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WORKING PAPER NO. 674

Cultural Doorways in the Barriers to Development

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May 2023

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ISSN: 2240-9696

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Abstract
We provide a new measure of cultural similarity among ethnic groups and countries, based on orally transmitted narratives. Compared to other measures of phylogenetic distances of the separation time of two ethnic groups, either linguistic, religious or based on the "molecular clock", our index measures the intensity of cultural exchanges across group pairs in their history, after separation and before the recent great migrations. By the use of this index, a "cultural clock", we provide further support to the hypothesis that the cultural channel is key to interpret the role of vertically transmitted traits in the account for the deep causes of observed pairwise distances in economic outcomes, at both the ethnic-group and the country level.

JEL Classification: J15, Z10.

Keywords: Culture; Phylogenetic Distances; Narratives, Comparative Development.

Acknowledgements: We would like to thank Alberto Bisin for helpful comments and suggestions. All remaining errors are ours.

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Multa sunt dicta ab antiquis de [...] rebus humanis.

A lot has been said about [...] human affairs by our ancestors.

Cicero, De finibus bonorum et malorum, Liber V.

1 Introduction

We propose a measure of cultural similarity between ethnic groups based on the folklore catalog assembled by Y. Berezkin, and recently introduced to economics and validated by Michalopoulos and Xue (2021)- MX henceforth. We argue and document, with abundant empirical evidence, that our folklore-based index captures important aspects of the similarity of cultural traits among ethnic groups as determined throughout their history by cultural contacts, after their separation in other phylogenetic traits, and that these similarities contribute to explain current economic outcomes. This investigation and the results we obtain can be relevant for the assessment and the interpretation of the cultural channel of the impact of vertically transmitted traits on currently observed socio-economic outcomes. In measuring cultural exchange among ethnic groups our approach can also provide interesting insights to the exploration of cultural persistence and change (Giuliano and Nunn, 2021).

The idea of constructing a synthetic index of cultural similarity based on folklore, that is on the oral tradition of existing ethnic groups, is naturally rooted in a specific character of the Berezkin's research effort and in the method applied in the building of its catalog. This is better described in his own words: "the focus of [my] research is placed on the replication of forms that can be borrowed from culture to culture and on the geographical patterns of shared elements of oral culture across ethnic groups that emerge from these exchanges recorded in the catalogue" (Berezkin 2015, p.34). Even more relevant for our investigation: "the ultimate purpose of the research, based on the analysis of the areal patterns of the spread of the folklore elements, is not to reveal functional dependencies between folklore and other spheres of culture (and nature) but the particular and, to some degree, chance [random] peculiarities of such processes as migrations and cultural contacts and interactions" (Berezkin 2015 p.35).

Accordingly, the unit of analysis in the catalogue is defined to be a *motif*, or "any episode or image [...] that are registered in at least two (although normally in many more) different traditions" (Berezkin 2015 p.37). In short, the folklore catalog lists the motifs that each ethnic group shared with each other during the history of their contacts, as preserved through oral, vertical, transmission within each group. One may expect, and we will provide evidence about this pattern, that the intensity of historical cultural exchanges of motifs across groups is correlated with measures of linguistic, genetic, religious and geographical distances, acting as barriers to these exchanges.

The starting observation of our analysis is that cultural distances, although correlated with phylogenetic distances of genetic and ethno-liguistic traits, contain quite different kind of information. As it is well known, phylogenetic distances between groups measure their separation time. The record of shared motifs in Berzkin's catalogue, instead, measures the intensity of their mutual cultural exchanges accumulated *after separation* through historical communication channels of cultural exchange or, for the sake of brevity, *cultural doorways*.

For instance, Etruscan and Romans, as groups, came into contact long after their separation, with Romans assimilating several cultural traits such as the widespread practice of Aruspicina, among many others. A similarly cultural intercourse occurred between Italians and Greeks, initially as a demic process of migration and colonization by the Greeks, and then as a cultural assimilation ("*Grecia capta ferum vincitorem cepit*" - a military defeated Greece culturally conquered the fierce winner) after long conflicts and wars.

Arguably, as a result of these cultural exchanges accumulated in history, communication channels among groups have affected similarity in socio-economic outcomes among ethnic groups. The issue we address, then, is whether this information is relevant for our understanding of currently observed socio-economic outcomes, and if it can be used to cast lights on the mechanisms through which ancient, vertically transmitted, traits operate in shaping currently observed differences in those outcomes.

To this aim, and based on the above described features of the folklore catalogue, we first construct an index of shared folklore motifs in group pairs, to recover these cultural doorways and to measure their intensity. Following the definition above, our index of cultural similarity is built on the idea that each motif in the folklore catalog represents a link in the ancient

communication network of each ethnic group, and that the intensity of the link between two groups can be measured by the number of motifs shared by them. Hence, we measure folklore similarity, for each ethnic group pair, with the Jaccard coefficient of their catalog entries, computed as the ratio of the number of common motives to both groups oral traditions divided by the total number of motives in either one of them[1].

This index provides a new measure of cultural similarity among ethnic groups that we next use to contribute to the debate on the deep roots of the observed heterogeneity of economic development. In particular, we use our index for three main tasks: 1) an exploratory analysis the relationship between folklore similarities and some of its determinants such as genetic, linguistic and geographic distances, which we also use to validate our measure, that is to show that this index contains new and more specific information compared to measures of phylogenetic distances commonly used in this literature; 2) a regression analysis, that links our pairwise measure of folklore similarity to pairwise distance in income per capita both at the country level and at the ethnic group level; 3) an exploration of the mechanisms that link cultural doorways, as measured by our index, to currently observed economics outcomes.

As for the first task, our exploratory analysis can be viewed as an additional contribution to the validation exercise of MX, that is for the use of oral tradition as a measure of cultural similarity. We argue that such index is specifically apt to recover and to interpret information which may be relevant for our understanding of deep determinants in comparative development. More generally, however, the aim here is to contribute to the discussion about the relationship between different indexes that measure vertically transmitted traits. Reassuringly, our main results are consistent with the theoretical mechanisms: folklore-based cultural similarity correlates negatively with phylogenetic (genetic, linguistic and religious) and geographic distances. Based on these results, we provide a discussion about why our index differs from other phylogenetic measures of distances, and why it represents, by construction, a *cultural clock* for measuring the occurrence of cultural exchange through oral communication between ethnic-groups (and hence current countries). This will also help us interpreting the results from our regression analysis.

[1]We also employ text analysis techniques to correct for the potential downward bias of this similarity measure due to the presence of essentially similar motives that could have been classified as separate because of slight content differences.

As for the second task, given the pairwise nature of the elementary unit of observation in the Berezkin catalog, the most natural framework to investigate the importance of this index for comparative economic development is the bilateral regression approach of Spolaore and Wacziarg (2009)-SW henceforth. There they document the existence of deeply rooted barriers to economic development determined by the historical separation in phylogenetic traits of ethnic groups. By adapting their framework, we use our index to study the effect of the intensity of the cultural exchanges between ethnic groups, after their separation in other traits, on the differences in economic performances. We show that our index of folklore similarity plays an important, if not crucial, role in the explanation of currently observed differences in income per capita, both at the ethnic group and at the country level of analysis, even after controlling for a wide range of potential confounders. Cultural exchanges recorded in the oral traditions of ethnic groups, historically occurred after separation in other vertically transmitted traits, matters.

Finally, we investigate the mechanisms that link folklore based measure of similarities to income differences. First, very much in the spirit of MX, we document a robust empirical relationship between folklore based measure of ancient cultural traits and contemporary values, as they emerge from the World Values Survey. To the extent that those traits shape cultural norms and determine economic behavior and outcomes, this evidence configures a specific channel that goes from ancestral culture to contemporary development. Second, in line with the analysis by SW, we explore the role of our measure of the differences in oral traditions as barriers to the diffusion of the development. Third, leveraging the specific information in the folklore catalog, we explore the role of the commonality of specific folklore motifs related to the cultural traits that are more relevant for long-run growth, by the use of disaggregated measures of folklore similarity by "concepts".

The rest of the paper is organized as follows: section 2 provides a more detailed discussion of the relationship with the literature and the interpretation of the index of cultural similarity within the debate of cultural and genetic co-evolution; section 3 illustrates the computation of the index of folklore-based cultural similarity; section 4 summarizes the relationship between our index of cultural similarity and other phylogenetic and geographic distances; section 5 summarizes the analysis of the impact of our measure of cultural distance on economic dis-

tances for both ethnic and country group pairs; section 6 provides an exploration of the mechanism underlying our results; section 7 concludes. The appendix contains technical details of the construction of the index and extensively discusses the results obtained by the use of alternative folklore based indexes of cultural similarity.

2 Related Literature and Contribution

The first contribution of our paper is the construction of an index of cultural similarity based on the set of oral narratives mutually shared by ethnic groups as reported in the Berezkin catalogue, which measures the intensity of the historical cultural exchange between them. We then show that our index, although correlated with other measures of phylogenetic (genetic, linguistic and religious) and geographic distances, captures new information. Differently from phylogenetic distances, which measure separation time across human groups, it measures the intensity of culturally transmitted traits across groups, and it indicates the presence and the role of cultural doorways in the barriers to development, a mixing mechanism tapering off the effect of the historical separation barriers measured by phylogenetic distances. Such doorway effect not only explain distances in several traits measured at the ethnic group level, but also have a remarkable effect on economic distances both at the ethnic and at the country level.

We build on the seminal work by MX (2021), who introduced the Berezkin catalog to economics showing its relevance. In an important validation exercise they also documented how, in a cross-sectional setting, folklore, or ancestral oral culture[2] influences current cultural traits such as trust, risk attitudes and gender roles. This latter contribution is important in that it candidates a mechanism through which vertically transmitted cultural traits have influenced current economic outcomes at the country level, casting new lights on the literature on comparative development. The main difference with MX (2021) is that we explicitly exploit the pairwise measure of cultural similarity in oral traditions to account for economic outcomes both at the ethnic groups and countries level in a dyadic setting. Our contribution extends their analysis in the empirical framework of SW, which seems to us the most natural way

[2]We report here a particular definition of folklore, or popular knowledge, as the accumulated store of what an ethnic group "has experienced, learned and practiced across the ages as popular and traditional knowledge", Leach (1959), p.257. We highlight that oral culture is vertically preserved in the identity of the ethnic group and horizontally transmitted across those groups through oral communication.

to exploit the observational units surveyed in the Berezkin catalogue, where a bilateral link among groups is recorded whenever a motif is found to belong to at least two oral traditions.

The main difference with the work by SW, on which we also build, is the different measure of similarity between ethnic groups and countries that we use to explain bilateral differences in incomes. SW, building their pairwise measure of separation time between ethnic groups on the "molecular clock" represented by genetic distances, emphasize that it includes all vertical transmitted traits in a group. The longer the separation time between groups, the more distant they are according to the molecular clock and, coeteris paribus, the less in common they have in the ensuing history. As discussed in the introduction and further argued later, our "cultural clock" measures, instead, a related but different object: intensity of cultural exchanges after separation. Importantly, it allow us to investigate the coeteris paribus assumption, i.e. the role of these cultural exchanges after separation. Indeed, by construction, for any given (genetic, geographic, linguistic) separation episode in the history of two groups, our index measures the intensity of cultural contacts that these two groups have experienced after, and hence, conditional on separation. Therefore, in terms of the taxonomy in Spolaore and Wacziarg (2013) our index allow us to measure more precisely the effects, on current economic distances, of episodes occurred after ancient separation. In principle, groups that are very distant according to the "molecular clock" may have accumulated intense cultural exchange for different reasons than genetic transmission. If the cultural channel matters for current social and economic distances, our measure should play a role, conditional on phylogenetic distances, in explaining those distances in outcomes, in terms of both absolute and relative distance from the frontier.[3] The evidence provided in this paper is supportive of the importance of such horizontal exchanges in history.

While writing the present paper, a very recent contribution by Wainstock, Klemp and Galor (2023) reported important results about the relationship between the migratory distance from East Africa and a measure of cultural diversity among ethnic groups based on the same folklore catalog that we use. They show that pre-historic migrations, as per the Out of Africa

[3]In the conclusions of their survey on the deep roots of comparative development Spolaore and Wacziarg (2013) argue that while long-term history matters, there is much scope for contingencies that are affected by human actions."The intergenerational transmission of traits and characteristics happens with variation and the diffusion of knowledge takes place not only vertically (from one generation to the next within populations) but also horizontally (across populations)".

Hypothesis, affect the number of motifs listed in the Berzkin's catalog or, in other words, they document the existence of a Founding Fathers effect for folklore based measures of ancient cultural richness, which is taken as evidence for the role of a cultural channel in the impact of those shocks. Our results support that interpretation.

More generally, our work is related to the literature that links economic, social and political outcomes with cultural differences (among others, see Guiso et al. 2006 and Burchardi et al. 2018) and to the literature on the historical roots of economic development (see Nunn 2020, among many others). With respect to this literature, we provide a new measure to assess the importance of deeply rooted cultural traits. Being focused on ancient cultural exchange, our folklore based measure of cultural exchange can also provide interesting insights for the exploration of cultural persistence and change (Giuliano and Nunn, 2021, Acemoglu et al., 2023)

3 A Folklore-based Measure of Cultural Similarity

The first contribution of our paper is the construction of a direct measure of cultural similarity between ethnic groups and countries based on the similarity of their oral traditions, as a proxy of the similarity of beliefs, custom and stories that have been shared in history and handed down across generations. The starting point is the Folklore catalog assembled by Yuri Berezkin (2015), and introduced to economics by MX.

The folklore catalog consists of a list of motifs or narratives that, sampled among an almost exhaustive list of the known ethnic groups, happen to be pairwise shared in their oral traditions. In total, the catalog consists of about 2500 motifs for 958 distinct ethnic groups, with the oral tradition of the median group consisting of 61 motifs. Although the information collected in the catalogue is about the oral motifs at the ethnic group level, the source is written text. Indeed the folklore catalog was assembled looking at various publications and other written sources, some of which are relatively recent, and some of which date back as far as 1638. The average year of the publications used for each ethnic groups range from 1882 to 2015, with a median equal to 1960 (distribution of the average year of publication over ethnic groups). The sources used for attributing specific motifs to each ethnic group, in turn,

range from 1 to 104, with a median of 10. These differences suggest that some ethnic groups have been indeed more studied than others, both because of data availability and because of anthropologists preferences. In the rest of the analysis, due account for these elements will be taken, following hints in Berezkin (2015), guidelines in MX (2021) and important qualifications in Galor et al. (2023).

These sources document the existence of shared motifs and the narratives in the oral traditions, but they do not provide any systematic evidence about the time since each narrative appeared. Given the nature of folklore, the presumption, however, is that such narratives originated in the remote past, as a way to transmit the accumulated knowledge of an ethnic group over time, a knowledge both about the way to cope with the environment and the shocks that the ethnic group faced, and about how to solve the coordination problems that arose throughout history. Moreover, as we will see, information about the timing, analogously as in the case of genetic distance, can indirectly emerge from measuring cultural distances among groups. Thus, if we think about the shared elements of oral traditions as evolving over time, then the folklore catalog must be interpreted as a picture that highlights, at a given point, the status of a long-term process of cultural evolution that started in the distant past.

So, distances in folklore can be considered as a measure of cultural distances among ethnic groups that reflects trait exchange in their cultural histories, or the cultural doorways between them. An alternative interpretation, again in line with the logic used to construct the folklore catalog, is that common motifs represent links in the networks of ancient cultural interactions between ethnic groups. We will not focus here on this network representation, which can be used to extract potentially important information, leaving it to future research.

Another important consideration to be taken into account is that these cultural distance register commonality of traits different from the written tradition as encoded in religious books, literature, or technical and scientific knowledge that are also vertically transmitted, usually based on scriptures. So oral motifs only measure the kind of knowledge that has been acquired by group exchange and then have been vertically transmitted across members of the group and, later, of the organized societies. These traits are to be considered as common to all members, part of the group cultural identity, independently of individuals' functional role in historical societies, so are to be viewed as common to farmers, artisans, clerks, warriors or

scholars in that group (Ong 2002).

Consistently with the aim and the logic used by Berezkin to compile his catalog, we consider folklore, for each ethnic group, as a set of cultural motifs whose elements are shared with at least another known ethnic group, and then assess the similarity in folklore, for ethnic group pairs, using a measure of set similarity. Following Bortolini et al. (2017), our baseline choice for the set similarity measure is the Jaccard coefficient, equal to the cardinality of the intersection of the two sets divided by the cardinality of the union (We extensively explore alternatives in Appendix). The Folklore-based measure of cultural similarity that we propose is:

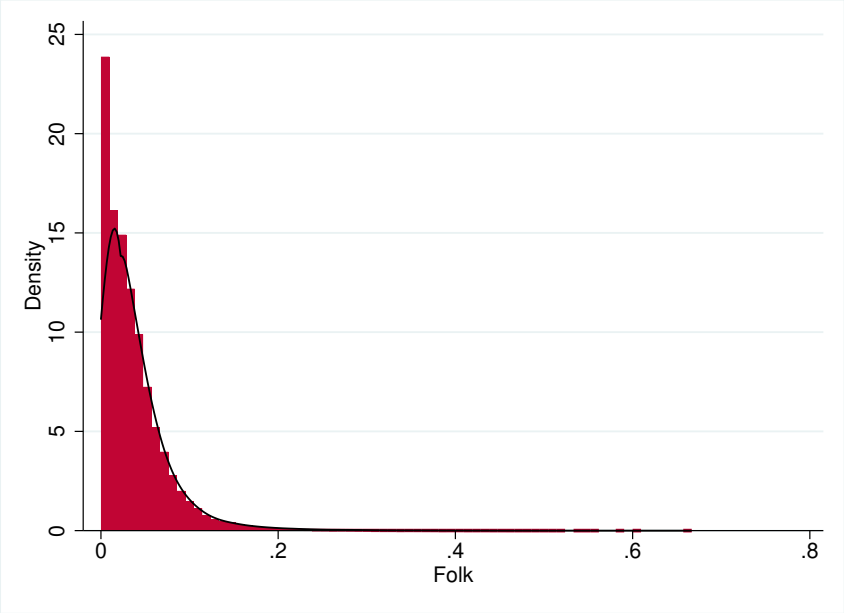
$$\chi_{kl} = \frac{\left|M^k \cap M^l\right|}{\left|M^k \cup M^l\right|} \tag{1}$$

where M^i is the set of all motifs that are listed in the folklore catalog for the ethnic group i, and where $|M|$ is the cardinality of the set M, that is the total number of motifs that are coded in the catalog, shared with at least another existing ethnic group. To illustrate the computation of the index, consider, for example, that in a pair of ethnic groups there is a total of $N = 5$ narratives (all possible narratives listed in the folklore catalog), respectively A, B, C, D and E, and suppose that the oral tradition of group k, as listed in the catalog, includes the narratives A and C, while the tradition of group l includes B, C and D. Cultural similarity between the ethnic groups l and k is equal to 0.25, because there is one common narrative, C, out of a total of 4 narratives in both traditions (A,B,C,D). Once again, this index can be interpreted as a measure of the strength of the cultural link between the two ethnic groups in the network of cultural interactions.

We can construct a measure of folklore-based cultural similarity for a total of slightly more than 450 thousands ethnic group pairs. Figure 1 reports the histogram of the distribution of the measure over country-pairs, together with a kernel density plot. The distribution is very skewed. Many ethnic groups do not have traits in common in their oral traditions, whereby the index is zero in 15.8% of the ethnic group pairs. Conversely, few ethnic groups have oral traditions that overlap considerably. Among others, the French and the Spanish have 50% of the motifs in common, the Russians and the Ukrainians 60%, while the Bongo and the Nyanga, two Sub-Saharan African groups, about two thirds. Overall, the sample median is

equal to 2.7%, with inter-quartile range [2.7%;5%] and a coefficient of variation of about 100%, indicating the large variability of this index in the sample.

Figure 1: **Folklore-Based Cultural Similarity**



Notes: Distribution of the folklore-based cultural similarity over ethnic groups with kernel density estimate. 457446 observations (ethnic group pairs).

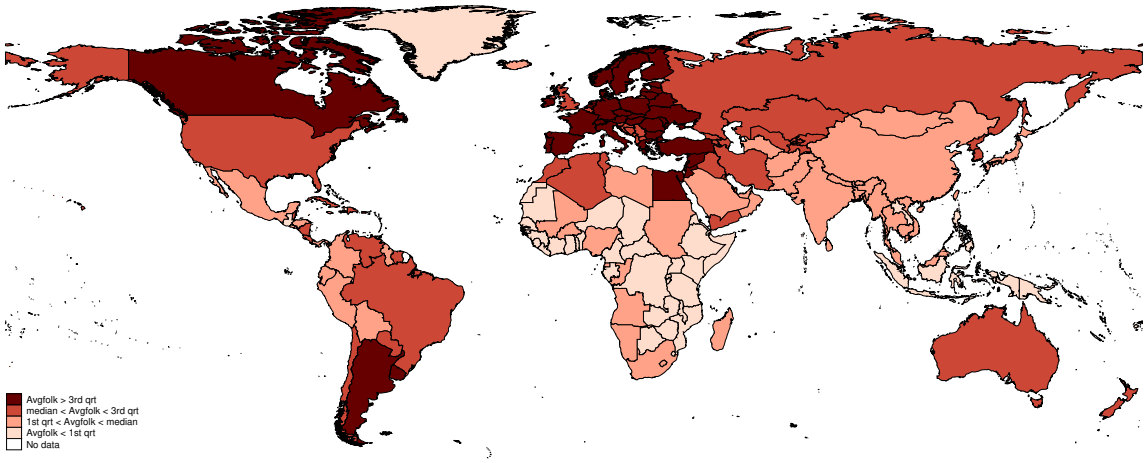
In the ensuing analysis we will also need to make use of folklore-based measure of cultural similarity for country pairs. To this aim, we aggregate the ethnic group level information according to the ethnic group shares (weights) in the current population of each country:

$$D_{ab} = \sum_{k \in K} \sum_{l \in L} \omega_k^a \, \omega_l^b \, \chi_{kl} \tag{2}$$

where ω_k^x is the population share of the ethnic group k in country x, ω_l^y is the population share of the ethnic group l in country y, and where K and L are, respectively, the sets of all ethnic groups in country x and y, with $\sum_{k \in K} \omega_k^a = 1 = \sum_{l \in L} \omega_l^b$.[4] In practice, we follow the same logic used to construct, among others, genetic distances for country pairs starting from genetic distances in ethnic groups pairs (Cavalli-Sforza et al.1994; Pemberton et al. 2013; Spolaore and Wacziarg 2009).

[4]Population shares by ethnic groups are the same as in MX (2021).

Figure 2: **Average Folklore-Based Cultural Similarity**



Notes: Avgfolk is the average folklore-based cultural similarity index between each country and all other countries in the World. Different colors refer to the quartiles (qrt) of the distribution of Avgfolk. 191 observations/countries.

To visualize the country-level measure, in figure 2 we offer a world map of the country averages folklore-based cultural similarities, computed as an unweighted average of the bilateral distances between a country and all other countries in the World. Countries in Sub-Saharan Africa and in South-East Asia appear to be the more culturally peculiar, that is the ones with the lowest number of motifs shared with the rest of the World. European countries, on the other hand, are characterized by large similarity. However, even within Europe, there is a high level of heterogeneity in the bilateral folklore-based cultural distances. In particular, focusing only on country-pairs within the European continent, the coefficient of variation of the bilateral folklore-based cultural distances is 83%.

In our baseline computations, we compute folklore-based cultural similarity measures using all narratives listed in the folklore catalog, i.e. the entire available information set, even the very peculiar ones that are found in few oral traditions around the globe. The reason for this choice, compared to the alternative of focusing on a subset of relatively frequent motifs, is to avoid a mis-measurement of cultural similarity for the ethnic groups with a relatively small number of motifs in the catalog, that could also disappear altogether from the analysis due to such an exclusion. We discuss the robustness of the results to the exclusion of rare motifs in the appendix.

Notice that, using all motifs in the catalog implies that we do not distinguish between

relatively older and newer motifs. Although there exists no precise information as of when the motifs first appeared in the oral tradition of a given ethnic group, we do know, based on the information provided by Berezkin (2015), that the motifs related to cosmology and to etiological myths are older. We computed folklore based measure of culture similarity restricting the set of motifs separately for the old the new motifs, according to the Berezkin classification. The two resulting measures of folklore similarity turned out to be correlated with each other (correlation coefficient in the sample of country pairs equal to 0.858, in the sample of ethnic group pairs 0.465), and very correlated with the measure of folklore similarity based on the entire catalog (correlations in the sample of country pairs equal to 0.894 for the measure based on old motifs only and 0.966 for the measure based on new motifs only; in the sample of ethnic groups pairs, respectively, 0.809 and 0.863). In most of the analysis we will not distinguish, then between old and new motifs.

Our measure of the similarity of oral traditions might deliver an underestimate in case of similarities in the motifs listed in the folklore catalog, that is in case the catalog lists two essentially similar motifs as different because of a slight difference in content. This could happen for oral traditions that are more extensively studied, where record of slight variants of the same tales can be more likely. In appendix, we show that, using text analysis techniques to consolidate similar motifs on the basis of their content, an index based on a closer scrutiny of similar motifs, delivers the same empirical results.

4 Cultural Doorways and Phylogenetic Measures of Ethnic Separation

In this section we extensively analyze the relationship between folklore similarity, phylogenetic distances and geographic distances. We start with a simple analytical framework (subsection 4.1), then focus on genetic distance (subsection 4.2) and language and geography (subsection 4.3), to finally summarize everything within a unified regression framework (subsection 4.4)

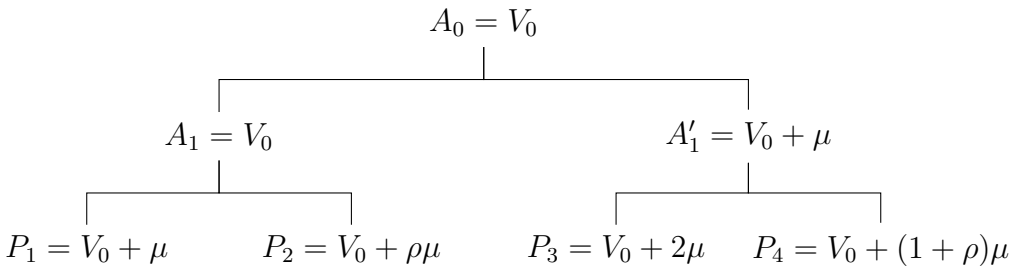
4.1 Cultural Doorways and Ethnic Separation: a Framework

We provide here a very simple example where the framework in Spolaore and Wacziarg (2009, 2012) is adapted to take into account the possibility that cultural traits can be shared within closer groups in a phylogenetic tree. The ensuing discussion is meant to provide a simple but rather precise foundation of the theoretical counterpart of our index of cultural similarity described in the previous section. The simple theoretical construct is based on the idea that cultural transmission (doorways) can be established both within and between separate groups identified according to a vertically transmitted trait represented in a phylogenetic tree. In this framework cultural traits, once acquired by a group are transmitted vertically, but can also be transmitted horizontally, across groups previously separated according to other phylogenetic traits different from folklore. Our key assumption in this simple framework is that a cultural traits once shared is vertically transmitted through the oral tradition within the groups that acquired it.[5]

Consider the following tree whose branches describe the phylogenesis of ethnic groups separated according a deep trait (deeper than motifs in folklore, genetic for example). The tree features a common ancestor population, A_0, that split into two groups A_1 and A_1', subsequently, each of these groups gave rise (through another step in the founding father hypothesis) to other two groups, P_1, P_2, P_3 and P_4 of current populations. The phylogenetic distance between these latter groups, the distance from the latter common ancestor possibly measured by indexes of genetic distances, is as follows: $d_g(P_1, P_2) = d_g(P_3, P_4) = 1$ whereas $d_g(P_1, P_3) = d_g(P_2, P_3) = d_g(P_1, P_4) = d_g(P_2, P_4) = 2$. Each population, at each point in time, is characterized by an emerging cultural trait subject to an independent variation. This variation is vertically transmitted through oral communication within the group, but there exists the possibility that horizontal transmissions across groups occurs. Denote V_0 the cultural trait of the common ancestor and suppose that the common ancestor is characterized by a cultural trait variation such that $\Delta V = \mu$ with probability $1/2$ and zero otherwise. In the following figure we represent one of the histories that may be produced where group A' experiences the evolution of the cultural trait whereas $A1$ does not. This is transmitted down to subsequent

[5]So our framework does not consider modeling dynamic aspects of the co-evolution of mutually dependent vertical traits, see Creanza et al. (2015) for the current state of the debate in this area.

off-spring of group A'. Suppose (for simplicity) that in the first step of this history cultural transmission between between groups A_1 and A'_1 was not possible. Repeat the same process after one period and assume, this time, that the trait can be horizontally transmitted across populations (for simplicity among those population who share at most one ancestor). Suppose that the share of the character that can be horizontally transmitted is ρ.



Then, in this history, one of the two populations with a common ancestors can share its acquired cultural trait (a motif) in proportion of ρ with a separate population, due to a cultural doorway.

If we compute the conditional cultural distances as $d_\chi(P_i, P_j) = |P_i - Pj|$ over all groups, we obtain a measure of unconditional cultural distance among those groups whose phylogenetic distance is equal to 1: $\mathbf{E}[d_\chi | d_g = 1] = (1 - \rho)\mu$. After appropriate conditioning on the phylogenetic distance, we obtain the following cultural distance among those groups whose phylogenetic distance is equal to 2: $\mathbf{E}[d_\chi | d_g = 2] = \mu$, whereas the unconditional distances across all groups: $\mathbf{E}[d_\chi] = [1 - (1/3)\rho]\mu$.

In other words, as in Spolaore and Wacziarg (2009, 2013), larger phylogenetic distances are associated to larger cultural distance. Although correlated, however, measures of cultural distances decrease the larger the fraction of shared tract across groups in the given history. We refer to the historical episodes of horizontal transmission by the term cultural doorways.[6] The intensity of such trait exchange along any history is measured by the parameter ρ. Our index of cultural similarity built on the shared motifs can be considered the empirical counterpart of this parameter.

[6]Similar results can be obtained by considering the set of all the possible histories generated by the process described in the text. This simple result can intuitively be generalized to the case in which horizontal transmissions also occur, maybe at a smaller rate, across groups with a common ancestors at generations earlier than one. Also notice that if the horizontal transfer of traits is absent, cultural distances are equally identical to the phylogenetic distance.

Then, compared to standard measure of phylogenetic distance, our folklore based measure of cultural similarity captures the intensity of historical exchanges of cultural traits among groups, that is the importance of ρ. Clearly these exchanges are themselves shaped by all sorts of genetic, linguistic and geographic barriers.

Notice that, if we extend the model to heterogeneous ρ, i.e. depending on the identity of the ethnic groups, there will be a distribution of cultural distances at each level of phylogenetic distance. In particular, if we assume that ρ decreases with philogenetic distance among contemporaneous groups, we end up with a non-linear relationship, with a higher variance of cultural similarity at lower levels of philogenetic distance, a pattern that we do find in the data (see subsection 4.2).

Based on this simple framework, in the following subsections we explore the relationships between our folklore based measure of cultural similarity and these phylogenetic and geographic distances.

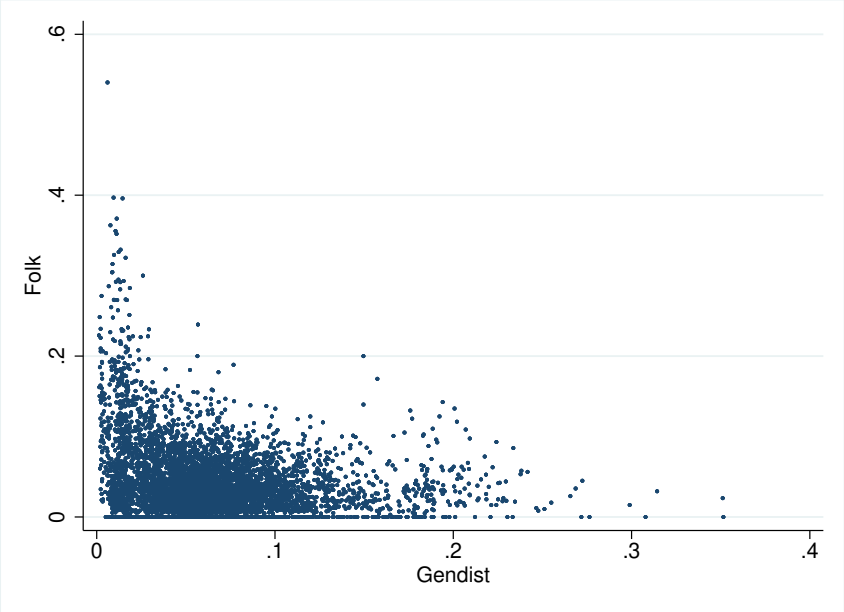
4.2 Cultural and Genetic Distances among Groups

In this section we further elaborate on the relationship between our measure of cultural similarity and genetic distance (Cavalli Sforza et al. 1994; Pemberton et al. 2013; Creanza et al. 2017).

Genetic similarity between populations or ethnic groups is assessed on the basis of neutral genes which are not related to specific traits subject to natural selection, and that evolve only because of random drift. As shown in the previous section, distances in culturally transferable traits can be correlated with genetic distance because populations that are more genetically further away, so that have been separated for a longer time span, have less opportunity to exchange cultural traits, both vertically and horizontally. This feature was explored by Spolaore and Wacziarg (2009). They argued that genetic distance, as an estimate of the separation time, can be considered as a proxy of the distance in vertically transmitted traits, both genetic and cultural. With the help of the folklore catalog, we are in the condition to verify empirically this argument. In particular, we can test whether the intensity of cultural exchange between ethnic groups is negatively correlated with their genetic distance.

Figure 3 reports a scatterplot of the raw data in the sample of 5479 ethnic group pairs for

Figure 3: **Folklore and Genetic Distance**



Notes: Gendist is Genetic Distance from Pemberton et al. (2013). Folk is cultural similarity computed as the Jaccard coefficients of the sets of narratives in the Berezkin folklore catalog. The statistical unit is a pair of ethnic/cultural groups (5749 observations).

which both folklore similarity could be calculated and genetic distance data from Pemberton et al. (2013) is available. As expected, there is a negative relationship between folklore-based cultural similarity and genetic distance: groups that are genetically more distant tend to share, on average, less motifs, with a correlation equal to -0.245. The relationship is negative also in the sample of 28056 country-pairs, with a correlation equal to -0.575 given a country-level aggregation performed with the MX population shares by ethnic group.

Figure 3 also shows that genetically close ethnic groups still exhibit large variability in the share of common motifs in their oral tradition. Quantitatively, the average percentage of common motifs for ethnic group pairs below the first quartile of the distribution of genetic distance is 7.1%, with standard deviation of 6.6% and a maximum value of 54%, while, above the third quartile of the distribution of genetic distance, the mean is 3.2% with standard deviation of 2.8% and a maximum value of 20%. This evidence suggests that the cultural histories of the ethnic groups, although affected by the history of genetic evolution, follow their own dynamics, and some genetically close groups can share a large amount of motifs

or not, depending on the drift in their cultural histories, which could be influenced by other factors such as geographic proximity.

Although folklore similarity is correlated with the timing of genetic separation among groups, remember that our index measures the historical occurrence of the horizontal cultural transmission (through cultural assimilation, migrations, trade and and interbreeding) after separation. This key observation calls for further enquiry, in particular about whether historical contacts and exchange through cultural doorways are relevant for the questions, emerged in recent years in the literature on comparative development, to understand the role of the historical roots of currently observed disparities in economic outcomes. In synthesis, the evidence displayed in figure 3 begs the following specific question: do the bilateral exchanges of cultural traits among groups, as accumulated in their cultural histories as recorded - in the Berezkin's catalog - have an impact on socio- economic outcomes? Before addressing this question let us first explore the correlations among the index of recorded intensity of cultural transmission episodes and other measures of potential barriers and distances.

4.3 Cultural Similarity, Language and Geography

In this section we study in greater detail how linguistic and geographical barriers affect the process of cultural exchange between ethnic groups that determined similarities in their oral traditions. The upshot is that geographically closer ethnic groups, and groups that speak similar languages, share, on average, more motifs, although and importantly we still find significant variability in folklore similarity even among narrowly defined clusters of ethnic groups by either linguistic or geographic proximity.

We start from linguistic similarity. Our exercise consists in constructing linguistic clusters by language groups using the classification compiled by MX. We then compute the average folklore-based cultural similarity between the ethnic groups in each cluster, and then compare these measures with the average folklore-based cultural similarity between each ethnic group and all others in the catalog, see table 1, columns 2-5.

Let us denote with $f_{k,l}$ the similarity of folklore between group k and group l, then $\bar{f}_k = (1/(K-1)) \sum_{l \neq k} f_{k,l}$ is the average similarity in folklore between ethnic group k and all other $K-1$ ethnic groups in the Folklore catalog. Let us denote with $\bar{f}_k^g = (1/G) \sum_{l \in G_k} f_{kl}$

the average similarity between ethnic group k and all other G ethnic groups in the same language group G_k. The exercise consists in comparing the distribution of $\bar{f}_k$ over all ethnic groups with the distribution of $\bar{f}_k^g$ over all linguistic groups (except the "isolate" group, that consists of more than one language) . If linguistic distance is negatively correlated with folklore similarity, we expect to see more motifs in common among the groups with languages belonging to the same linguistic group. This is what we actually find in the data, and with a large difference margin, as shown in table 1. The average median of the distribution of $\bar{f}_k$ is 0.038, with interquartile range $[0.027; 0.046]$, whereas the average of the distribution of $\bar{f}_k^g$ over the 45 language groups with at least 2 ethnic groups within them (there are 19.4 ethnic groups on average within each linguistic group) is 0.126, with interquartile range $[0.075; 0.156]$. The average is instead smaller over the 25 relatively bigger language groups with at least 10 ethnic groups within them (31.2 ethnic groups on average within each linguistic group): 0.098, with interquartile range $[0.071; 0.111]$. As we increase the size of the language group, the average folklore similarity decreases, so larger linguistic groups tend to be culturally more heterogeneous within them, whereas smaller linguistic groups are very homogeneous in terms of folklore. Still, there is considerable variability of within clusters folklore based cultural similarity: the coefficient of variation within the 45 language group clusters is 51%, which is significantly bigger than in the whole sample, which is equal to 37%.

This evidence lends support to the idea that cultural similarity is higher within closer family languages and, nevertheless, important variation of cultural exchanges among group pairs emerges empirically within each language family.

We performed a similar exercise for geographic proximity, by constructing geographical clusters based on the distance between ethnic groups centroids indicated by MX; (See table 1, again). Using a similar notation as above, let us define the groups G_k as composed by all ethnic groups whose geographic centroid lies within a given distance (100, 200, 500 or 750 km) from the group k centroid. Since geographic distance is negatively related to folklore similarity, we expect to see more motifs in common among the geographically closer groups. The results are also reported in table 1, Columns 6-9. They confirm our prior. More specifically, within 100 km radius, the median cultural similarity among the 177 ethnic groups with at least one neighbor within this radius (1.76 neighbors on average) is 0.142, with interquartile range

[0.081; 0.207]. The same measure computed within 500 km, the median is smaller: 0.123, with interquartile range [0.077; 0.172]. Increasing the geographic distance, the average number of neighbors increases and, as a result, the average folklore similarity decreases. However, even within a rather large 750 km radius, the average similarity is still much higher than the average similarity among the entire sample. Moreover, the coefficient of variation within the spatial clusters is actually much higher than in the entire sample.

As in the case of linguistic similarity, the evidence shows that although geographic proximity facilitates cultural exchanges, important variation of cultural exchanges among group pairs emerges within geographically proximate ethnic pairs.

4.4 Cultural Similarity, Genetic, Language and Geographic distances: A Synthesis

In this section we report the results from a regression analysis of our measure of folklore based cultural similarity computed from the Berezkin catalog on several measures of (deeper) phylogenetic distances in a sample of ethnic groups pairs. Together with genetic distance, we focus on geographic, linguistic and religious distance.

Geographic distance is simply computed as the pairwise distance between the ethnic groups centroids or ancestral locations[7], as indicated by MX (2021). For linguistic distance, we use the measure proposed by Automated Similarity Judgment Program (2022), computed, for each language pair, as the average Levenshtein distance (number of replacements needed to convert one word into another) between 40 basic words/meanings (hand, one, eye, drink, person, etc.). For religious distance, we use the complement to one of the relative number of common nodes in the World Christian Database religious tree.

In all regressions, we control for the absolute value of the difference in the number of publications used to code the folklore catalog and for the absolute value of the difference in the year of first publication of the sources used, following the analysis by MX (2021), to capture the extent to which an ethnic group has been studied by folklorists and for how specialized

[7]Note that, in our empirical exercise, geodesic distance between the ethnic groups centroids and relative migratory distance from east Africa turn out to be correlated (correlations 0.446). However the latter measures the cultural distance induced by ancient migrations (and hence by genetic separation time), the latter measures the current geographic distance as a more recent barrier to cultural exchange.

they were (missionaries versus university-trained anthropologists). Moreover, all regressions include two-way ethnic group fixed effects to soak up any unobserved, ethnic-group level, heterogeneity such as the homogeneity of its members in both cultural and genetic terms, or the physical characteristics of their environment, including the shocks to which they were subject.

The results are reported in table 2, with standard error clustered at the level of the first and of the second ethnic group in the couple, as in SW. First, the regression shows that genetic separation is negatively correlated with folklore similarity even after conditioning on geodesic, linguistic and religious distance (column 5). Second, conditional on genetic distance, that is conditional on the separation time, bigger geodesic, linguistic, and religious distances predict a lower number of common motifs in the oral traditions. This we take as empirical evidence showing that historical cultural exchanges between group pairs have been facilitated by the commonality of language and religion and by spatial proximity, where spatial proximity must also be interpreted in terms of commonality of shocks, to which the groups responded similarly.

The empirical results support our interpretation of the folklore based measure of cultural similarity: indeed, we can conclude that genetic, linguistic, spatial or ecological barriers to cultural exchange in the history of ethnic groups pairs affect the measure of the intensity of cultural exchange in the expected way. These results further validate the information content in the Berezkin catalogue, complementing the evidence in MX (2021).

However, these results also highlight the fact that these geographic and phylogenetic measures of distance between group pairs only explain part of the variation in the proposed folklore based (The R^2 is below one third of the total variation). Where does the residual variation in cultural similarity at the ethnic group level originate? Following the logic of the Berezkin catalogue our tenet is that this residual variation is related to historical episodes of cultural exchange that happened *after the separation of ethnic group pairs*, in their main phylogenetic traits (genetic, linguistic, religious) and given their more recent geographic locations.

This we take as empirical evidence that cultural exchange, therefore, had its own drift as driven by specific histories of exchange, migrations, colonization, trade, violent interaction, ecological shocks etc. So, we have to take the above results as a robust indication that folklore

based measures of cultural similarities carries specific, independent information about cultural exchange in the history of the ethnic group pairs. This evidence, then, begs the question: do such cultural doorways recorded in the Berezkin catalogue have an impact on historically and currently observed socio- economic outcomes? Is there evidence of this impact both at the ethnic group level and at the country level? We address these questions in the following sections.

5 Cultural Doorways and Economic Distances

We now turn to the study of the relationship between the folklore-based measure of cultural similarity and distances in the level of income per capita in a dyadic country-pair setting. We pursue two main objectives. The first is to further empirically verify our conjecture, namely that folklore-based measures of cultural distances among populations are, by construction, direct measures of historical exchanges that occurred after their separations, and that they have the potential to explain currently observed economic distances. The second, is to contribute to the isolation of the specific cultural channel within the "molecular clock" measurement of the separation time, as proposed in SW and extensively used in the literature. We consider two different empirical specifications, in a country-pairs setting, using GDP per capita in 2000 (sections 5.1 and 5.2) and population density in 1500 (section 5.3) as target variables, and in an ethnic groups pairs setting, using either night light intensity or the complexity of the settlement type as targets (section 5.4).

5.1 Country-Level evidence

Our baseline empirical specification for the country-level analysis is the following two-way fixed effects model:

$$|Y_i - Y_j| = \beta_0 + \beta_1 D_{ij} + \Gamma X_{ij} + \eta_i + \eta_j + \varepsilon_{ij} \tag{3}$$

where Y_i is the logarithm of the average GDP per capita of country i from the Maddison project over the period 2000-2020, D_{ij} is the folklore-based cultural similarity between country i and j, X_{ij} are controls specific to the country pair, η_i and η_j are country dummies and ε_{ij} an

error term, that we cluster at the level of country i and country j (in an un-directed sample of country pairs)[8]. We consider a wide range of control variables X, some of which are borrowed from the analysis in Spolaore and Wacziarg (2009) and Ashraf and Galor (2013).

To control for the genetic separation time, we include the country-pair genetic or "molecular clock" distance measure, based on micro-satellites as in Spolaore and Wacziarg (2018). We include linguistic and religious distance to control for the separation time in these traits as a measure for the barriers to cultural exchanges (see section 4.2). Both measures are aggregated at the country-pair level as in equation 2.

To capture the effect of geographic barriers, we consider both the geodesic distances between the major cities of the country-pair, and a dummy for contiguous countries. Furthermore, we include a dummy in case one country is an island, a dummy in case one country is landlocked, a dummy for a common sea or ocean, and the transportation cost from Giuliano, Spilimbergo and Tonon (2014), to capture geographical isolation. We include the latitude difference, because, according to Diamond (1997), it proxies for barriers to the diffusion of technology, and a measure of climatic similarity (average difference in the percentages of the total surface in each of the 12 Koeppen-Geiger climate zones), because countries with similar climates can adopt similar innovations and because climate has a direct effect on productivity and, therefore, on income (Sachs 2001). To capture the effect of an early transition to agriculture on growth (Diamond 1997), we include the difference in the neolithic transition timing from Putternam (2008) and a dummy for the "Diamond effect", equal to one in case only one of the countries in a pair is from Eurasia, because of its documented advantages in farming.

To capture the effect of democracy on growth, we included the absolute value of the difference in the POLITY2 scores (Marshall et al. 2017). Since colonialism determined a transfer of institution and technology, we include a dummy equal to one in case the two countries in the pair were in a colonial relationship, and a dummy equal to one in case the two countries ever been within the same country in the past. Finally, the country fixed effects allow to control also for country-specific factors, such as the extent of ethnic fractionalization, that can have an effect on growth (Alesina et al. 2003), as well as for other barriers to development that are not capture by geographic and phylogenetic variables and for idiosyncratic shocks.

[8]This choice is dictated by the very nature of the database, since Berzkin's catalogue of motifs only records the episode of a shared trait, not the direction.

There could be concerns that folklore similarities in country pairs mechanically reflect the ethnic composition of their populations: two countries might have a high similarity in folklore, and a small genetic distance, simply because they are inhabited by the same ethnic groups in similar proportions. Actually, in our largest sample of country pairs, and using the population shares by ethnic groups as in MX, 63% of the country pairs do not have any ethnic group in common. Nevertheless, the empirical distribution of folklore-based cultural similarity over the country pairs with no ethnic group in common is statistically different from the empirical distribution over the countries with one or more ethnic group in common[9] and, as expected, there are more country pairs with many motifs in common in case of ethnic similarity.

Thus we include three additional control variables in the regression to deal with this concern. The first control is given by the share of common ethnic groups in the country pair, obtained dividing the number of ethnic groups that are present in both countries by the total number of ethnic groups in both countries or, in other words, the Jaccard coefficients of the set of ethnic groups. The second control is defined by the share of the combined population of the countries that belong to the ethnic groups that are present in both of them, to control for the differential size of the pool of individuals that come from the same ethnic background in a country pair. To further control for the effect of common ethnic composition among pairs on similarities in their folklore, we also consider an additional index of joint ethnic fractionalization at the ethnic group pair level. This we computed as the fractionalization index in a fictional country constructed merging the two populations in the group pairs. The reason is that country-pairs that are less ethnically fractionalized are more likely to have common motifs in their folklore because there is a bigger share of the population in the common ethnic groups.

The results for our baseline regression are summarized in table 3, where we report details for the estimates of the coefficients of our folklore based measure of cultural similarity and of genetic distance [10] for different regression specification that include or not all of the controls (some of which might be "bad controls") and the two-way fixed effects (which are not part of

[9] In greater detail, the average over the pairs with no common ethnic group is 10.21%, with median 7.13%, standard deviation 8.47%, interquartile range [4.39%,13.56%] and range [0,1]; over the pairs with one or more ethnic group in common, the mean in 16.97%, with median 12.18%, standard deviation 16.08%, interquartile range [5.88%,23.26%] and range [0,1].

[10] More detailed reports are available upon request.

the SW empirical model which we take as a reference point).

The main evidence we offer is that country pairs with larger cultural similarities exhibit smaller differences in the level of income per capita (negative signs on the regression coefficient on Folk in columns 1,3, 4 and 5 of Table 3). Note that the variables in the regression are standardized, so the table entries must be read as the effect of a one standard deviation change of the regressor on the standard deviations of the outcome.

Similar results as in SW also obtain in our sample, namely genetically more distant countries are characterized by more different levels of income per capita (positive sign on Gen in columns 2 and 3, Table 3), but with important qualifications: when we include folklore similarity in the regression, (columns 3 and 4 of table 3), the magnitude of the coefficient on genetic distance drops considerably, and it remains lower upon the inclusion of country fixed effects (column 5 of table 3). These results provide an empirically documented base for the arguments provided in Spolaore and Wacziarg (2009, 2013), i.e. that genetic distance proxies for vertically transmitted traits are likely to capture cultural similarities. It is worth noticing that the inclusion of a direct measure of cultural exchanges occurred after separation in other vertically transmitted traits also weakens their role in capturing the deep roots of current economic distances.[11]

All in all, this we consider as an important empirical evidence in support of our general interpretation: our folklore-based index of similarities of cultural traits represents a more direct measure of the intensity of episodes of cultural exchanges in the time span - the cultural clock - during which different groups of people (and hence countries) had the opportunity to interact, exchange, and orally transmit information, ideas and beliefs and it has a documented relevance for current outcomes.

5.2 Instrumenting Differences in Folklore

As argued in the literature on comparative development, one potential problem with the above empirical specification for country-pairs is that differences in folklore, in a cross-country setting, might be endogenous because they are computed using population shares that are the

[11]This result is not reported in Table 3, to simplify the reading of our main results. They are available on request.

result of recent (post 1500) migrations, resulting from factors that are likely correlated with the determinants of income differences.

In the baseline specification, this issue was (partially) dealt by considering specific controls and by including country fixed effects in the regressions. In this section, we further explore this issue following an IV strategy. We construct a measure of ancestral cultural distance, according to the same logic used by SW, to instrument genetic distance, and use it as an exogenous instrument for the weighted average cultural similarities at the country pair level. More specifically, in this procedure to each country we assign the ethnic group with the earliest recorded history in that geographic area, or with the dominant ethnicity in that territory before the great migrations[12], and then compute bilateral cultural similarities between these dominant ethnic groups as in eq. (1). The exclusion restriction is that ancestral folklore-based cultural distances do not have a direct effect on current income differences other than through currently observed cultural distances.

Table 4 reports the results from the IV regression. The first stage turned out to be quite strong, especially in the regressions without country fixed effects. The main result from this exercise is that, even in this regression specification, that accounts for the potential endogeneity of the similarity in folklore due to recent migrations, our measure of folklore-based cultural similarity is positively and significantly associated with differences in income per capita, even after controlling for geodesic, genetic, linguistic and religious distance. Column (2) in Table 4 reports a similar IV strategy as in Spolaore and Wacziarg (2009) for comparison.

5.3 Country Level Evidence about Historical Differences in Development

We now explore the relationship between folklore similarity and development in a historical perspective, focusing on the Pre-colonial Malthusian era. In particular, we use the population density in 1500 from McEvedy and Jones (1978) as outcome, consistently with the analysis by Ashraf and Galor (2013). As main explanatory variable, we use the folklore-based cultural similarity of the ancestral ethnic groups, that is the exogenous instrument that we described

[12]In few cases we were not able to match a single ethnic group to a country. In these cases we simply computed weighted averages distances with equal weights.

in section 5.2. The regression results are summarized in Table 5, and they and are in line with the previous evidence: more similar countries in terms of their oral tradition tend to have similar levels of population density in 1500. Note that our empirical specification with fixed country effects controls for several country-specific factors like the Neolithic transition timing and the physical land characteristics such as its suitability to agriculture and its productivity, that are important determinants of growth (Diamond 1997; Olsson and Hibbs 2005).

5.4 Ethnic-Group level Evidence

We now turn to the analysis of the impact of cultural similarities on economic outcomes for ethnic-group pairs. The empirical specification is the same as the one in equation (3), although some of the included variables are defined differently. In particular, since GDP per capita is not observed at the ethnic group level, we use two proxies. The first is given by the average night light intensity per square km within a 200 km radius from the ethnic group centroid, as in MX (2021). The second is given by the settlement type or complexity assigned [13] in the Ethnographic Atlas, following Giuliano and Nunn (2021). We control for climatic similarity, defined as a dummy equal to one in case the two ethnic groups are in the same Koeppen-Geiger climate zone. Controls also include freight costs: these are imputed by matching ethnic groups to countries based on their centroid and on the present-day country borders, and then using country-to-country freight costs. Analogously, relative migratory distance among groups is re-defined with respect to the ethnic group centroid. Finally, the contiguity dummy is replaced with a dummy equal to one in case the ethnic groups centroids are in the same present-day country.

The regression results are summarized in table 6, and are in line with the country-level analysis: with folklore-based cultural similarity explains income differences over and above genetic and linguistic distances. Notice that there is a much bigger number of data-points in this empirical specification, especially when using light intensity as dependent variable, although not all control variables are available for all ethnic group pairs, with genetic distance

[13] Settlements in the Ethnographic Atlas are classified in order of complexity as follows: 1 - nomadic or fully migratory, 2 - semi-nomadic, 3 - semi-sedentary, 4 - compact but not permanent, 5 - neighborhoods of dispersed family homesteads, 6 - separate hamlets forming a single community, 7 - compact and relatively permanent, 8 - complex.

being especially scarce due to the relatively small sample of Pemberton.

6 Folklore based Cultural Similarities and Income Differences: Mechanisms

In this last part of our analysis, we explore the mechanism though which the accumulated cultural exchange in the remote past, that we detect with our synthetic measure of cultural similarity, affects current economic performance. First, we follow MX (2021) and study the relationship between folklore similarity and current cultural traits (section 6.1), to investigate whether the relationship between oral tradition and current income might be determined, among other factors, by the effect of the oral tradition on current cultural similarity. Second, we explore the possibility that cultural barriers act as a barrier to the diffusion of innovations (section 6.2), in line with the analysis by SW. Third, we construct disaggregated measures of folklore similarity based on subsets of motifs associated with given concepts, to isolate the tracts of the oral tradition that are mostly responsible for the empirical results (section 6.3).

6.1 Ancient Cultural Similarities and Current Cultural Distances

The first possibility is that folklore influences current cultural traits, which was already documented by MX in a cross-sectional setting. Differently from their approach, we consider here a bilateral setting, regressing present-day cultural differences in country-pairs on our measure of similarity in folklore. We use the cultural distance measures developed by Muthukrishna et al. (2020), and which is based on World Values Survey. Their methodology consists in extending the logic of the computation of genetic distances based on fixation indexes (Cavalli-Sforza et al. 1994) to surveys[14]. We chose this measure because of its analogy with the computation of genetic similarity and because, as discussed in Muthukrishna et al. (2020), it overcomes many of the issues of other measures of cultural distance based on survey answers. Moreover,

[14]They treat survey questions as DNA loci (location of the genes responsible for a particular trait such as eye color), and survey answers as alleles (gene variations for blue, green, brown eyes etc.) and then compute the fixation index as the ratio of the between and within groups variance of answers (alleles) for a particular question (or locus such as the DNA location for the main eye-color gene) in the WVS answers of the individuals in two populations.

as showed by Desmet et al. (2017), the fixation index for WVS questions is highly correlated with an alternative index of cultural distance that accounts for the overlap between culture and ethnicity.

We considered the aggregate measure of cultural distance based on all[15] WVS questions whenever possible, and averaged over the period 2005-2014 (whenever more than two waves of answers are available for a country). Table 7 reports the results of a regression of this aggregate measure of cultural distance on our folklore based measure of cultural similarity. In all regressions we include the geodesic distance between the countries, a dummy for contiguous countries, to account for the relationship between similarity and geographical proximity, together with the three controls for common ethnicity, namely the percentage of common ethnic groups, the share of the population in the common groups and the joint index of ethnic fractionalization. We also include two-way country fixed effects to soak up the effect of unobserved country characteristics such as the development stage.

The result is that folklore-similarity predicts a smaller distances in the cultural traits measured by the WVS answers. Genetic distance also predicts a bigger cultural distance, in line with the result of Desmet et al. (2011) but, when including together folklore similarity and genetic distance, the coefficient on genetic distance is not significant anymore. The results are robust to the inclusion of linguistic similarity and religious distance, both of which are potential explanations for the similarity in WVS answers.

These empirical results lend further credibility to our interpretation of the folklore similarity, showing that our measure is relevant for currently observed cultural traits, in accordance with the analysis by MX, who extensively showed, in a different empirical setting, the relationship between the oral tradition and contemporary culture. These results also confirm our previous analysis: our measure of cultural similarity, that captures cultural exchange after philogenetic separation, downplays or even obliterates the role of other phylogenetic distances, especially genetic distances.

We notice here that an additional, very convenient, feature of the cultural distance that we used is that it can be disaggregated by specific cultural traits, that is by subsets of WVS answers, for instance focusing on the cultural traits that have been showed to be determinants

[15]The full set of used answers is available at the URL: http://www.culturaldistance.com.

of long-run growth. We leave this analysis, closer in spirit to MX, to future research.

6.2 Cultural Doorways and the Distance from the Frontier

Another possible mechanism linking cultural similarity to income differences is through the barrier effect to the diffusion of innovations, as studied by SW. The general idea is that learning from the technological leaders/innovators is more difficult in case of cultural differences, which are more likely to arise in case of a longer separation time between populations. SW test this hypothesis identifying the US as the technological frontier, and using the relative genetic distance form the USA as a measure of the difficulty of the diffusion of innovations. We replicate their analysis, but- importantly- using the relative folklore-based cultural distance from the technological frontier, equal to $|F_{i,US} - F_{j,US}|$, as an additional dependent variable in the regression. Since it is not possible to identify a technological frontier in this ethnic-group level data-set, we focus only on the country-level evidence.

Table 8 reports the empirical results of a regression of differences in log income per capita on the relative folklore-based cultural similarity and the relative genetic distance from the US. Note that, since we take the absolute value of the difference in similarities with the technological frontier, we are in fact measuring the relative distance of country pairs, therefore the sign of the coefficient on the relative cultural distance is expected to be positive. Indeed, we find that a relatively bigger difference in the folklore-based cultural similarity relative to the technological frontier predicts higher differences in income per capita in country pairs (positive signs on the regression coefficients on RelFolk in columns 1, 3, 4 and 5). In line with SW, we also find a similar result for genetic distance.

Since the US, although technologically advanced, is not the only country from which innovations can directly diffuse, and since innovations could be interpreted in a less restrictive sense than in a purely technological way, but also as- broadly speaking institutional distances, we extended the analysis allowing for different frontiers. The results are reported in table 9. First, we considered two rich, and technological advanced, Asian countries, China, and Japan, who are both geographically and culturally very far from the US. The results turned out to be in line with the US benchmark, also in terms of point estimates. We then considered France, and advanced European country, obtaining again similar results. The picture that emerges

shows that what matters is being culturally close to rich and advanced economies, which hints at the importance of cultural doorways in the technology transfers that took place in history. Notice also that relative genetic distance remains significant in these regression specifications, which proves that the original SW result is indeed much more general.

Actually, the empirical results hold also when using some poor and underdeveloped countries as benchmark to compute the relative distance. In table 9, we report the results for the two poorest countries in the sample, Burundi and Malawi. This evidence suggests that being culturally similar to countries which are far from the technological and institutional frontier, predicts a similar, small, level of income per capita. We interpret these results as evidence that cultural doorways are not necessarily a way to technological advancement. Rather they can actually reinforce the persistence of traits that prevent the diffusion of development[16]: a strong link to a country which is far from the technological frontier tends to increase the distance with the frontier. Accordingly, the estimates we obtain are not the same regardless of the choice of the frontier country. For instance, the regression coefficient on relative folklore similarity is not statistically significant when taking Russia (a middle income country in Europe with medium technology level) or Mozambique (in the bottom decile of income per capita) as benchmark. Thus the above discussion must be considered as an illustrative example deserving further investigations.

6.3 Concept-Specific Cultural Similarity

In order to further explain the relationship between folklore similarity and income differences, we explore the effects of folklore similarity arising from specific cultural traits, looking more closely at the text of the motifs and extracting more content from them. To this end, we computed disaggregated, narrower, measures of folklore-based cultural similarity based on subsets of motifs associated with specific concepts that have been shown to be directly associated with GDP growth and with its determinants, using the classification of motifs by concepts compiled by MX. We looked for keywords/tags in the motifs descriptions, then restrict the folklore catalog to the set of motifs associated with those tags, and finally computed the

[16]The underlying mechanisms are conceivably similar to those considered in the literature on social segregation.

Jaccard coefficient of folklore similarity starting from these restricted sets.

We considered a rather large set of concepts and, since SW emphasize the diffusion of innovations as a mechanism behind their result, a result which is also supported in our previously reported empirical evidence, some of the concepts are related to the literature on innovation and economic growth. The first concept is "Trust" (tags: cheat, deceive, trick), because of the literature linking trust to growth, and because of the result in MX of a cross-country association between trust motifs (individuals who engage in anti-social behavior, or "tricksters", are punished[17]) and contemporary measures o trust in others. We also consider the complementary "No Trust" concept (tricksters not punished), because similarities in the lack of trust might predict low levels of the income per capita in both countries. Since risk-taking is a fundamental part any entrepreneurial activity, we select the concept "Risk" (tags: contest, competition, winner, challenge, challenger, compete, tournament, contender, competitor, confront, dare, difficult, and difficulty), following the analysis by MX, selecting the concept associated with challenges that turn out to be successful. We then consider the concepts "Rich" (tags: rich, richness, wealth, greed) and "Success" (tags: success, successful) to capture, respectively, the monetary and non-monetary motivation to engage in economic activities and to put effort. More related to the effects of innovations, we considered the concept "Learn" (tags: learn, learning, knowledge), because knowledge is what ultimately drives innovation, and the accumulation of knowledge depends on the emphasis given to it in a society. We then consider the concept "Imitation" (tags: imitation, imitate, mimick), because, far from the technological frontier, imitation of already existing technologies is enough to have growth (Acemoglu et al. 2006). Finally, we consider a "residual" measure of folklore similarity obtained excluding, from the set of motifs, all of the motifs associated with the concepts that we selected and that we believe are important for growth.

The results are summarized in table 10, for a regression specification that includes genetic, linguistic and religious distance, alongside the full set of controls used to estimate equation 3. All coefficients are standardized, so the table is useful for a direct comparison of the importance of the similarity in specific traits. The upshot is that the similarities in the

[17]MX asked a group of individuals hired trough MTURKS to classify the stories with tricksters according to the punishment. We select as trust motifs those that were classified by 50% or more of the individuals as having a punishment for the trickster.

individual motivation and in the emphasis on learning are important determinants in the similarities of income differences. The coefficients on the similarities of Trust-related motifs, Risk-related motifs, and imitation related motifs, are statistically significant, but they are quantitatively less important. Note that the negative sign of the regression coefficient does not imply any specific mechanism of the motifs on growth.

We must, however, be careful in the interpretation of the above results, for two reasons. First, the isolation of the motifs related to a particular concept does not exclude the possibility that the very same motifs are also associated with other concepts that might also be driving income difference, and this is especially problematic for the concepts that are associated with a large number of motifs. Second, the concept-specific measures of folklore similarity are (unconditionally) very correlated with each other, so countries that are similar, say, in trust-related concepts are also similar in non-trust related concepts, which is also the reason why we did not include all concept-specific measures together in a single regression.

Importantly, the residual measure of folklore similarity is also statistically significant in the regression. The interpretation of this result is that the folklore based index of cultural similarity captures additional information than that contained in the specific cultural traits we isolated in the above exercise. One explanation is that focusing on specific set of motifs does not capture appropriate information about the overall intensity of cultural exchange in ethnic group pairs in their history. Our preferred interpretation of the exploration of the mechanism is in support of the findings in SW, i.e. that a synthetic index of cultural similarity captures cultural doorways in the barriers to development. In this view it is the overall intensity of historical episodes of cultural exchanges, measured by our index, that better captures the impact of vertically transmitted trait distances in income per capita, or barriers to development.

7 Conclusion

We exploited information in the Berezkin catalog to obtain an index of similarity in cultural traits among ethnic groups. Starting from the elementary unit of observation in that catalog, a shared motif among different ethnic groups, the synthetic measure of cultural similarity

among groups was computed as the Jaccard index of shared motifs in each pair of ethnic groups.

In a further validation of the information contained in the catalog we find that our folklore based index of cultural similarities correlates remarkably well with its determinants, mainly geographic and phylogenetic (genetic, linguistic and religious) distances.

Nevertheless, important residual variation in the folklore based measure of cultural similarities remains, as induced by the historical accumulation of common cultural traits after separation in other traits. Indeed we argued for an important difference between our folklore based measure of cultural similarity and these other phylogenetic measures of distances between vertically transmitted traits. Metrics of genetic, linguistic and religious distances measure *the time since separation* in the vertically transmitted traits (a "molecular clock" in the case of genetic distances), among the branches of the phylogenetic tree as experienced by ethnic groups over their history. Instead, information recorded in the Berezkin catalog, and hence in the index we propose, measures the episodes of cultural exchange according to the number of shared cultural traits as accumulated in history in their oral traditions, *after* all these separations had taken place.

This observation motivated our main regression analysis of the role of cultural similarities for the explanation of currently observed distances among countries and group pairs. Abundant and quite robust evidence emerged from the analysis that our measure of cultural similarity plays an important- if not crucial- role to explain distances in historical and current economic outcomes among ethnic groups and country pairs. Several robustness checks allowed us to reinforce and qualify this result.

In summary, in our interpretation, such exchanges allowed cultural mixing among remotely separated groups and hence shared motifs in the Brezkin catalog measure the historical occurrence and the intensity of such exchanges among groups. According to the results from the analysis provided in this paper, these exchanges turn out to have a clearly detectable empirical impact in explaining the barriers to development that still sustain significant existent differences in economic outcomes at both the ethnic and country level.

As it is well known cultural similarities and variation can affect current outcomes through several mechanisms, by influencing the transferability of technological advances across groups,

through a direct impact of cultural values on economic attitudes and behavior by the individuals in a country, in the market or by the impact of group identity on the shaping of the political organization and policies in that same country. Evidence about these channels, especially the former two, was also proposed. Additional support for a cultural channel operating through the role of cultural exchange in barriers to diffusion of technological advancement was provided. Our analysis suggest that further improvements can be obtained by the use of measures of historical cultural exchanges for the improvement of our knowledge of the more proximate causes and mechanisms through which ancient cultural intercourse among populations have operated. Prominent examples, still in the pairwise setting of analysis, can be the analysis of the impact of deep rooted similarity in cultural traits on currently observed pairwise trade patterns and agreements, regional integration processes, contemporary migrations and financial flows, FDI, conflicts and diplomatic relationships.

A Appendix

In this appendix we discuss the robustness of the measure of folklore-based cultural similarity to several possible alternatives criteria for the construction of the Jaccard index. In particular, we discuss the robustness to the exclusion of rare motifs (subsection A.1), to the consolidation of similar motifs by content using text analysis (subsection A.2) and to the use of alternative measures of set similarity (subsection A.3).

A.1 Exclusion of Rare Motifs

The benchmark measure of folklore-based cultural similarity is computed starting from all motifs in the folklore catalog, including the rare ones that are part of the oral traditions of few groups and also the very rare ones that appear only in the folklore of two ethnic groups. Just to give few numbers, there are 10 motifs shared by two groups only, 38 motifs shared by three groups only, 730 motifs (28.5% of the total number) shared by 10 groups or less and 1715 (66.9% of the total) shared by 30 groups or less. As emphasized in the main text, the rationale behind the inclusion of rare motifs is to properly measure cultural similarity for the ethnic groups with few motifs in the catalog, and to include all of the ethnic groups in the analysis, since, excluding rare motifs, could also deliver empty sets of motifs for some ethnic groups. To check for robustness of our results, we implemented a rather extreme exercise, computing folklore-based cultural similarity on a reduced folklore catalog obtained from the exclusion of motifs shared by 30 ethnic groups or less. The correlation between our benchmark measure and this alternative, that actually delivers the exclusion of just one ethnic group from the analysis, is 0.98. We conclude that our results are mostly driven by the similarities among relatively more frequent motifs in the catalog.

A.2 Correction for Similar Motifs

The measure of oral traditions similarities that we developed is potentially downward biased, because similar motifs might be listed as different because of minor content dissimilarities. To illustrate, let's follow up on the example in section **??**, that features a folklore catalog made up of 5 motifs, A, B, C, D, and E, but suppose that the motifs B and C are very similar to

each other. Consider the case of 3 ethnic groups with the following oral traditions $\{B; E\}$ for group 1, $\{B; D\}$ for group 2 and $\{A; C\}$ for group 3. According to our similarity measure, 1 and 2 have more similar oral traditions (they share one motif) than 2 and 3 (no motif sharing), but this is problematic because motifs B and C are similar. We are confident that the Folklore catalog avoids such an inflation of motifs, i.e. that the classified motifs are sufficiently different in content from each other, so we believe that an underestimate should be, if anything, only minimal. Nevertheless, we also considered a correction to our measure to account for the potential motif similarity using latent semantic analysis. We identified similar motifs in the folklore catalog computing cosine similarities of the motifs descriptions (in English), and then consolidated similar motifs in case of a cosine similarity above a threshold (ethnic groups with either one of the similar motifs are classified to have only the consolidated one). This procedure yields a reduced folklore catalog with fewer motifs, that we use to construct an alternative bias-reduced folklore-based cultural similarity measure. In the above example, a reduced catalog includes motifs A, D, E, plus one, composite of B and C, and the similarity between group 2 and 3 based on this new set of motifs is equal to the similarity between group 1 and 2. In the Folklore catalog, a threshold cosine similarity of 0.75 entails the exclusion of only 6.5% of the motifs. This evidence can be interpreted as an indication of the efficiency of the catalog classification, which effectively avoids separate listings for similar motifs, especially given the small threshold cosine similarity measure used. For our purposes, the exclusion of such a small number of motifs implies that the correlation between the benchmark and the bias-reduced measures of folklore-based cultural similarity index is very high, specifically 0.979. This result represents reassuring evidence that there is no underestimate in our measure. With an even smaller cosine similarity threshold of 0.6, the exclusion entails 12.7% of the motifs in the catalog, but the correlation between the benchmark and the bias-reduced measures is still very high: 0.962.

A.3 Alternative Measures of Set Similarity

The Jaccard index used for our benchmark measure of folklore-based cultural similarity is not the only possible measure of set similarity that we can use, although it is arguably the most intuitive. There are at least four valid alternatives substantially based on the same logic: the

Simple Matching (Rand) Coefficient, the Soresen-Dice coefficient, the Otsuka-Oichiai similarity and the Tversky index. The Simple Matching coefficient is a slight generalization of the Jaccard index where the absence of a motif in the oral traditions of the two ethnic groups is considered a similarity. In this context, this is problematic given the quite high number of total folklore motifs in the catalog, and given the relatively small number median number of motifs per ethnic group, which results in (very) inflated similarity measures. To partially overcome this issue, it is in principle possible to restrict the total set of motifs excluding the infrequent ones, i.e. the motifs that are present in the oral traditions of very few ethnic groups, but then the similarity measures between the groups that have the excluded motifs will be wrong. So we will refrain from considering it[18]. In fact, the computation of the Jaccard index, that focuses only on the narratives that are present in the oral traditions of the two groups that are compared, can be seen as a solution to this problem. The Soresen-Dice coefficient is instead equal to twice the number of motifs in both oral traditions over the sum of the motifs in at least one of them, and it is computationally similar to the Jaccard (correlation in the sample of country-pairs between these two indexes is equal to 0.98). The Otsuka–Ochiai coefficient is basically the cosine similarity for binary vectors, and it is computed as the ratio of the total number of motifs in both oral traditions divided by the square root of the product of the number of motifs in each of them, so it is also computationally similar to the Jaccard index (correlation in the sample of country-pairs between these two indexes is equal to 0.96). Finally, the Tversky index is a actually a family of similarity measures indexed by two parameters, and generalizes the Jaccard and the Soresen-Dice coefficient, which are both particular cases for a specific choice of the parameter values, so it is also not worth considering. Another possible alternative approach to the construction of a similarity measure for folklore would be to consider the catalog, for each ethnic group, as a binary vector with length equal to the total number of existing motifs and with entries equal to one in case the motif is present in the oral tradition of that ethnic group, and then compute distances among such vectors using, say, the Euclidean or the Hamming (number of vectors entries with different elements) distance. The problem with this approach, however, is the same as the Simple matching coefficient, namely

[18]Following Berezkin (2015) our interpretation of shared motifs as cultural doorways provides an argument for why the absence of sharing of a specific motive in both groups in a pair has to be considered as a measure of distance, not as a measure similarity.

absences of motifs in both traditions are considered similarities. We also tried an easier measure, simply counting the number of common elements in the sets without any normalization, and we obtained again a very high correlation (0.961 in the country-pairs sample).

In conclusion, the choice of the Jaccard Index to evaluate the similarity of the oral traditions is consistent with the theoretical representation of cultural exchange of the motif as a unit of observation and it significantly eases the interpretation of our results.

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Table 1: **Folktales Similarity, Language and Geography**

	All	Language Clusters				Spatial Clusters			
	(1)	(2) Lang 2	(3) Lang 5	(4) Lang 10	(5) Lang 20	(6) Dist 100	(7) Dist 200	(8) Dist 500	(9) Dist 750
Mean	0.0363	0.1264	0.1015	0.0984	0.0889	0.1494	0.1397	0.1304	0.1234
Std	0.0136	0.0647	0.0358	0.0371	0.0266	0.0929	0.0822	0.0752	0.0684
Min	0.0006	0.0135	0.0497	0.0497	0.0628	0	0	0	0
1^{st} qrt	0.0278	0.0754	0.0712	0.0706	0.0701	0.0801	0.0751	0.0767	0.0764
Median	0.0379	0.1104	0.1003	0.0935	0.0736	0.1428	0.1373	0.1228	0.1138
3^{rd} qrt	0.0463	0.1563	0.1155	0.1107	0.1079	0.2069	0.1928	0.1717	0.1569
Max	0.0632	0.3302	0.1896	0.1896	0.1481	0.5607	0.5497	0.4137	0.4036
Obs	958	45	29	25	12	177	480	878	933
Neigh	957	19.37	28	31.24	47.67	1.76	2.84	7.98	14.27

Notes: All is for the distribution of bilateral similarities between of all ethnic groups. Lang Clusters refers to the conditional distribution of folklore-based cultural similarity among linguistic groups with at least 2, 5 10 or 20 ethnic groups within them (all others are excluded). Dist refers to the conditional distribution of folklore-based cultural similarities among ethnic groups within a 100, 200, 500 or 750 km radius from the group centroid. obs in column (1) is the number of ethnic groups; obs in columns (2) to (5) is the number of linguistic groups; obs in columns (6) to (9) is the number of ethnic groups with at least one neighbor in the spatial cluster of given distance. neigh in column (1) is the number of ethnic groups minus 1; neigh in columns (2) to (5) is the average number of ethnic groups within each language group; neigh in columns (6) to (9) is the average number of neighbors within the distance specified in column.

Table 2: **Folktales Similarity and Distances in phylogenetic traits, ethnic groups**

	Folklore-Based Index of Cultural Similarity				
	(1)	(2)	(3)	(4)	(5)
Gen	-0.6945***				-0.3609***
	(0.0728)				(0.0830)
Dist		-0.3587***			-0.1843***
		(0.0302)			(0.0340)
Lang			-0.2071***		-0.1478***
			(0.0393)		(0.0348)
Relig				-0.1585***	-0.0933***
				(0.0237)	(0.0213)
R^2	0.237	0.239	0.169	0.138	0.302
Obs	5479	5379	5413	5379	5214

Notes: Observations are for Ethnic group pairs. Dependent variable is the folklore-based cultural similarity index measured as the relative number of common folktales from the Berezkin catalog. Gen is genetic distance between the ethnic groups from Pemberton et al. (2013). Dist is the geodesic distance between the ancestral locations of the ethnic groups. Lang is linguistic distance from the ASJP. Relig is religious distance based on the religion tree from the World Christian Database. All regression include: the absolute value of the difference between the number of publications used to code the motifs; the absolute value of the difference of the year of publication of the first source; two-way ethnic groups fixed effects. Standardized beta coefficients. Two-way clustered standard errors (ethnic group level) in bracket. *** significant at 1% level.

Table 3: **Folklore and Income Differences, Countries**

	Differences in Log Income per Capita				
	(1)	(2)	(3)	(4)	(5)
Folk	-0.3749***		-0.2852***	-0.3205***	-0.4686***
	(0.0361)		(0.0352)	(0.0435)	(0.0875)
Gen		0.3506***	0.1679**	0.1437**	0.2576***
		(0.0547)	(0.0562)	(0.0648)	(0.0777)
R^2	0.141	0.119	0.161	0.228	0.272
Obs	12561	11325	11325	9453	9453
Cont	no	no	no	yes	yes
FE	no	no	no	no	yes

Notes: Observations are for country pairs. Dependent variable is the absolute value of the differences in the logs of income per capita. Folk is folklore-based cultural similarity. Gen is genetic distance between the countries. All regression include geodesic distance, a dummy for contiguous countries, the percentage of common ethnic groups, the share of the joint population in the common ethnic groups and the index of joint fractionalization. Cont indicates the presence of additional controls: linguistic distance, religious distance, a dummy in case one country is an island, a dummy in case one country is landlocked, a dummy for a common sea or ocean, the transportation cost from Giuliano, Spilimbergo and Tonon (2014), the latitude difference, the average difference in the percentages of the total surface in each of the 12 Koeppen-Geiger climate zones), a dummy equal to one in case only one of the countries in a pair is from Eurasia (Diamond effect), the difference in the agricultural transition timing, the difference in the Polity2 scores, a dummy equal to one in case of a past colonial relationship, a dummy in case the two countries have ever been in the same country. Two-way clustered standard errors in brackets. FE is yes in case of two-way country fixed effects are included. Standardized Beta coefficients. *** significant at 1% level. ** significant at 5% level.

Table 4: **Folklore and Income Differences, Countries, IV**

	Differences in Log Income per Capita				
	(1)	(2)	(3)	(4)	(5)
Folk	-0.6144***		-0.7630***	-0.4861***	-1.2419***
	(0.0725)		(0.1565)	(0.1233)	(0.4261)
Gendist		0.4975***	-0.1381	0.0342	-0.0822
		(0.0887)	(0.1159)	(0.1080)	(0.2029)
R^2	0.093	0.103	0.042	0.217	0.161
Obs	12561	11325	11325	9453	9453
F (folk)	81		31	40	16.5
F (gen)		84			
Cont	no	no	no	yes	yes
FE	no	no	no	no	yes

Notes: Observations are for country pairs. Dependent variable is the absolute value of the differences in the logs of income per capita. Folk is folklore-based cultural similarity. Gendist is genetic distance. In columns (1), (3), (4) and (5), folklore-based cultural similarity is instrumented with ancestral folklore-based cultural similarity. In column (2), genetic distance is instrumented with ancestral genetic distance. All regression include geodesic distance, a dummy for contiguous countries, the percentage of common ethnic groups, the share of the joint population in the common ethnic groups and the index of joint fractionalization. Cont indicates the presence of additional controls: linguistic distance, religious distance, a dummy in case one country is an island, a dummy in case one country is landlocked, a dummy for a common sea or ocean, the transportation cost from Giuliano, Spilimbergo and Tonon (2014), the latitude difference, the average difference in the percentages of the total surface in each of the 12 Koeppen-Geiger climate zones), a dummy equal to one in case only one of the countries in a pair is from Eurasia (Diamond effect), the difference in the agricultural transition timing, the difference in the Polity2 scores, a dummy equal to one in case of a past colonial relationship, a dummy in case the two countries have ever been in the same country. F (folk) is the first stage F statistic for folklore similarity. F (gen) is the first-stage F statistic for genetic distance. Two-way clustered standard errors in brackets. FE is yes in case of two-way country fixed effects are included. Standardized Beta coefficients. Negative R^2 omitted. *** significant at 1% level. * significant at 10% level.

Table 5: **Folklore and 1500 Population Density, Countries**

	Differences in Log Population Density in 1500		
	(1)	(2)	(3)
Folk1500	-0.1301***	-0.1337***	-0.0690**
	(0.0342)	(0.0363)	(0.0344)
Gen1500		-0.0367*	-0.0399**
		(0.0207)	(0.0201)
R^2	0.055	0.053	0.062
Obs	12246	11175	9870
Cont	no	no	yes

Notes: Observations are for country pairs. Dependent variable is the absolute value of the differences in the logs of the population density in 1500 in the area currently occupied by the country. Folk1500 is folklore-based cultural similarity of the ancestral ethnic groups. Gen is genetic distance between the ancestral ethnic groups. All regression include geodesic distance, a dummy for contiguous countries and two-way country fixed effects. Cont indicates the presence of additional controls: the latitude difference, a dummy for a common sea or ocean, a dummy in case one country is an island, the average difference in the percentages of the total surface in each of the 12 Koeppen-Geiger climate zones) a dummy equal to one in case only one of the countries in a pair is from Eurasia (Diamond effect). Standardized Beta coefficients. *** significant at the 1% level. * significant at the 10% level.

Table 6: **Folklore and Income Differences, Ethnic Groups**

	Differences in Light Intensity			Differences in Settlement Type		
	(1)	(2)	(3)	(4)	(5)	(6)
Folk	-0.0799***	-0.1508***	-0.1338***	-0.0699***	-0.0708	-0.0649*
	(0.0119)	(0.0318)	(0.0290)	(0.0144)	(0.0446)	(0.0364)
Gen		-0.0092	0.0204		0.0470	0.0228
		(0.0351)	(0.0418)		(0.0699)	(0.0538)
R^2	0.044	0.038	0.042	0.031	0.063	0.045
Obs	294017	8868	8868	77588	4529	4529
FE	no	no	yes	no	no	yes

Notes: Observations are for ethnic group pairs. OLS regression result Dependent variable is columns 1 to 3 is the absolute value of the differences in the logs of average night-time light intensity per capita within a 200-km radius from the ethnic group centroid. Dependent variable in columns 4 to 6 is the absolute value of the difference in the settlement type/complexity. Folk is folklore-based cultural similarity. Gen is genetic distance. All regression include: geodesic distance, linguistic distance, a dummy in case one of the ethnic groups is on an island, a dummy in case one ethnic groups is landlocked, a dummy for a common sea or ocean, the transportation cost from Giuliano, Spilimbergo and Tonon (2014) (imputed with the present-day country border of where the ethnic group centroid is located), the difference in latitudes, a dummy in case the ethnic groups are in the same Koeppen-Geiger climate zones, a dummy equal to one in case only one of the countries in a pair is from Eurasia (Diamond effect), a dummy equal to one in case the ethnic groups centroid is in the same present-day country. Two-way clustered standard errors (ethnic group level) in brackets. FE is yes in case two-way country fixed effects are included. Standardized Beta coefficients. *** significant at 1% level. * significant at 10% level.

Table 7: **Folklore and World Values Survey (WVS)**

	Cultural Distance based on WVS			
	(1)	(2)	(3)	(4)
Folk	-0.5070***		-0.4592***	-0.3001***
	(0.1011)		(0.0991)	(0.0907)
Gen		0.3492***	0.0673	0.0551
		(0.0860)	(0.0678)	(0.0641)
Lang				0.1572***
				(0.0553)
Rel				0.6266***
				(0.1252)
R^2	0.157	0.110	0.162	0.237
Obs	2926	2628	2628	2628

Notes: Observations are for country pairs. Dependent variable is current cultural distance measured as the fixation index of WVS answers (average 2005-2014). Folk is folklore-based cultural similarity. Gen, Lang and Rel are respectively, genetic, linguistic and religious distance between the countries. All regression include geodesic distance, a dummy for contiguous countries, the percentage of common ethnic groups, the share of the joint population in the common ethnic groups, the index of joint fractionalization and two-way country fixed effects. Two-way clustered standard errors in brackets. Standardized Beta coefficients. *** significant at 1% level.

Table 8: **Folklore and Income Differences, Relative to Frontier, Countries**

	Differences in Log Income per Capita				
	(1)	(2)	(3)	(4)	(5)
RelFolk	0.3831***		0.2348***	0.2690***	0.2887***
	(0.0463)		(0.0531)	(0.0643)	(0.0721)
RelGen		0.3810***	0.2452***	0.2217***	0.1527**
		(0.0508)	(0.0572)	(0.0713)	(0.0735)
R^2	0.169	0.163	0.201	0.233	0.250
Obs	12403	11325	11175	9316	9316
Cont	no	no	no	yes	yes
FE	no	no	no	no	yes

Notes: Observations are for country pairs. Dependent variable is the absolute value of the differences in the logs of income per capita. RelFolk is the difference of folklore-based cultural similarity from the technological frontier (US). RelGen is the relative genetic distance from the US. All regression include geodesic distance, a dummy for contiguous countries, the percentage of common ethnic groups, the share of the joint population in the common ethnic groups and the index of joint fractionalization. Cont indicates the presence of additional controls: Linguistic distance, religious distance, a dummy in case one country is an island, a dummy in case one country is landlocked, a dummy for a common sea or ocean, the transportation cost from Giuliano, Spilimbergo and Tonon (2014), the latitude difference, the average difference in the percentages of the total surface in each of the 12 Koeppen-Geiger climate zones), a dummy equal to one in case only one of the countries in a pair is from Eurasia (Diamond effect), the difference in the agricultural transition timing, the difference in the Polity2 scores, a dummy equal to one in case of a past colonial relationship, a dummy in case the two countries have ever been in the same country. Two-way clustered standard errors in brackets. FE is yes in case of two-way country fixed effects are included. Standardized Beta Coefficients. *** significant at 1% level.

Table 9: **Folklore and Income Differences, Alternative Frontiers, Countries**

	Differences in Log Income per Capita				
	China	Japan	France	Burundi	Malawi
RelFolk	0.4245***	0.2490***	0.1909***	0.4638***	0.3329***
	(0.1197)	(0.0607)	(0.0668)	(0.1562)	(0.1193)
RelGen	0.2637***	0.2492**	0.2332***	0.1557*	0.1507*
	(0.0801)	(0.0776)	(0.0727)	(0.0832)	(0.0889)
R^2	0.172	0.173	0.215	0.174	0.175

Notes: Observations are for country pairs. Dependent variable is the absolute value of the differences in the logs of income per capita. RelFolk is the difference of folklore-based cultural similarity from the country indicated in column. RelFolk^2 is the absolute value of the difference of the squares of the folklore similarities from the country indicated in column. RelGen is the relative genetic distance from the country indicated in column. Rel is religious distance. Lang is linguistic similarity. All regression include: geodesic distance, a dummy for contiguous countries, the percentage of common ethnic groups, the share of the joint population in the common ethnic groups, the index of joint fractionalization, a dummy in case one country is an island, a dummy in case one country is landlocked, a dummy for a common sea or ocean, the transportation cost from Giuliano, Spilimbergo and Tonon (2014), the latitude difference, the average difference in the percentages of the total surface in each of the 12 Koeppen-Geiger climate zones), a dummy equal to one in case only one of the countries in a pair is from Eurasia (Diamond effect), the difference in the agricultural transition timing, the difference in the Polity2 scores, a dummy equal to one in case of a past colonial relationship, a dummy in case the two countries have ever been in the same country, two-way country fixed effects. Two-way clustered standard errors in brackets. Standardized Beta Coefficients. 9316 observations. *** significant at the 1% level. ** significant at the 5% level.

Table 10: **Folklore and Income Differences, Specific Concepts**

	Differences in Log Income per Capita							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gendist	0.3853***	0.3967***	0.4176***	0.2443	0.3438***	0.3299***	0.4533***	0.2761***
	(0.0725)	(0.0743)	(0.0734)	(0.0756)	(0.0738)	(0.0730)	(0.0731)	(0.0773)
Trust	-0.2245***							
	(0.0710)							
NoTrust		-0.1938***						
		(0.0534)						
Risk			-0.2041***					
			(0.0571)					
Rich				-0.4930***				
				(0.0816)				
Suc					-0.2869***			
					(0.0519)			
Learn						-0.4365***		
						(0.0837)		
Imitate							-0.0697*	
							(0.0417)	
Gwtexc								-0.4227***
								(0.0828)
R^2	0.149	0.151	0.150	0.189	0.163	0.181	0.137	0.174

Notes: Dependent variable is the absolute value of the differences in the logs of income per capita. Gendist is genetic distance. Trust is the weighted average cultural similarity based on motifs related to trust (tricksters punished). NoTrust is the weighted average cultural similarity based on motifs related to the absence of trust (tricksters not punished). Risk is the weighted average cultural similarity based on motifs related to risk-taking (successful challenges). Rich is the weighted average cultural similarity based on motifs related to richness and wealth. Succ is the weighted average cultural similarity based on motifs related to success. Learn is the weighted average cultural similarities based on motifs related to learning and knowledge. Imitate is the weighted average cultural similarity based on motifs related to imitation. Gwtexc is the weighted average cultural similarity based on all motifs except trust-related (both trust and no trust), risk-related, richness-related, success related, learn-related, and imitation-related. All regression include: geodesic, linguistic and religious distance; a dummy for contiguous countries; The percentage of common ethnic groups; the share of the joint population in common ethnic groups; the joint fractionalization index; a dummy in case one country is an island; a dummy in case one country is landlocked; a dummy for a common sea or ocean; the transportation cost from Giuliano, Spilimbergo and Tonon (2014); the latitude difference; the average difference in the percentages of the total surface in each of the 12 Koeppen-Geiger climate zones); a dummy equal to one in case only one of the countries in a pair is from Eurasia (Diamond effect), the relative migratory distance from Eastern Africa with respect to the countries capitals, the difference in the agricultural transition timing, the difference in the Polity2 scores, a dummy equal to one in case of a past colonial relationship, a dummy in case the two countries have ever been in the same country, two-way country fixed effects. Two-way clustered standard errors in brackets. Standardized Beta coefficients. 9453 observations (country-pairs) *** significant at 1% level.