointments lead to better development outcomes. The baseline specification uses within-country variation among ethnic groups.

$$L_{rct} = \beta_1 govshare_{r,c,t-1} + \beta_2 govshare_{r,c,t-1} \times popshare_{r,c} + \delta_c + \delta_t + \varepsilon_{rct} \tag{4}$$

Where *govshare* is the percentage of ministerial seats allocated to ethnicity r in country c at time $t-1$. I additionally run the above specification including region dummies, and so use cross-country variation within ethnic group after accounting for country differences common to all groups. This approach relies on the argument that ethnic regions spanning multiple countries are similar in unobservable characteristics, so the extent to which differ in development outcomes, after accounting for cross-country differences common to all groups, reflects differences in inclusion and population share across national boundaries.

C. Robustness

In order to rule out competing channels from inclusion to development outcomes I perform a number of robustness checks. One competing explanation is the geographic size of ethnic groups. If large groups inhabit more-than-proportionally larger areas, or have higher population density, then the concavity of the inclusion effect in group size may in fact simply reflect averaging over systematically different sized areas. To address this, I include an interaction of the log of squared kilometers with my regressors and show that differences in area are not driving the results. A more subtle confound is that by including a new group the share of the population represented by government increases, ceteris paribus. Including a larger group thus makes the government more representative than including a smaller group. I thus interact inclusion with a measure of government representativeness, and show that this channel is only significant to the extent that increasing representativeness is correlated with the size of the included group.

An interesting possibility is that those ethnic groups which experience a positive economic shock increase in value or threat to the existing regime, and so are more likely to be included. This becomes a threat to identification if this growth is

persistent, so that past growth predicts both inclusion and more future growth, which the specifications presented above will confuse as the effect of inclusion. Although I discuss above inclusion of a linear trend to mitigate this possibility, I further regress inclusion on lagged light density to detect signs of reverse causality.

IV. Results

A. Main Tables

Table 1 presents the results from specifications (1) and (2) from the sample of 40 African countries from 1992-2013 on the effect on inclusion on light density. Columns (1) through (3) present the main results from inclusion and leader co-ethnicity. Columns (4) through (6) include group population share of country c as an interaction term.

	(1)	(2)	(3)	(4)	(5)	(6)
Leader	0.0787		0.0554	0.166	0.0622	0.152
	(0.0676)		(0.0673)	(0.108)	(0.0663)	(0.106)
Included		0.118*	0.109*	0.110*	0.197***	0.184***
		(0.0629)	(0.0637)	(0.0637)	(0.0661)	(0.0669)
Leader × Group size				-0.417**		-0.341*
				(0.202)		(0.203)
Included × Group size					-0.466*	-0.399
					(0.255)	(0.268)
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3169	3169	3169	3169	3169	3169

* $p < .1$, ** $p < .05$, *** $p < .01$. Heterskedasticity-robust standard errors in parentheses. Clustering is at country level

The group size interaction is a crucial moderator to the effect of inclusion into government. When included, the baseline effect of inclusion and coethnicity increases in magnitude, and falls sharply for more populous groups. When both leader coethnicity and inclusion are interacted with group size, inclusion emerges as the more significant channel in explaining ethnic patronage.

Table 2 presents the replication of Table 1 using within-country variation in the subsample where ministerial data is available. The dependent variable $incl_{r,c,t}$ is a dummy variable for at least one coethnic minister present in the cabinet. I use within-country variation as my baseline specification, and to control for unobserved ethnic region effects, I use an alternative specification that uses within ethnic region and cross-country variation, which augments the within-ethnicity specification with cross-country variation when ethnic regions span multiple countries.

	(1)	(2)	(3)	(4)	(5)	(6)
Included	1.032***	1.014***	0.812**	0.812**	0.214	0.313**
	(0.250)	(0.262)	(0.354)	(0.354)	(0.165)	(0.108)
Leader		0.172	0.0422	0.0422	0.00578	-0.120
		(0.308)	(0.321)	(0.321)	(0.199)	(0.181)
Popshare			3.745	3.745	-5.457	-1.620
			(5.210)	(5.210)	(4.529)	(4.088)
Included × Popshare			0.692	0.692	2.257	-2.511
			(6.278)	(6.278)	(5.197)	(4.122)
Region FE	No	No	No	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3000	3000	3000	3000	3000	3000

* $p < .1$, ** $p < .05$, *** $p < .01$. Heterskedasticity-robust standard errors in parentheses. Clustering is at country level

Columns (1) through (4) introduce the regressors of interest. Column (5) uses ethnic region dummies instead of country dummies, and column (6) is the most stringent specification, with country and ethnic region dummies. Note that unlike the full sample, in the subsample population share is time-varying, and so can be included without interaction. The interaction effect between inclusion an group size, estimated

Table 3 presents results from the intensive margin of inclusion. The dependent variable $govshare_{r,c,t}$ is the share of ministerial positions from ethnicity r in country c and time t.

	(1)	(2)	(3)	(4)	(5)
Govshare	7.741***	8.536***	15.04***	6.816***	6.226**
	(5.84)	(5.36)	(6.92)	(3.87)	(2.72)
Leader		-0.532	-0.501	-0.198	-0.275
		(-1.65)	(-1.56)	(-0.87)	(-1.18)
Popshare			9.766***	0.0542	-1.003
			(3.90)	(0.02)	(-0.21)
Govshare × Popshare			-72.03***	-33.56***	-29.05**
			(-6.59)	(-2.98)	(-2.74)
Region FE	No	No	No	Yes	Yes
Country FE	Yes	Yes	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	3000	3000	3000	3000	3000

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$.

Heterskedasticity-robust standard errors in parentheses. Clustering is at country level

The effect of increasing representation in government is positive and significant across all specifications, and the leader coefficient is negative and insignificant. This underscores the importance of not using leader coethnicity in isolation to

measure ethnic patronage.

B. Robustness Results

Table 4 returns to the full sample, and presents the robustness of the results to interacting region area in addition to group size, and splits the sample according to median Polity score, as a proxy for institutional quality, and median total country light.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Included	0.0830	0.161	0.128	0.109*	0.197***	0.185**	-0.234
	(0.396)	(0.419)	(0.420)	(0.0637)	(0.0661)	(0.0895)	(0.610)
Leader			0.0628	0.0553	0.0621	-0.00712	0.0750
			(0.0667)	(0.0673)	(0.0663)	(0.0487)	(0.0898)
Included × log km^2	0.00329	0.00403	0.00647				0.0420
	(0.0386)	(0.0384)	(0.0385)				(0.0610)
Included × Group size		-0.447*	-0.467*		-0.466*	-0.0263	-0.424*
		(0.252)	(0.253)		(0.255)	(0.469)	(0.242)
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Full	Full	Full	Full	Full	Polity	Light
Observations	3154	3154	3154	3169	3169	1798	1533

* $p < .1$, ** $p < .05$, *** $p < .01$. Heterskedasticity-robust standard errors in parentheses. Clustering is at country level

Table 5 tests for robustness to reverse causality directly by regressing inclusion and leadership coethnicity on lagged lights data.

	(1)	(2)	(3)	(4)
	Included	Included	Leader	Leader
L_{t-1}	0.0519	0.0621**	0.0147	0.0101
	(0.0407)	(0.0300)	(0.0151)	(0.00991)
L_{t-2}		0.00444		0.00756
		(0.0320)		(0.0103)
Region FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	4090	3855	3204	2991

* $p < .1$, ** $p < .05$, *** $p < .01$. Heterskedasticity-robust standard errors in parentheses. Clustering is at country level.

Significance here does not necessarily contradict the results above, because inclusion does not have to be exogenous per se, and I allow for a linear pre-trend in light density. However, if past light predicts that inclusion occurs simultaneously with a change in the trend for future light, identification of the causal effect of inclusion and leader coethnicity is confounded.

Table 6 presents robustness to controlling for the size of the government coalition at the time of inclusion.

	(1)	(2)	(3)	(4)
Included	0.0975	0.151**	0.182	0.221*
	(1.57)	(2.70)	(1.64)	(1.74)
Leader	0.0469	0.0333	0.0326	0.0439
	(0.81)	(0.64)	(0.61)	(0.85)
Pop share in coalition		-0.167	-0.115	-0.0757
		(-1.34)	(-0.54)	(-0.34)
Included × Pop share in coalition			-0.0754	-0.0515
			(-0.35)	(-0.24)
Included × Group size				-0.365
				(-1.36)
Region FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	3338	3338	3338	3338

t statistics in parentheses

* p<0.1, ** p<0.05, *** p<0.01. Heteroskedasicity-robust standard errors in parentheses.

V. Discussion

The results suggest that inclusion into the regime is as important quantitatively as coethnicity with the regime leader, and more precisely estimated. Considering inclusion along the intensive margin, by share of coethnic ministerial appointments, strengthens these results considerably. In addition, group size is a crucial moderator on the effect of inclusion: the largest benefit to inclusion is for small groups, while the benefit to inclusion declines sharply for larger groups.

The importance of both inclusion and group size provide evidence for the more nuanced view of African ethnic governance politics put forward by FRT. Leaders must share rents with elites from different ethnicities in order to guard against deposition through coups and rebellions. Elites from larger groups are offered less-than-proportionately larger patronage to join the regime, leading to a concavity of patronage over group size. This concavity in patronage allocation is generated in their model by the resolution of two oppositional forces in their model. The first is when a large group assumes power, they need include less elites from the rest of the population to form a stable coalition, which increases the available rents to share among the large leadership group. Knowing this, any leader needs to allocate more to large group elites. The second force, in opposition to the first, is that when a large group takes control, there are more elites to share the residual spoils after building a stable coalition of ethnicities. This makes a coup relatively less valuable, and so knowing this, any leader can co-opt members from a larger

group for less. In FRT's model this second force dominates the first sufficiently that they generate a concave but strictly increasing relation between patronage and group size.

The results in this article draw the missing link from FRT's model of elite patronage to on-the-ground development outcomes. This is notable because it suggests direct accountability of group elites to group members. However, drawing a direct link from elite patronage to group member development outcomes is complicated by the steep concavity I find in group size. The results above suggest that the inclusion effect is sufficiently concave that larger groups receive a smaller total benefit from inclusion than smaller groups. To reconcile this result with FRT, there must be an additional nonlinearity in the diffusion of elite patronage to group members. Several potential mechanisms suggest themselves. For example, if elite monitoring by group members is more difficult for larger groups, the amount of rent captured by elites may increase more than linearly with group size. A second possibility is that smaller groups find it easier to overcome collective action problems, and are so better able to direct patronage to projects that benefit all group members.

VI. Conclusion

I have presented evidence that inclusion into government leads to higher development outcomes, as proxied by mean regional luminosity. This positive inclusion effect operates along both the extensive and intensive margin. The direct relationship between the ethnic composition of the state executive and coethnic development outcomes reinforces evidence for the salience of ethnicity in the African political context.

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VII. Appendix

A. Data Descriptives

Below are some descriptive statistics from the subsample of African states with minister ethnicity data.

	N	mean	median	max	min
govshare	3432	.0554133	.0333333	.4705882	0
popshare	3432	.0550605	.03	.39	.004
leader	3432	.0646853	0	1	0
lights	3250	1.349075	.03775	60.00893	0

Below are some descriptive statistics from the full sample of African states.

	N	mean	median	max	min
inclusion	4325	.5972254	1	1	0
popshare	4325	.1679589	.094	.964	.0002
leader	3422	.1835184	0	1	0

B. Sample Variation

Below I present the source of identifying variation for the results by year and country in the subsample of fifteen states used for identifying the intensive margin effect of inclusion. I partial out country and year fixed effects from dependent and independent variables, then normalize and plot the squared residuals. This approach provides a transparent check on those countries and years which provide the identifying variation for the coefficients of interest.

From the figures, no single year has a disproportionate share of identifying variation. There is an outlying country, Tanzania, which accounts for nearly 20% of identifying variation by country. Dropping Tanzania from the analysis significantly improves precision of the regressors of interest, and increases the magnitude of the effect from an increase in inclusion.

C. Lights Data

Figure II showcases my data on ethnic regions from Evangelical Mission and satellite luminosity data. It is a detail of Nigeria, with snapshots from 1992, 2003, and 2013.

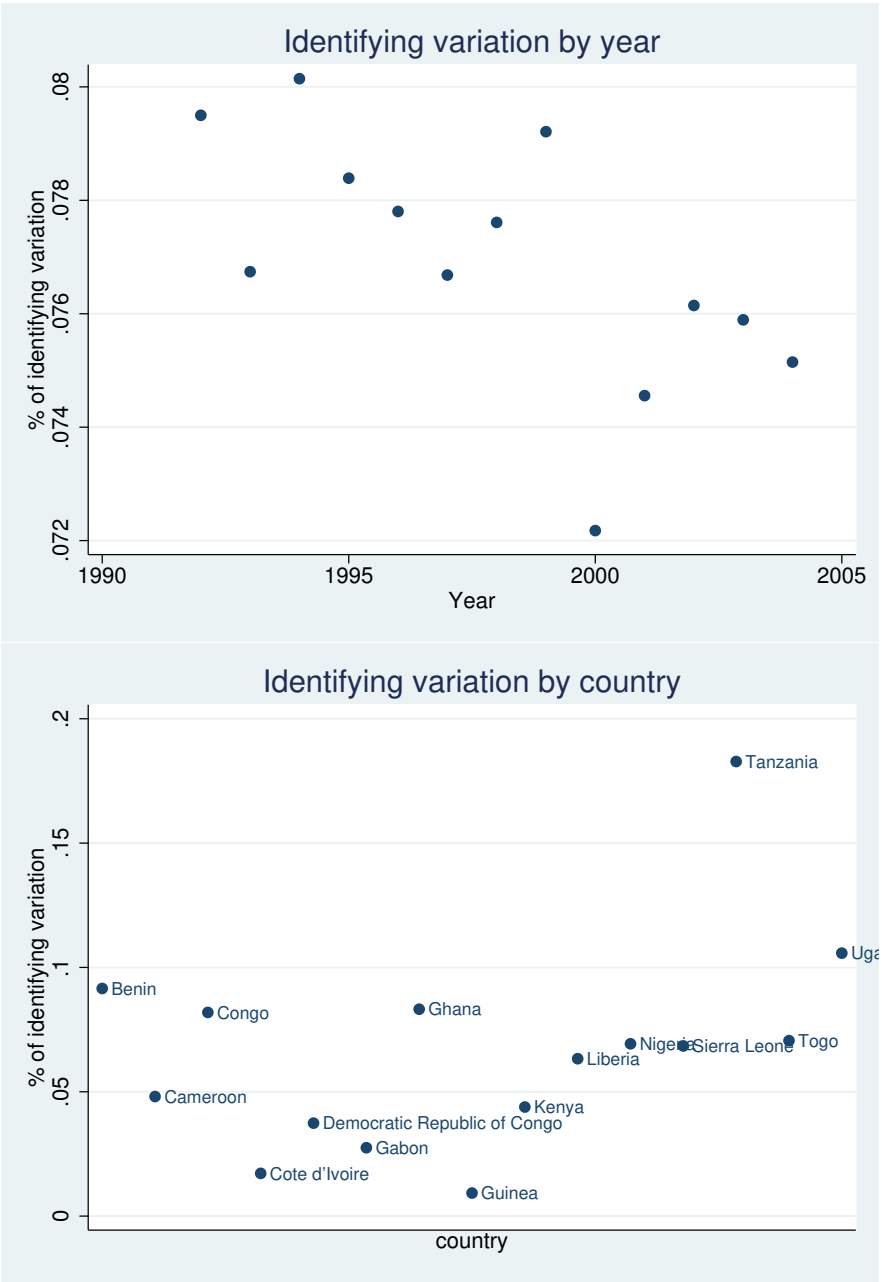

FIGURE 1. SAMPLE IDENTIFYING VARIATION

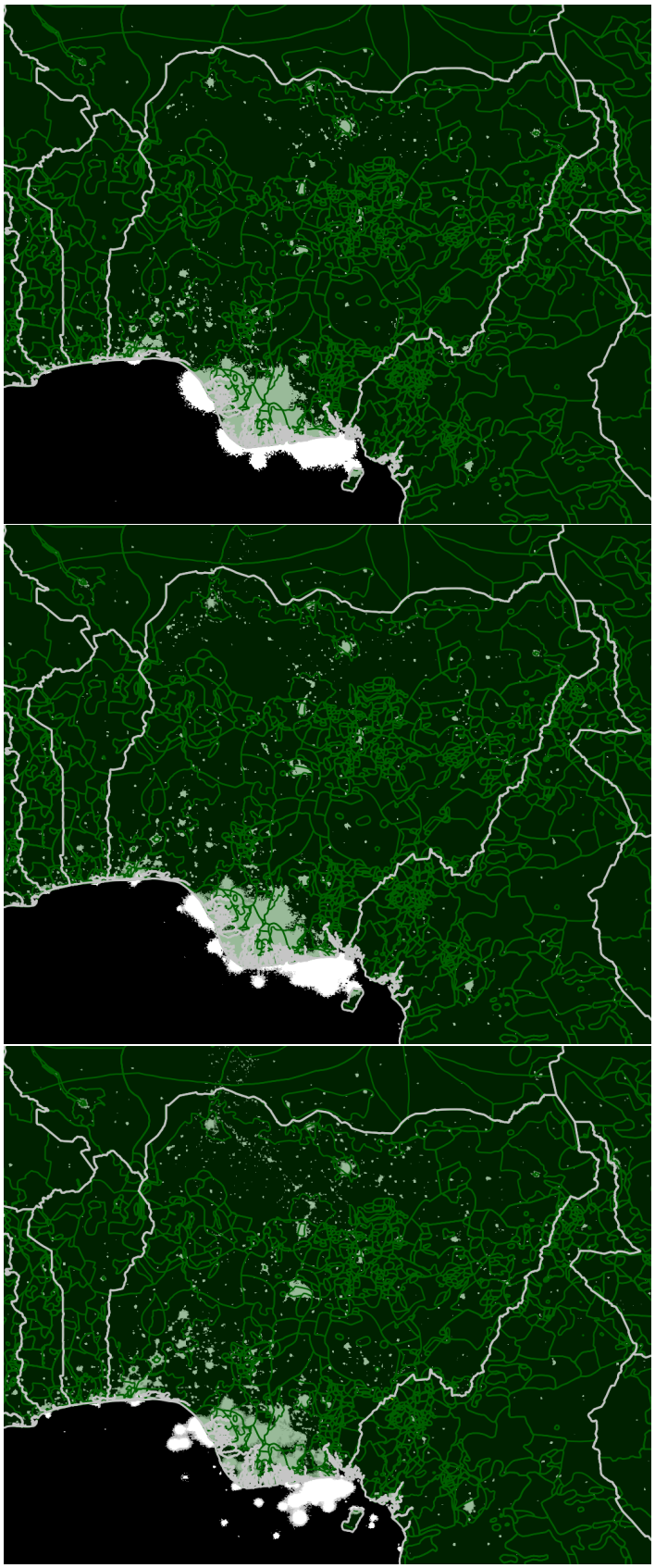

Figure 2. Luminosity in Nigeria, 1992, 2003, 2013