Development of Artificial States: New Concerns

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Abstract

In this paper I investigate the role of borders (official as well as ethnic ones) on the development of the countries (influence of GDP per capita). I make three main hypothesis. First, land-locked countries tent to have lower GDP per capita in comparison with another ones. Second, the larger is the distance between national and ethnic borders, the higher is GDP. Third, in countries which have both water and land borders, regions which have a land border are less rich in comparison with those which have a water border.

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1 Introduction

In their paper Alesina et al. (2011) define artificial states as those in which political borders do not coincide with a division of nationalities desired by the people on the ground. They propose and compute two measures of the degree to which borders may be artificial. One measures how borders split ethnic groups into two separate adjacent countries. The other measures the straightness of land borders, under the assumption the straight land borders are more likely to be artificial.

Thus, former colonizers or post-war agreements among major powers regarding borders have often created monstrosities in which ethnic, religious or linguistic groups were thrown together or separated without any respect for those groups' aspirations. Eighty percent of African borders follow latitudinal and longitudinal lines, and many scholars believe that such artificial (unnatural) borders, which create ethnically fragmented countries or, conversely, separate the same people into bordering countries, are at the root of Africans economic tragedy. Not only in Africa, but around the globe, including Iraq and the Middle East, failed states, conflict and economic misery are often very visible near borders left over by former colonizers, borders which bore little resemblance to the natural division of peoples. There are four ways in which those who drew borders created problems. First, they gave territories to one group, ignoring the fact that another group had already claimed the same land. Second, they drew boundary lines that split ethnic (or religious or linguistic) groups into different countries, frustrating the national ambitions of various groups and creating unrest in the countries formed. Third, they combined into a single country groups that wanted independence. Fourth, even if there were no major ethnic divisions in the new states, they were still a random collection of families, clans, and villages that would not have a strong collective national identity.

Overall these results have sometimes been disastrous: artificial borders increase the motivation to safeguard or advance nationalist agendas at the expense of economic and political development. For example, in British India, two other provinces of the future Pakistan were Sindh and Balochistan. Sindhi feudal landowners initially opposed the Pakistan idea and only later gave their grudging support under the naive hope that Sindh would be largely autonomous. Balochi tribesmen (also divided from ethnic compatriots by a colonial boundary with Iran) preferred an independent Balochistan, which would lead to a secessionist attempt in the 1970's, met with murderous repression by the Pakistani state. Punjab and Bengal were on the borders and had slight Muslim majorities. Congress leaders would not consent to hand them over to the Muslims. This meant that the British partitioned the mosaic of Hindus and Moslems in each state.

Alesina et al. (2011) even after controlling for a host of geographical variables and colonial history fount that the variable which captures the partition of groups is a significant determinant of GDP per capita. The variable capturing the straightness of borders is less robust, but it is also correlated to GDP per capita in most specifications.

In this paper I have four main goals. First, to check what are the consequences for a country

of being land-locked for development. Second, I propose a new measure in addition to those two above which is computed as the difference between national «natural» border and the ethnic border. So that I expect the higher is the difference, the lower is country's GDP. Third, I want to measure within country inequality: my hypothesis is that the GDP is higher in regions where different ethnicities are separated by water rather than land. Finally, I want to measure it not only on the national level as in Alesina et al. (2011) but on a regional level in a mood of Michalopoulos and Papaioannou (2012). The interesting feature is that regional GDP in such works is measured using satellite data of night lights, which has proved to be a good proxy for GDP (Henderson et al.,2012).

The paper is organized as follows. Second section describes the contribution of this paper to the current literature. Third section shows the details of the construction of the key variables and the intuition behind them. Fourth section describes the data sources. Finally, section 5 is devoted to the the main hypotheses and empirical strategy.

2 Literature Review

This paper contributes to the following four strands of literature and in many ways serve as a kind of bridge for them. First, it contributes to the papers which speak about specific characteristics of the countries and its influence on the economic growth. Thus, Fors (2014) states that one of the main findings of his paper is that the relationship between island status and institutional quality is significantly positive, and that these results are robust to the inclusion of a number of control variables. Further, he finds that country size is negatively related to institutional quality, which is in keeping with previous results. These results provide further support for the hypothesis that institutions account for these countries' relatively better economic performance. Indeed, Alesina et al. (2003) argue that size matters for economic performance and that country size is endogenous and depends on economic factors such as free trade, public goods provision and preference heterogeneity. Second,this paper builds on the literature concerning the relationship between ethno-linguistic fractionalization and economic growth. Thus, Easterly and Levine (1997) show that ethnic diversity helps explain cross-country differences in public policies and other economic indicators. In the cas of Sub-Saharan Africa, economic growth is associated with low schooling, political instability, underdeveloped financial systems, distorted foreign exchange markets, high government deficits, and insufficient infrastructure Africa's high ethnic fragmentation explains a significant part of most of these characteristics. The recent research by Alesina et al. (2016) exploits across-district within-African countries variation using individual-level data on ethnic identification and well-being from the Afrobarometer Surveys they find that between ethnic-group inequality is systematically linked to regional under-development. In this sample they also explore the channels linking ethnic inequality to (under) development, finding that ethnic inequality maps to political inequality, heightened perceptions of discrimination and

undersupply of public goods. However, the interesting result was found by Aker et al.(2014). They use unique and high-frequency data on narrowly-defined goods to gauge the extent to which a national border impedes trade between developing countries (Niger and Nigeria). Using a regression discontinuity approach, they find a significant price change at the national border, but one that is lower in magnitude than that found for industrialized countries. Yet unlike that literature, and in line with important characteristics of African economies, we investigate the role of ethnicity in mitigating and exacerbating the border effect. They find that a common ethnicity is linked to lower price dispersion across countries, yet ethnic diversity creates an internal border within Niger. The primary mechanism behind the internal border effect appears to be related to the role of ethnicity in facilitating access to credit in rural markets. Finally, the paper contributes to the literature about the role of the former colonizers. Glaeser et al. (2004) revisit the debate over whether political institutions cause economic growth, or whether, alternatively, growth and human capital accumulation lead to institutional improvement. They found that (a) human capital is a more basic source of growth than are the institutions, (b) poor countries get out of poverty through good policies, often pursued by dictators, and (c) subsequently improve their political institutions. La Porta et al. (1999) find that countries that are poor, close to the equator, ethnolinguistically heterogeneous, use French or socialist laws, or have high proportions of Catholics of Muslims exhibit inferior government performance. They also find that the larger governments tend to be the better performing ones. Finally, the paper contributes to the strand of literature that exploits border discontinuities in institutional arrangements in order to study the role of national policies across a particular border. Miguel (2004) examines how government policies affect ethnic relations by comparing outcomes across two nearby districts, one in Kenya and one in Tanzania, using colonial-era boundary placement as a "natural experiment." The evidence suggests that nation building has allowed diverse communities in rural Tanzania to achieve considerably better local public goods outcomes than diverse communities in Kenya. To illustrate, while Kenyan communities at mean levels of diversity have 25 percent less local school funding than homogeneous communities on average, the comparable figure in the Tanzanian district is near zero. The Kenya-Tanzania comparison provides empirical evidence that serious reforms can ameliorate social divisions and suggests that nation-building should take a place on policy agendas, especially in Africa. Bubb (2009) investigates how differences in de jure property rights between Ghana and Ivory Coast affect development in border areas, finding that in spite of large differences in formal institutions, there are no differences in the actual enforcement of property rights.

3 Definition of the key variables

The partitioned measure

This measure focuses on the specific case of borders cutting across an ethnic group and dividing it into two adjacent countries. The variable is defined as the percent of a country's population that

belongs to a partitioned group. The latter is a group that is present in two bordering countries. The intuition for this variable is that, when the same ethnic group is split between two adjacent nations, the border is very likely to be "artificial," i.e., not reflective of the desires of people on the ground. The presumption is that, in most cases, ethnic groups would like to be in the same country. Obviously, if an ethnic group is distributed among countries very far apart, it is out of the question that such a group could form a country including all its members (except by migrating, of course). But this does not seem to be the case when the same group is split between two adjacent countries. When this situation occurs, it may signal an artificial border.

The point is that this kind of artificiality also hinders good development outcomes. An important mechanism for inducing sacrifice for public goods is group loyalty. Both ethnic groups and nations command group loyalty from their members. If ethnic group = nation, the group loyalty on the basis of ethnicity and nation is the same, and it is easier to achieve cooperation and consensus for public goods, as well as for overall pro-development policies. In cases of split ethnic groups, this leads to divided loyalties, as individuals of the partitioned group are conflicted whether to ally themselves with their co-ethnics in another nation. If they care more about their co-ethnics than they do about their co-nationals, then they are less willing to invest in public goods in their home nations. Note that if groups wanted to be in the same country they could migrate. Not only it is costly but countries may prevent migrations (both in and out) and in same cases they may invest resources in repressions of migratory movements.

The mechanical procedure was to define partitioned ethnic groups as identifiable groups listed in the ethnic fractionalization exercise of Alesina et al. (2003) that appear in two or more adjacent countries. That paper, which produced a widely used data set on ethnicity, defined an ethnic group as any group defined on the basis of physical characteristics (e.g., skin color) and/or language that was politically salient enough in each country to be listed separately in the "ethnic breakdown" given in descriptions of the nation in general sources such as encyclopedias or world yearbooks.

This measure accounts fairly precisely for one of the ways in which borders may be «wrong», that is, when they cut through groups and leave them in separate countries. But it does not capture other ways in which borders may be undesirable; for instance, situations in which two ethnic groups are forced into the same country or a state that is simply a random collection of regions that do not have a national identity. In order to account for it the authors propose the second measure which is called «the fractal measure».

The fractal measure

This measure is based upon the assumption that, if a land border is close to a straight line, it is more likely to be drawn artificially, for example by former colonizers. However, if it is relatively squiggly, it is more likely to represent geographic features (rivers, mountains, etc.) and/or divisions carved out in time to separate different people.

Fractal dimension is analogous to the typical concept of the dimension of an object, although, unlike the simple definition of dimension, the fractal dimension can be a fractional number. A point

has a fractal dimension of zero, a straight line a fractal dimension of one, and a plane a fractal dimension of two. However, unlike the traditional definition of dimension, as a line stops being perfectly straight and begins to meanders more and more, i.e. to become more and more squiggly, the fractal dimension increases. In the limit that a curve meanders so much that it essentially fills a whole page, then the fractal dimension becomes much closer to 2 than to 1. This is because the "line" is behaving more like a «plane». This measure is meant to capture how close a border is to a straight line that would have a fractal dimension of 1 versus a line so squiggly that it fills a plane and has a fractal dimension of 2.

The fractal dimension can be calculated in several ways, however the authors use the box-count method. For this method, a grid of a certain size/scale is projected onto the border, and the number of boxes that the border crosses is tallied. The scale of this grid is also recorded, as measured by the length of a side of a box in the grid. This gives a pair of numbers: box-count and box-size. The process is then repeated using grids with different box-sizes, each time recording both the box-size and the number of boxes that the border crosses. In particular, the authors use twelve different box sizes. The smallest box size is the smallest possible, given the digital nature of our data. This smallest box size corresponds to about 0:001 of a degree latitude or longitude. In addition to this box size, which we normalize to 1, we also use grids with box sizes of 2, 3, 4, 6, 8, 16, 31, 64, 128, 256, and 512. For each box size, they project a grid with that box size onto country border. Then they count the number of boxes that the border crosses, resulting in a data point of box count and box size. Taking logs of all twelve box sizes gives twelve data points with which to regress In(boxcount) on In(boxsize). The general formula for the fractal dimension is as follows:

In(boxcount) = (constant intercept)-(fractal dimension)*In(boxsize)

Thus, the negative of the slope of the regression of In(boxcount) on In(boxsize) is the coefficient of interest - the fractal dimension for the country.

4 Data

Here is presented the brief description of data sources. National level data is constructed through the following sources. Main key variables «partitioned» is based on the ethnic data from Alesina et al. (2003) the fractal measure could be constructed through the World Vector Shoreline Dataset (GIS format). The authors also used a considerable set of the control variables. Ethno-linguistic indicies (Alesina et al., 2003 and Atlas Narodov Mira); being a colony; years of ancient state history measured by log of Discounted Sum of Years of Ancient Statehood, 1 AD to 1950 AD (Putternam, 2007); log GDP per capita; percent of cultivated land in Koppen-Geiger climate zone A (humid climate with no winter) and percent of cultivated land in Koppen-Geiger climate zone B (dry climate with no winter); percentage of total land area in the tropics (between the

Tropics of Capricorn and Cancer); distance from the middle of the country to the equator; percent of total land area in Koppen-Geiger climate zone BW (desert); log of total land area in kilometers squared; log of population density as experienced by the typical citizen (sum of pop density of many small regions, weighted by the pop of each region)- all Gallup and Sachs (1999). Also they include log of predicted trade share based on gravity equation featuring only geographic variables (Frankel and Romer, 1999); fraction of the population that speaks any European language (Hall and Jones, 1999).

Regional level data requires the following sources. Light Density at Night[2]; log (population density per sq. km. in 2000). from Nelson, African Population Database Documentation, UNEP GRID Sioux Falls (2004)[3]; log (land area) at the country-ethnic homeland level or at the pixel level; log (1 + total area covered by rivers or lakes in sq. km.) (Global Mapping International, Colorado Springs, CO, Global Ministry Mapping System); average elevation in km of each ethnicity-country or each pixel from National Oceanic and Atmospheric Administration (NOAA) and U.S. National Geophysical Data Center, TerrainBase, release 1.0 (CD-ROM), Boulder, CO[4]; average land quality for cultivation within each country-ethnicity homeland or within each pixel[5]; distance to the capital city calculated through Haversine formula; distance to the Sea Coast (Global Mapping International, Colorado Springs, CO, Global Ministry Mapping System, version 3.0); indicator variable that equals 1 if an oil field is found in the region (or pixel) of ethnic group i in country c[6]; Indicator variable that takes on the value of 1 if a diamond mine is found in the region (or pixel) of ethnic group i in country c[7]; rule of law index[8]; control for corruption [9]; ordered (range 1–4) variable capturing law enforcement regarding committing a serious crime based on individuals' responses to the following question: "How likely do you think it would be that the authorities could enforce the law if a person like you committed a serious crime?" A score of 1 indicates "not at all likely"; a score of 2 suggests "not very likely"; a score of 3 indicates "likely"; and a score of 4 indicates "very likely."[10]; dummy variable that takes on the value of 1 if the respondent replies that he or she identifies more strongly with the nation rather than his or her ethnicity[11].

The only data which I use and can not be retrieved from the sources above is the list of land-locked countries. The list from Wikipedia seems credible[12].

[2]https://ngdc.noaa.gov/eog/

[3]http://na.unep.net/siouxfalls/ datasets/datalist.php.

[4]http://www.sage.wisc.edu/atlas/data.php? incdataset=Topography

[5]http://www.sage.wisc.edu/iamdata/grid$_data_sel.php$

[6]http://www.prio.no/CSCW/ Datasets/Geographical-and-Resource/Petroleum-Dataset/Petroleum-Dataset-v11/

[7]http:// www.prio.no/CSCW/Datasets/Geographical-and-Resource/Diamond-Resources/

[8]http:// info.worldbank.org/governance/wgi/index.asp

[9]http://info.worldbank.org/ governance/wgi/index.asp.

[10]http://www.afrobarometer.org/data/ round-3-merged.

[11]http://www.afrobarometer.org/data/round-3-merged

[12]https://en.wikipedia.org/wiki/Landlocked$_country$

5 Empirical strategy and hypotheses

Hypothesis 1: Land-locked countries have lower GDP in comparison with another countries.

The intuition behind this hypothesis is straightforward: land-locked countries have more land borders which in a case when ethnicities are situated along both parts of the borders will lead to more conflicts and, as a result, lower GDP.

Measuring this effect on the national level let's follow Alesina et al. (2011):

$$log(GDP)_c = \alpha + \beta Partitioned_c + \mu Fractal_c + \gamma Land - locked_c + X_c Phi + \epsilon_c; \quad (1)$$

Measuring this effect on the regional level let's follow Michalopoulos and Papaioannou (2012):

$$y_{i,c} = \alpha_0 + \gamma IQL_c + \lambda_1 PD_{i,c} + \lambda_2 AREA_{i,c} + \lambda_3 Land - locked_c + X'_{i,c} Phi + \alpha_i + \epsilon_{i,c} \quad (2)$$

where $y_{i,c}$ reflects the level of economic activity in the historical homeland of ethnic group i in country c as proxied by light density. IQL_c denotes institutional quality of country c, as reflected in the rule of law and the control of corruption measures; $PD_{i,c}$- population density of ethnicity i in country c; $AREA_{i,c}$ - area of ethnicity i in country c.

The same specification but taking into consideration ethnicity-fixed-effects:

$$y_{p,i,c} = \alpha_0 + \gamma IQL_c + \lambda_1 PD_{p,i,c} + \lambda_2 AREA_{p,i,c} + \lambda_3 Land - locked_c + X'_{p,i,c} Phi + \alpha_i + \epsilon_{i,p,c} \quad (3)$$

Here $y_{i,c}$ is a dummy that takes on the value 1 if pixel p is lit and 0 otherwise. Each pixel, p, falls in the historical homeland of partitioned ethnicity i located in country c.

Finally, we can exploit the regression discontinuity design in order to identify the (average) effect of being land-locked at the border:

$$y_{p,i,c} = \alpha_0 + f(BD_{p,i,c}) + \gamma IQL_c + \lambda_1 PD_{p,i,c} + \lambda_2 AREA_{p,i,c} + \lambda_3 Land - locked_c + X'_{p,i,c} Phi + \alpha_i + \epsilon_{i,p,c} \quad (4)$$

This specification differs from (3) is that since we aim at identifying the effect of being land-locked at the border, we add RD-polynomials of the distance from the centroid of each pixel to the national border ($f(BD_{p,i,c})$), allowing the coefficients on the polynomial terms to be different for each side of the boundary.

It's necessary to mention that regional specification includes population density and area as explanatory variables since it allows night lights to be a «better» measure of GDP. Other discrepancies in approaches are just reflection of the original identification strategies, so that influence of

institutes could be added to the regional level regressions and our key constructed measures to the regional level as a robustness check.

Hypothesis 2: The larger is the distance between national and ethnic borders, the higher is GDP.

The intuition is the same as in the previous case: the further opposing ethnicities, the lower probability of a conflict, the larger is an economic well-being.

I propose two measures of difference. First (further Diff1) is just an average distance between the official border and the ethnicity which borders with this country. Second (further, Diff2) , one have to calculate the index similar to the fractal measure but for the ethnic border, the difference in the indexes will be the variable of interest.

That is, following the logic above:

$$log(GDP)_c = \alpha + \beta Diff_i + \gamma Diff_j c + X_c Phi + \epsilon_c; \tag{5}$$

where $Diff_j$ corresponds to Diff1 and Diff2.

Analogously the basic specification for the regional level looks as follows:

$$y_{i,c} = \alpha_0 + \gamma IQL_c + \lambda_1 PD_{i,c} + \lambda_2 AREA_{i,c} + \lambda_3 Diff_{j,i,c} + X'_{i,c} Phi + \alpha_i + \epsilon_{i,c} \tag{6}$$

Hypothesis 3: In countries which have both water and land borders, regions which have a land border are less rich in comparison with those which have a water border.

This hypothesis tries to measure within country inequality. The logic as usual is the same: regions with water border have less opportunities for conflict and thus tend to be richer.

In order to check this hypothesis let's use the last specification. I offer to add the interaction terms:

$$y_{i,c} = \alpha_0 + \gamma IQL_c + \lambda_1 PD_{i,c} + \lambda_2 AREA_{i,c} + \lambda_3 Diff_{j,i,c} * Water_{i,c} + \lambda_4 Diff_{j,i,c} + X'_{i,c} Phi + \alpha_i + \epsilon_{i,c} \tag{7}$$

That is I suppose the $lambda_3$ to be positive and capture the effect I talk about.

The serious drawback of the paper is the fact that I do not address migrations which should have been taken into consideration in the future research.

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