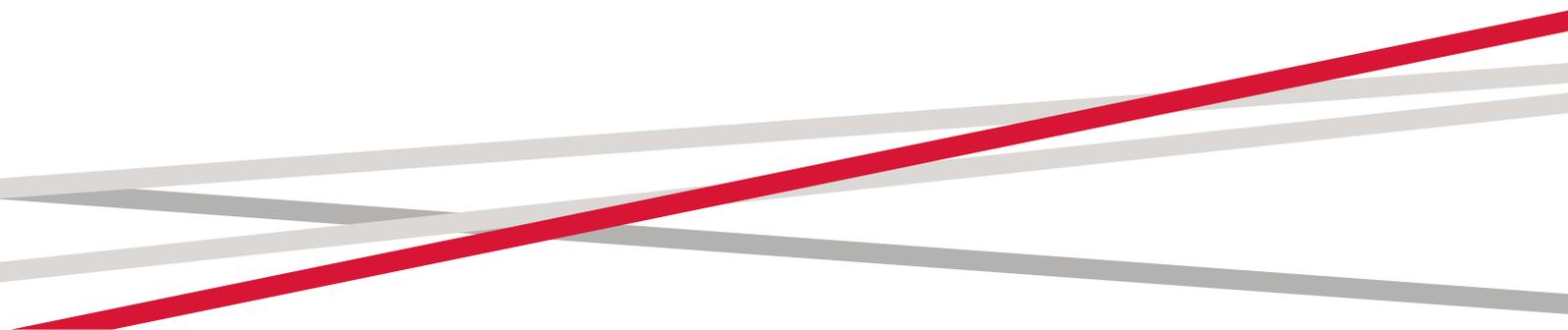


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Ethnic Geography: Measurement and Evidence

The effects of ethnic geography, i.e. the distribution of ethnic groups across space, on economic, political and social outcomes, are not well understood. We develop a novel index of ethnic segregation that takes both ethnic and spatial distances between individuals into account. Importantly, we can decompose this index into indices of spatial dispersion, generalized ethnic fractionalization, and the alignment of spatial and ethnic distances. We use ethnographic maps, spatially disaggregated population data, and language trees to compute these four indices for 161 countries. We apply these indices to study the relation between ethnic geography and current economic, political and social outcomes. We document that country level quality of government, income and trust increase with the alignment component of segregation.



Ethnic Geography: Key Idea

There is a vast literature on how a country's ethnic diversity affects economic, political and social outcomes. This literature provides evidence for negative effects of ethnic diversity on e.g. peace, public goods provision, redistribution, the quality of government, and economic development in general. In these studies, ethnic diversity is typically quantified by indices based on the different ethnic groups' country-wide population shares. By definition, these indices ignore ethnic geography, i.e. the distribution of ethnic groups across space.

Alesina and Zhuravskaya (2011) make an important first step towards taking ethnic geography into account. They construct an index of ethnic segregation that is based on the various ethnic groups' population shares in different subnational units such as regions or provinces. We contribute to the literature on ethnic diversity by proposing a set of indices that capture important aspects of ethnic geography.

Theory

We derive a new segregation index that is based on both spatial and ethnic distances between pairs of individuals. Starting from a general class of indices that are expressions of the relation between a randomly selected pair of individuals, we uniquely characterize an index via a set of axioms. Our index avoids the standard problems of the so-called a-spatial segregation measures (based on population shares in administrative units), in particular the border dependence mentioned by Alesina and Zhuravskaya (2011) and the

checkerboard problem (White 1983, Reardon and O'Sullivan 2004). Both problems are potentially very severe and are illustrated in detail in the paper. Importantly, our index can be decomposed into three (sub)indices: an index of spatial dispersion, a well-known index of generalized ethnic fractionalization (see below), and a measure of the alignment of spatial and ethnic distances between individuals (i.e. ethno-spatial alignment or, simply, alignment hereinafter). Interested readers can also find a stylized illustration of what each component stands for in the paper.

Data and Illustration

We compute these four indices of ethnic geography for 161 countries from all over the world using a combination of digital maps showing the distribution of ethno-linguistic groups all over the world and the current population at a very high resolution. As robustness check, we also compute our measure using historical population maps as well as a simpler map based on global land cover data that should proxy for the exogenous component of the spatial distribution of a country's population.

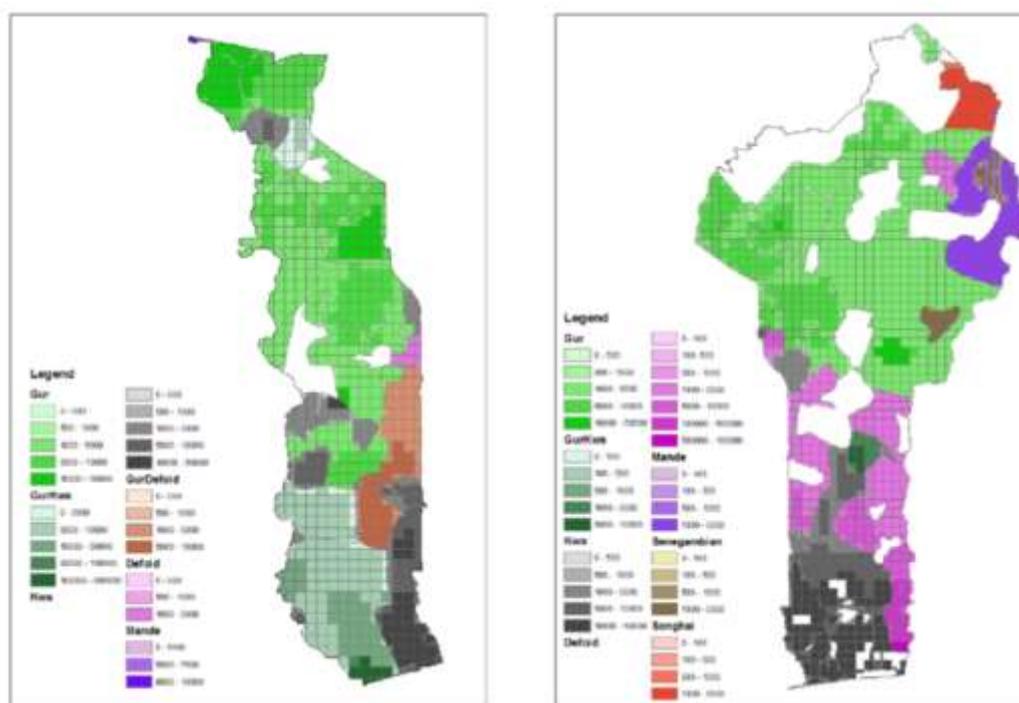
This provides us with real world examples of countries that differ in, for example, alignment, but are otherwise similar. For example, Togo and Benin are neighboring countries located in West Africa with comparable climatic, geographic and demographic characteristics. Moreover, they were both French colonies after WWI, became independent in 1960, and started their post-colonial history in tumultuous ways that culminated in coups. The ruling autocrats both



managed to stay in power for many years. Benin and Togo are also comparable in terms of generalized ethnic fractionalization (between the median and the third quartile of our sample) and spatial dispersion (above the third quartile). Ethno-spatial alignment is however considerably higher in Benin (1.35, which is above the third quartile) than in Togo (1.11, which is below the median). Figure 1 shows the different ethnic homelands and the main language groups which these ethnic homelands belong to. Ethno-spatial alignment is relatively high in Benin as there is a relatively clear divide between Kwa

speaking groups in the South, Defoid speaking groups in the Center, Gur speaking groups in the North, and some smaller groups speaking very different languages in the North East. As a result of this divide, linguistically distant individuals tended to live far apart from one another. In contrast, ethno-spatial alignment is relatively low in Togo, mainly because there are Gur and Kwa speaking groups in the country's South, its Center and its North. As a result of these large and widespread language groups, linguistically distant individuals often lived relatively close to one another.

Figure 1



Source: Maps of Togo (left) and Benin (right) showing the traditional homelands of language groups according to WLMS and our grid cells. Each grid cell constitutes a different location in the computation of our indices, each color indicates that the corresponding grid cell belongs to the traditional homeland of a certain language group (with the relevant language groups given in the legend), and the brightness of this color indicates the current population (also given in the legend). The legend entries Gur/Kwa and Gur/Defoid indicate the traditional homelands of multiple language groups, some speaking a Gur language and some a Kwa or Defoid language. WLMS indicates no traditional homelands in the white areas.



Empirical Analysis

We use our indices in cross-country regressions to improve our understanding of the role that ethnic geography plays in economic, political and social outcomes around the globe. We first focus on the associations between our index of ethnic segregation on the one hand, and the quality of government, incomes and generalized trust on the other hand. We find a negative relation between ethnic segregation and the quality of government, similar to Alesina and Zhuravskaya (2011) with their index of a-spatial segregation in their sample of 97 countries. We further find that our index of ethnic segregation tends to be negatively associated with incomes, too, but unrelated to generalized trust. See also Ejdemyr et al. (2018) and Tajima et al. (2018) for recent contributions on Malawi and Indonesia.

More importantly, we study the relation between the three components of our index of ethnic segregation - ethnic fractionalization, spatial dispersion and ethno-spatial alignment - and these outcome variables. Strikingly, we find a positive and statistically significant association between the alignment of ethnic and spatial distances between individuals, and the quality of government, incomes and trust. Hence, societies perform better when ethnically diverse people live far apart, relative to what they would have, had all ethnic groups been represented in all locations with population shares equal to their country shares.

Conclusion

To better understand the role of ethnic geography and to mitigate well-known problems of a-spatial segregation measures, we have developed a new segregation index that is based on ethnic distances between groups and spatial distances between locations rather than categorical data on ethnic groups and administrative units.

The decomposition of our segregation index reveals that it corresponds to the product of generalized ethnic fractionalization, spatial dispersion, and the alignment between ethnic and spatial distances. This ethno-spatial alignment is a novel concept that captures, broadly speaking, whether ethnically different individuals tend to live far from each other, relative to the situation where all groups appeared in each location with population shares equal to their country ones.

Using these indices in cross-country regressions suggests, among other things, that countries with higher ethno-spatial alignment tend to be better governed, richer, and more trusting.

Of course, the indices we have developed can also be applied to measure the ethnic geography of cities. For example, one could use our segregation index instead of a-spatial measures to compare segregation across Russian metropolitan areas or within metropolitan areas over time. Finally, we would like to stress that our theoretical framework is not specific to the ethnic dimension. Instead of categorizing individuals by ethnic groups and measuring linguistic distances, future research could focus on other social or socio-economic



cleavages that are believed to be salient in a particular setting.

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