The Origins and Long-Run Consequences of the Division of Labor*

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Abstract

This research explores the historical roots and persistent effects of the division of labor in pre-modern societies. Exploiting a novel ethnic-level dataset, which combines geocoded ethnographic, linguistic and genetic data, it advances the hypothesis and establishes empirically that population diversity had a positive effect on the division of labor, which translated into persistent differences in economic development. Specifically, it establishes that pre-modern economic specialization was conducive to pre-modern statehood, urbanization and social hierarchy. Moreover, it demonstrates that higher levels of pre-modern economic specialization are associated with greater skill-biased occupational heterogeneity, economic complexity and economic development in the contemporary era.

Keywords: Comparative Development, Division of Labor, Economic Specialization, Human Capital, Skill-Bias, Population Diversity, Cultural Diversity, Persistence

JEL Classification: D74, F10, F14, J24, N10, O10, O11, O12, O40, O43, O44, Z10, Z13

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1 Introduction

At least since Adam Smith, the presence of individuals exclusively engaged in specific occupations has been considered fundamental to comparative economic development.[1] The importance of this division of labor is attributed to its essential role in the accumulation of production specific human capital and the potential benefits of learning by doing, all of which may be conducive to increasing productivity, innovation, trade, and economic development.[2] Moreover, these consequences of the division of labor may in turn have provided the fertile ground for the emergence and subsequent evolution of complex social organizations.[3] Despite the prevalence of the division of labor since pre-modern times and its suggested fundamental role for the progression of societies, little, if anything, is known about its deep-rooted determinants and its persistent consequences for comparative development.

This research explores the deep historical roots and persistent effects of the division of labor in pre-modern societies. It advances the hypothesis, and establishes empirically that population diversity had a positive causal effect on the division of labor in pre-modern times, which translated into persistent differences in economic development during the pre-modern and contemporary eras.

Underlying the hypothesized positive effect of population diversity on the division of labor is the idea that more diverse populations experienced larger variations across individuals in intergenerationally transmitted traits (e.g., preferences, skills, human capital), which increased the complementarities between individuals and between individuals and their environment. In turn, these larger complementarities fostered the emergence of the division of labor within a society due to the potential gains of increased occupational specialization.[4] Thus, the theory predicts that during the pre-modern era economic specialization should emerge and be more prevalent among diverse populations. Importantly, any intergenerationally transmitted trait, such as preferences and skills, that leads to larger complementarities, should have qualitatively similar effects on the division of labor (Yang and Borland, 1991; Yang and Sachs, 2008). Thus, the theory does not take a stand on which specific trait underlies the effect of population diversity on the division of labor. Moreover, it is also agnostic on the mechanism of transmission of these traits, since the effects of population diversity should not depend on whether they are culturally or genetically transmitted across generations. Additionally, since diverse geographical environments should allow diverse populations to generate larger complementarities, the theory predicts that diverse populations inhabiting diverse environments should have a larger division of labor. In turn, the gains generated by increased occupational specialization, should have allowed these societies to benefit from higher levels of prosperity in pre-modern times. Given the persistence of

[1] The idea presented by Smith (1776) has been shared by many philosophers and political economists across the ages, including Plato, Xenphon, Aristotle, Kuan Chung, Mencius, Hsün Tzu, al-Ghazali, Ibn Khaldün, Thomas Aquinas, David Hume, Karl Marx, Emilé Durkheim, among others (Sun, 2012).

[2] There exists a large theoretical literature on the relation between division of labor and economic outcomes (Stigler, 1951; Houthakker, 1956; Romer, 1987; Kiyotaki and Wright, 1989; Yang and Borland, 1991; Borland and Yang, 1992; Henrich and Boyd, 2008; Yang and Sachs, 2008).

[3] This relation has also been previously hypothesized in other social sciences outside economics (Claessen and Skalník, 1978; Brumfiel and Earle, 1987; Childe and Wailes, 1996; Polanyi, 2001; Henrich and Boyd, 2008).

[4] I.e., the emergence within a society of individuals exclusively engaged in specific occupations, e.g., a baker, a butcher, or a metalworker. Importantly, the lack of economic specialization does not imply the lack of knowledge about an activity. E.g., members of the *Aché* tribe of Paraguay, while having the knowledge to produce arrows, bows, huts, among other goods, were not specialized.

culture, institutions, human capital and technology, and their effect on development (Diamond, 1997; Glaeser et al., 2004; Acemoglu et al., 2005; Alesina et al., 2013; Michalopoulos and Papaioannou, 2013; Galor and Özak, 2016; Depetris-Chauvin, 2014), the theory suggests a potential persistent positive effect of pre-modern economic specialization of labor on contemporary economic outcomes.

To empirically test the main predictions of the theory, this research combines geocoded ethnographic, linguistic and genetic data to construct a novel dataset of measures of population diversity, economic specialization and development for pre-modern societies.[5] In particular, for over 1100 ethnicities, the research constructs novel measures of economic specialization, based on the number of economic activities in which specialization existed in the pre-modern era. By performing the analysis at the *ethnic level*, the research sidesteps potential pitfalls from the aggregation of data (e.g., to the country level). Thus, the analysis focuses on the effects of *intra-ethnic* population diversity, overcoming the potential confounding effects of *country-level inter-ethnic* diversity, which have been widely exploited in the literature.

A major challenge for the analysis is the measurement of population diversity within a society in the past. The lack of direct measures of skills, preferences or other relevant intergenerationally transmitted traits for individuals within an ethnicity, rules out the direct measurement of historical population diversity in those specific traits. However, the research overcomes this major challenge by using measures of intra-ethnic genetic and linguistic diversity. In particular, language and genetic material are also intergenerationally transmitted, and as shown below, share with other intergenerationally transmitted traits a common historical source of exogenous variation. Based on this fact, the analysis establishes their validity as proxies of historical population diversity in these kind of traits. Moreover, it shows that while the use of these proxies permits the identification of the effect of population diversity on economic specialization, they cannot identify the specific traits that cause this effect. In fact, the analysis demonstrates that even if genetic and linguistic diversity do not have a direct effect on the division of labor, they still capture the effect of diversity in some relevant trait in the population. This suggests the measures of genetic and linguistic diversity capture general aspects of historical population diversity, above and beyond genes and phonemes, making them appropriate proxies for the relevant traits.

The research explores the deep historical roots of the division of labor, by establishing the robust positive effect of population diversity on the prevalence of economic specialization in pre-modern societies in various steps. First, using ordinary least squares and a restricted sample of ethnicities for which ethnic, genetic and linguistic data exist, the empirical analysis documents the robust positive statistically and economically significant relation between diversity and economic specialization. Clearly, these statistical associations do not necessarily imply causality and could arise from omitted confounders, such as heterogeneity in environmental factors, or as a result of reverse causality from, for instance, the emergence of institutions on the composition of populations.

In order to overcome these potential concerns, the research follows several strategies. First, it accounts for the confounding effect of a large set of geographical controls, including absolute latitude,

[5]The analysis follows the approach in the literature and identifies pre-modern societies by their ethnicity, and uses these two terms interchangeably (Gennaioli and Rainer, 2007; Michalopoulos, 2012; Alesina et al., 2013).

area of the ethnic homeland, average elevation, terrain ruggedness, accessibility to navigable water, average temperature and precipitation. Second, it establishes that the main results are not driven by other plausible sources for the emergence of economic specialization such as variation in agricultural suitability, ecological diversity, spatial and intertemporal temperature volatility, pre-1500CE caloric suitability and mobility costs.[6] Third, it follows an instrumental variable approach by exploiting the exogenous variation in population diversity caused by a fundamental statistical process generated by historical migratory patterns known as a serial founder effect (SFE).[7] Indeed, as could be expected in an era when populations were small and knowledge and culture, among others, were passed orally between generations, the decrease in diversity along historical migratory routes has been documented for various intergenerationally transmitted traits. In particular, the diversity in the shape and size of arrow heads and handaxes, cultural memes, and phenotypes, as well as the proxies of population diversity based on genetic and linguistic data have been shown to follow a serial founder effect (Ramachandran et al., 2005; Lycett and von Cramon-Taubadel, 2008; Lycett, 2008; Hamilton and Buchanan, 2009; Betti et al., 2009; Rogers et al., 2009; Atkinson, 2011; Creanza et al., 2015). By exploiting these three strategies jointly, the research establishes the positive causal effect of population diversity on the prevalence of economic specialization for the restricted sample of ethnic groups. Additionally, it provides a lower bound for the size of this effect, suggesting an economically significant effect of diversity.

In a second stage of the analysis, the research exploits the implications of the serial founder effect and a two-step econometric method to generate predicted population diversity measures (Murphy and Topel, 2002; Ashraf and Galor, 2013b). This allows the analysis to be performed on a sample of more than 900 ethnicities. By increasing the sample size, the analysis overcomes potential concerns regarding geographical coverage and representativeness of the restricted sample. Moreover, by increasing the sample size the effect of population diversity can be estimated more precisely. Reassuringly, and in line with the proposed hypothesis, the estimated effect of population diversity on the prevalence of economic specialization is positive, statistically and economically significant. Moreover, the research establishes the positive complementary effect between the diversity in population and in the environment on the prevalence of economic specialization. These results are robust to accounting for the potential confounding effect of other historical processes such as the demic diffusion of the Neolithic Revolution and the number of years of continuous human presence. Additionally, the analysis is robust to potential historical and spatial dependence generated by sharing common cultural ancestry or by the level of interaction with other ethnicities. Furthermore, the analysis establishes that the positive effect of diversity on specialization is robust to the distance to pre-modern technological frontiers and to the presence of centralized institutions. In particular, it establishes that the effect of population diversity on pre-modern specialization is qualitatively similar for ethnicities with and without a state.

In a third stage, the research analyzes the effect of pre-modern economic specialization on economic development in both the past and the present. First, it focuses on pre-industrial economic development

[6] While this paper focuses on the effect of population diversity and its interaction with environmental diversity, the analysis also sheds light on the role of geographical factors on the emergence of the division of labor, as well as their relative importance compared to population diversity. In particular, it establishes the effect of geographical determinants of market size on the emergence of the division of labor.

[7] As established in section 4.2, SFE generated exogenous variation in the proxies of population diversity employed in this research. A similar strategy was employed by Ashraf and Galor (2013b).

and establishes that pre-modern economic specialization has a positive association with pre-industrial levels of technological specialization, socio-economic complexity, population density, size of local communities, statehood, and class stratification. Furthermore, it provides suggestive evidence that economic specialization is a crucial mechanism linking population diversity and economic development in the pre-industrial era. In order to overcome potential endogeneity concerns due to reverse causality, the analysis exploits a second instrumental variable strategy based on the method of generated instrumental variables suggested by Lewbel (2012). This strategy exploits second moment conditions in the cross section of ethnicities to identify the structural parameters in the absence of traditional identifying information such as external instruments or repeated measurements.[8] The results suggest a positive statistically and economically significant effect of pre-modern economic specialization on pre-industrial economic development.

Second, the research explores the persistent effect of pre-modern economic specialization on contemporary economic development. In particular, it provides suggestive evidence that ethnicities exposed to higher levels of pre-modern economic specialization have higher levels of contemporary development as captured by the light density in their ethnic homelands. Moreover, based on a sample of African ethnicities, the analysis establishes a strong positive robust correlation between pre-modern economic specialization and contemporary occupational heterogeneity at the ethnic level. Interestingly, although this association holds for low- and high-skilled occupations, the analysis suggests a stronger effect on the heterogeneity of high-skilled occupations and thus a potentially skill-biased effect that may reflect the accumulation of a more diverse set of production-specific human capital. Finally, the research shows that countries with higher levels of pre-modern economic specialization tend to have more complex and diversified economic structures. Thus, the analysis provides support for a novel channel through which deep historical factors affect contemporary economic development (Spolaore and Wacziarg, 2013).

This research is the first attempt to identify the deep-rooted historical factors behind the prevalence of economic specialization in pre-modern times, as well as its effect on comparative economic development. Moreover, it is the first to identify the positive causal effect of (i) population diversity and (ii) the complementarity between the heterogeneity of both population and environment on economic specialization. Additionally, it is the first to provide evidence on the effect of pre-modern economic specialization on economic development. In doing so, this research contributes to various strands of literature.

First, this research contributes to the literature on the deep-rooted historical sources of economic development (Diamond, 1997; Nunn, 2008; Alesina et al., 2013; Ashraf and Galor, 2013b; Spolaore and Wacziarg, 2013; Galor and Özak, 2016; Andersen et al., 2016). In particular, it provides a novel channel through which historical conditions determined in the distant past still have an effect today. Moreover, this research takes a step back and analyzes the underlying causes of economic specialization in pre-modern times. Therefore, the research contributes to the literature studying societal attributes

[8]The strategy of using second moment conditions in a cross section to obtain identification goes back to Wright (1928). These methods have been fruitfully employed in various areas of economics, including economic growth, finance, health, labor, monetary economics and trade (Rigobon and Sack, 2003; Broda and Weinstein, 2006; Nakamura and Steinsson, forthcoming; Chaboud et al., 2014; Feenstra and Weinstein, 2017). See Rigobon (2003) and Lewbel (2012) for surveys and technical results. Similar moment conditions have been used in panel data settings (Arellano and Bond, 1991; Blundell and Bond, 1998).

in the past (Ahlerup and Olsson, 2012; Michalopoulos, 2012; Giuliano and Nunn, 2013; Fenske, 2014). Thus, it sheds light on the origins of a fundamental driver of economic development in the pre-industrial and contemporary eras (Smith, 1776). Additionally, by unveiling the complementarities between population and the environment the analysis bridges the gap between the literature that focuses on their independent roles in shaping long-run development (Michalopoulos, 2012; Alesina et al., 2013; Ashraf and Galor, 2013b; Galor and Özak, 2016; Giuliano and Nunn, 2016).

Second, this research contributes to the literature on the effects of diversity on economic development, which has previously been explored using various measures of genetic, ethnic, cultural, and religious diversity (Easterly and Levine, 1997; Alesina et al., 2003; Desmet et al., 2012, 2015; Ashraf and Galor, 2013a,b; Arbatli et al., 2013; Cook, 2015; Alesina et al., 2016). Although economic theory suggests that higher diversity should be beneficial for productivity and, thus, development, due to larger complementarities between agents, the empirical evidence on the benefits of diversity is sparse.[9] In fact, most of the existing empirical evidence, which is based on country-level measures of diversity, suggests that diversity adversely affects contemporary social cohesiveness, trust and development. In contrast to this literature, this paper establishes a positive effect of diversity on a key driver of economic development.

The remainder of the paper is organized as follows. Section 2 presents ethnographic evidence on the importance of the division of labor and the role of diversity in its origin. Section 3 discusses the empirical strategy and describes the data. Section 4 analyzes the impact of population diversity on economic specialization. Section 5 explores the effect of economic specialization on pre-industrial and contemporary development. Section 6 concludes.

2 Ethnographic Narratives on the Origins and Consequences of the Division of Labor

This section presents ethnographic and historical evidence in support of the view that the division of labor (i) was prevalent in many pre-industrial societies, (ii) was associated with pre-industrial development, (iii) emerged even in societies without centralized institutions, and (iv) was higher in diverse societies.

A complex division of labor has been prevalent since pre-modern times (Nolan and Lenski, 2011). While some types of division of labor, at least along sexual lines within a family, is present in almost every society since primeval times, a high degree of specialization of labor, tasks, and other functions within different specific groups of people has been identified as a proxy of societal advancement and prosperity (Durkheim, 1893). E.g., Trigger (1983) argues that the archeological evidence from the Gerzean period in Egypt (ca. 3500BCE) supports the view that the appearance of occupational specialization, such as the existence of craft specialists producing ornaments of gold, silver, cast copper, and lapis lazuli, was accompanied by the rise of complex social and economic institutions.

The Aztecs provide another illustrative example of high degree of division of labor in pre-modern times. As documented by the *Matrícula of Huexotzinco*, a great deal of specialization existed in this

[9]Notable exceptions include Ashraf and Galor (2013b) and Alesina et al. (2016).

Mesoamerican society around mid-1500CE (Prem and Carrasco Pizana, 1974). Certainly, almost 1600 specialists are classified in different professions such as wood workers, stone cutters, basket makers, hunters, fishermen, and even doctors. Historical records and archaeological findings provide evidence of well-developed market places before the arrival of the Spaniards. When describing the Aztec's Tlatelolco Market, Díaz del Castillo (1796) wrote "All the things which are sold there... are so numerous and of such a different quality and the great market place [...] was so crowded with people that one would not have been able to see and enquire about it all in two days". Similar developments are found in other ancient civilizations like the Hittites, Minoans, Athenians, Egyptians and Sumerians. Moreover, evidence suggests that in these civilizations the emergence and increase in the division of labor was accompanied by the emergence of record-keeping, credit, money, writing and socio-economic complexity (Berosus and Burstein, 1978; Nissen et al., 1993; Schmandt-Besserat and Schmandt-Besserat, 1996; Loomis, 1998; Basu and Waymire, 2006; Roberts, 2011).

The previous examples, characterized by highly centralized societies engaged in economic exchange, is consistent with the idea put forward in this paper that the emergence of division of labor facilitated the emergence of complex institutions. Moreover, as proposed by this paper, evidence suggests that local markets preceded the emergence of both long-distance trade and states (Claessen and Skalník, 1978). E.g., Bisson (1982) presents archeological evidence, which suggests that commerce in indigenous products was taking place long before the introduction of foreign products into the trading systems of the Kingdom of Zimbabwe. Similarly, Reid (2002) argues that specialization and local exchanges were well developed by the Ganda people before they started to trade with coastal Arabs in the early 19th century taking advantage of an older local market system, which included a variety of currencies and markets for several commodities such as salt, iron, and bananas.

Although the discussion provided above illustrates the strong link between division of labor and statehood, the direction of causality is hard to identify. Nonetheless, examples of highly centralized societies without division of labor are virtually absent in the anthropological, archeological and historical literature on pre-modern societies. On the contrary, several examples of stateless pre-modern societies having a noticeable division of labor suggest that statehood was not a necessary precondition for economic specialization. In particular, examine the case of the Konso of Ethiopia, who have a high degree of specialization without any level of jurisdictional hierarchy above the local level. Similarly, consider the cases of the Karen in Myanmar and the Guajiros at the Colombia-Venezuela border. The Karen people are a culturally and linguistically diverse and historically stateless society that have traditionally traded cotton, forest products, and domestic animals (Hinton, 1979). The Guajiros, mostly a pastoralist society nowadays, were an egalitarian society that historically based their economy on hunting, gathering, horticulture, and fishing activities (Perrin, 1996). According to early European explorers the division of labor was historically important among the Guajiros who commonly held weekly markets.

An illustrative example of the link between diversity and division of labor is given by two stateless societies: the Konso people of South-Western Ethiopia and the Aché people of Eastern Paraguay. These two ethnic groups are located on both extremes of the sample distribution of the proxies of population diversity, separated by more than five standard deviations from each other. Due to their proximity to the Ethiopian rift valley, Konso's population diversity is among the highest in the world; while the Aché is the less diverse group in the sample of societies analyzed in this research. For thousands of years, both groups inhabited remote locations with little influence from outsiders (Hill and Hurtado, 1996; Hallpike, 2008). The ecological environment for both societies was hard and not particularly rich. More specifically, the Konso historically lived in a rocky high elevation (Freeman and Pankhurst, 2003), whereas the Aché inhabited a flat tropical forest (Hill and Hurtado, 1996). The difference in diversity between these two groups maps into differences in their economic specialization of labor. In particular, according to the Ethnographic Atlas, the Konso had labor specialization in 5 activities, whereas the Aché had none. Moreover, when it comes to economic exchange, the two groups were very dissimilar as well. Markets were ancient in Konso society and held daily at different locations (Hallpike, 1968), with artisans selling wares, farmers selling grains, butter, and honey, as well as butchers selling raw meat. Contrarily, there was no exchange either between the Aché and outsiders nor within the Aché people in pre-modern times (Hill and Hurtado, 1996).

3 Data and Empirical Strategy

This section develops the empirical strategy and introduces measures of pre-modern economic specialization, pre-industrial economic development, historical population diversity, and geographical controls at the ethnic level required to implement the empirical strategy.

3.1 Identification Strategy

The proposed theory suggests that the empirical relation between economic specialization and population diversity is given by

$$s_i = \alpha_0 + \alpha_1 d_i + \sum_{k=1}^{K} \alpha_{2k} x_{ik} + \epsilon_i \tag{1}$$

where s_i measures economic specialization, d_i is a weighted average of population diversity measures across various intergenerationally transmitted traits, x_{ik} is the level of geographical characteristic k and ϵ_i is the error term, all for ethnicity i.[10] The main prediction of the theory is that $\alpha_1 > 0$. Let $d_i = \sum_{j=1}^{J} \alpha_{1j} d_{ij}$, where d_{ij} is the level of population diversity in intergenerationally transmitted trait $j = 1, \ldots, J$, $\alpha_{1j} > 0$ denotes its importance in the effect of population diversity and $\sum_j \alpha_{1j} = 1$. The identification of the effect of population diversity on economic specialization based on equation (1) poses two types of challenges: measurement and causal identification.

First, as discussed in the introduction, the lack of direct measures of historical population diversity across intergenerationally transmitted traits, prevents the construction of the measure d_i. Nonetheless, as previously discussed, it has been shown that different intergenerationally transmitted traits share a common underlying exogenous determinant: the serial founder effect generated by historical migratory patterns.

[10] Appendix A establishes similar results for the case when specialization is affected by population diversity in specific traits instead of a weighted average of population diversity across various traits.

A serial founder effect (SFE) implies that successive divisions of an original population into various subpopulations generates a loss of diversity in intergenerationally transmitted characteristics such as genes, phonemes, cultural traits, preferences, knowledge, skills, etc. Of particular interest is the SFE generated by the dispersal of anatomically modern humans out of East Africa more than 60,000 years ago (Ramachandran et al., 2005). In particular, according to the Out-of-Africa hypothesis, which posits the African origin of modern humans, the SFE implies that diversity decreases along migratory routes from East Africa. Importantly, it has been established that genetic and linguistic diversity decrease with the migratory distance from East Africa (Ramachandran et al., 2005; Manica et al., 2007; Atkinson, 2011). Moreover, as could be expected in an era when knowledge and culture, among others, were passed orally between generations, the decrease in diversity along historical migratory routes has also been documented for non-genetic traits such as arrow heads, handaxes, cultural memes, and phenotypes (Lycett and von Cramon-Taubadel, 2008; Lycett, 2008; Hamilton and Buchanan, 2009; Betti et al., 2009; Rogers et al., 2009; Atkinson, 2011).[11]

Thus, ethnicity i's diversity in intergenerationally transmitted trait j is determined by

$$d_{ij} = \beta_{0j} + \beta_{1j} D_i + \sum_{k=1}^{K} \beta_{2jk} x_{ik} + \eta_{ij}, \tag{2}$$

where η_{ij} is the error term, $\beta_{1j} < 0$ and D_i is the historical migratory distance from its homeland to East Africa. This implies that:[12]

Proposition 1. *If some trait p is observable, so that diversity in p can be measured, then d_{ip} serves as a proxy for all other measures of diversity. In particular, for $j \neq p$,*

$$d_{ij} = \gamma_{0j} + \gamma_{1j} d_{ip} + \sum_{k=1}^{K} \gamma_{2jk} x_{ik} + \zeta_{ij}, \tag{3}$$

where $\gamma_{1j} = \frac{\beta_{1j}}{\beta_{1p}} > 0$ for all $j \neq p$.

Using the definition of d_i and equation (3), equation (1) can be rewritten in terms of the proxy of population diversity d_{ip} as

$$s_i = \delta_0 + \delta_1 d_{ip} + \sum_{k=1}^{K} \delta_{2k} x_{ik} + \varepsilon_i, \tag{4}$$

where

$$\delta_1 = \alpha_1 \left(\alpha_{1p} + \sum_{j \neq p} \alpha_{1j} \gamma_{1j} \right). \tag{5}$$

[11]These effects have been found in both human and non-human species (Baker and Jenkins, 1987). Moreover, the decrease in diversity due to migration and serial founder effects has been found in later migratory processes within continents (Wang et al., 2007; Friedlaender et al., 2008; Lao et al., 2008; Myres et al., 2011; Pinhasi et al., 2012).

[12]Appendix A provides the proofs, the relation between the various parameters, and all the intermediate steps to obtain the results presented in this section.

Clearly,

Proposition 2. *The proxy d_{ip} has a positive association with specialization, if and only if, population diversity has a positive effect on it. I.e., $\delta_1 > 0$ if, and only if, $\alpha_1 > 0$.*

Moreover,

Proposition 3. *Assume all variables in the analysis have been standardized to have a variance of 1 in order to allow comparison of coeffcients. If the distance D_i has the largest effect on the proxy p, i.e., $\beta_{1p} < \beta_{1j}$ for all $j = 1, \dots, J$, then δ_1 provides a lower bound to the effect of population diversity on economic specialization, i.e.*

$$\delta_1 < \alpha_1. \tag{6}$$

Thus, equation (4) can be used to identify the sign and provide a lower bound of the effect of population diversity on economic specialization. Moreover, equation (5) implies that the proxy d_{ip} can be used to identify this lower bound of the causal effect, even if the proxy itself has no effect on economic specialization, i.e., if $\alpha_{1p} = 0$.

These results suggest that the measurement and identification problems require finding appropriate proxies. As explained in section 3.3, the analysis constructs measures of genetic and linguistic that satisfy the above conditions for various samples of ethnicities. In particular, section 4.2 establishes that both types of proxies are affected by a serial founder effect. Moreover, the measure of genetic diversity used in the analysis has been shown to be mainly affected by the serial founder effect of the Out-of-Africa migration of anatomically modern humans and has not been affected by other factors (Ramachandran et al., 2005; Betti et al., 2009; Creanza et al., 2015). On the other hand, while this serial founder effect should have operated on many other intergenerationally transmitted traits, their diversity may have been influenced by many other factors. Thus, the effect of the distance to East Africa has the largest negative effect on genetic diversity compared to its effect on the diversity of these other traits, i.e., $\beta_{1genetic} < \beta_{1j}$ for any trait j, inclusive linguistic diversity. Indeed, section 4.2 provides supportive evidence for this claim. Thus, the analysis employs these measures as proxies for population diversity of all types of intergenerationally transmitted traits in order to estimate this lower bound of the causal effect. Importantly, these proxies capture factors that should be "neutral" to human behavior. Thus, although it can be expected that neither proxy has a direct effect on economic specialization, i.e., $\alpha_{1genetic} = 0$ and $\alpha_{1linguistic} = 0$, they can be used to provide the lower bound on the causal effect of population diversity on economic specialization δ_1. Clearly, the estimation of δ_1 is subject to various additional identification challenges.

The analysis surmounts significant hurdles in the identification of the causal effect δ_1 of population diversity on the division of labor. First, the results may be biased by omitted geographical, institutional, cultural, or human characteristics that might have determined economic specialization and are correlated with the proxy of population diversity. Thus, several strategies are employed to mitigate this concern: (i) The analysis accounts for a large set of confounding geographical characteristics (e.g., absolute latitude, area of the ethnic homeland, average elevation, terrain ruggedness, accessibility to navigable water, average temperature and precipitation). (ii) It accounts for other plausible sources for the emergence of economic specialization such as variation in agricultural suitability, ecological diversity, spatial and intertemporal temperature volatility, pre-1500CE caloric suitability and mobility costs. (iii) It accounts for continental fixed effects, capturing unobserved time-invariant heterogeneity at the continental level. (iv) It conducts within language phylum analyses of the effect of population diversity on the division of labor, accounting for language phylum fixed effects and thus unobserved time-invariant language-phylum-specific factors and common cultural history. (v) It accounts for the potential confounding effects of other historical processes like the adoption of agriculture or the continuity of human presence on economic specialization. (vi) It accounts for the geographical isolation and proximity to other ethnicities in order to account for the confounding effects of potential historical and spatial dependence generated by sharing common cultural ancestry or by the level of interaction with other ethnicities.

Second, the results may be biased due to reverse causality, measurement errors or some remaining hard to account omitted factors. In order to mitigate these concerns, the analysis employs an instrumental variable approach to estimate the causal effect δ_1. In particular, it exploits differences in the distance to East Africa as a source of exogenous variation. Indeed, as established in section 4.2, this distance is a major determinant of the proxies of population diversity employed in the analysis, thus satisfying the first condition for a good instrument (i.e., relevance). Thus, the main requirement for the identification of the causal effect δ_1 in equation (4) is the exogeneity assumption $E(D_i\varepsilon_i \mid (x_{ik})_{k=1}^K) = 0$. While this condition cannot be tested, the results in appendix E establish that the reduced form estimates in the regression of economic specialization on the distance to East Africa are very stable across many specifications. Since accounting for different sets of confounders does not seem to affect these estimates, this analysis does not seem to be subject to selection on unobservables, suggesting this exogeneity condition may be satisfied in practice. Moreover, Table 9 provides further support for this exogeneity assumption by accounting for other distances and historical processes, suggesting additionally that the exclusion restriction may hold.

These results can be summarized as follows:

(i) Genetic and linguistic diversity can be used as proxies for population diversity of intergenerationally transmitted traits (affected by similar serial founder effects).

(ii) The distance to East Africa is a valid instrument for population diversity.

(iii) The estimated effect of the proxies of population diversity presented in the body of the paper captures the combined effect of population diversity in all relevant intergenerationally transmitted traits and provides a lower bound to the true causal effect.

(iv) The estimated effect of the proxies of population diversity does not necessarily imply that genetics or language are the fundamental mechanism behind the effect of population diversity on the division of labor.

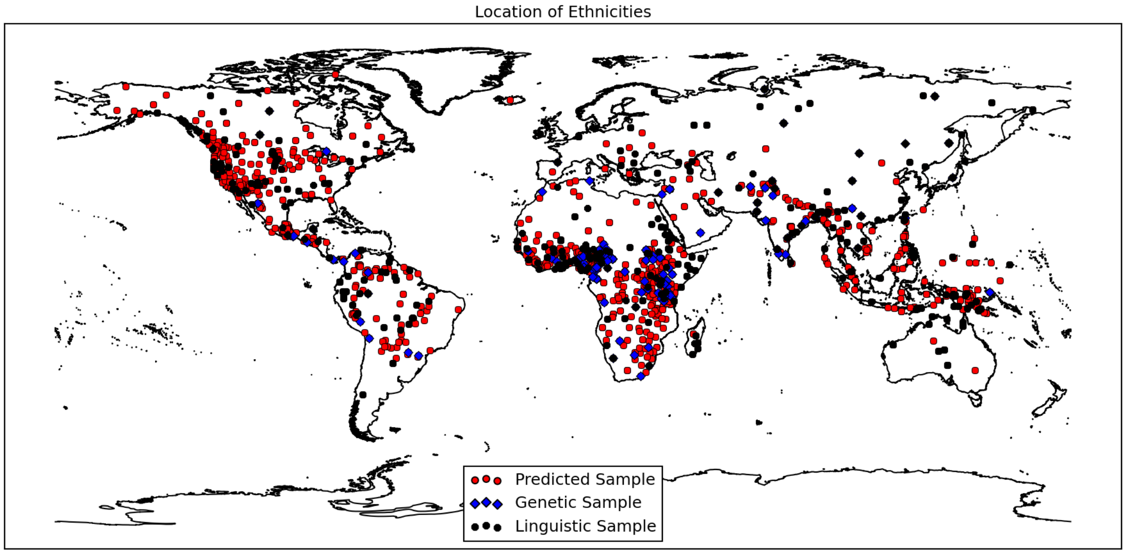


Figure 1: Location of Ethnicities employed in the Analysis (Full and Restricted Samples)

3.2 Dependent Variables: Pre-Modern Economic Specialization and Development

The analysis employs the two main sources for ethnic level data currently available, namely the Ethnographic Atlas (EA) and the Standard Cross-Cultural Sample (SCCS). Both datasets have been widely used in anthropology and economics for the study of pre-industrial societies and the long-term effects of pre-industrial culture and institutions (Gennaioli and Rainer, 2007; Michalopoulos and Papaioannou, 2013; Alesina et al., 2013; Fenske, 2014). The Ethnographic Atlas (Murdock, 1967) includes information on 115 characteristics for 1267 ethnicities around the globe. On the other hand, the Standard Cross-Cultural Sample (Murdock and White, 1969) expands the set of characteristics to over 2000 for a subsample of 180 independent ethnicities. By combining both datasets the analysis overcomes the restriction in terms of thematic coverage of the EA and ethnic/geographic coverage of the SCCS.[13] Figure 1 depicts the location of the full sample of ethnicities used in the main analysis. Additionally, it highlights the ethnicities for which population diversity data (genetic in blue, linguistic in black) is available and those for which it is predicted (red) as explained below.

In order to explore the hypothesis proposed in this paper, the analysis constructs various novel measures of economic specialization of labor at the ethnic level using data from both the EA and SCCS. In particular, both data sets include variables on the existence of "age or occupational specialization" for metal working (v55), weaving (v56), leather working (v57), pottery making (v58), boat building (v59), house construction (v60), gathering (v61), hunting (v62), fishing (v63), animal husbandry (v64), and agriculture (v65). For each of these activities, the EA and SCCS assess if the ethnic group had craft, industrial or age specialization or if the activity was absent or no specialization occurred. These variables allow the identification of ethnicities in which specialization existed in the pre-modern era. On the other hand, these variables do not allow for the differentiation of ethnicities where no specialization

[13]The main reason behind the construction of the SCCS was to overcome Galton's independence problem, i.e., the difficulties of drawing inferences from cross-cultural data due to spatial auto-correlation and historical dependence. The sample of ethnicities in the SCCS were chosen so as to minimize this problem (Murdock and White, 1969).

occurred from those in which the activity was absent, thus confounding the lack of specialization with the lack of the activity. In order to overcome this problem, the analysis uses additional information from variables v44-v54 in order to assess, for the same activities, whether the activity was absent or unimportant or present.

Based on this information, the analysis constructs three measures of specialization. The first measure of the level of specialization in ethnicity e, s_e^1, counts the number of specialized activities, i.e. $s_e^1 = \sum_a s_{ea}$, where s_{ea} equals 1 if the activity was present *and* specialized in ethnicity e and zero otherwise. The second measure of the level of specialization in ethnicity e, s_e^2, is the share of activities present that were specialized, i.e. $s_e^2 = s_e^1/n_e$, where s_e^1 is the first measure and n_e is the number of activities available in ethnicity e. Finally, the third measure of the level of specialization in ethnicity e, s_e^3, is a score given by $s_e^3 = \sum_a \tilde{s}_{ea}$, where $\tilde{s}_{ea}$ equals 0 if the activity a is not present, 1 if it is present but it is not specialized, and 3 if the activity is present and specialized in ethnicity e.[14] Importantly, as shown below, the main results in the paper do not depend on the measure of specialization employed in the analysis. However, given the ease of interpretation and space limitations, the analysis focuses mainly on the number of specialized activities in an ethnicity, s_e^1. Figure B.1 depicts the spatial distribution and frequencies of the three measures. Importantly, the new measures of economic specialization correlate strongly among themselves.[15]

In order to analyze the effects of economic specialization on pre-industrial development, the analysis further employs various measures from the SCCS and EA. Specifically, it uses measures of technological specialization, complexity, population density, mean size of local communities, the level of statehood and class stratification.

3.3 Independent variables: Population Diversity

This research constructs a novel dataset on georeferenced population diversity at the ethnicity level using two types of proxies, namely genetic and linguistic diversity measures. It is important to note that both measures capture intra-ethnic population diversity as opposed to inter-ethnic diversity, which has been widely used in the existing literature that analyzes cross-country differences in population diversity. As previously explained, an essential feature of these diversity measures is the main source of their variation was caused exogenously by a serial founder effect (SFE).

The analysis constructs a novel dataset on georeferenced genetic diversity at the ethnicity level using the most comprehensive genomic data set on human micro-satellite variation to date (Pemberton et al., 2013). In particular, Pemberton et al. (2013) combine eight previous population-genetic data sets and analyze them following a standardized procedure, which ensures all the data is produced

[14] The analysis assigns a higher value to specialization in order to differentiate the effect of specialization from technological development. Reassuringly, using a value of 2 for specialization does not alter the main results.

[15] Moreover, given the theoretical association between division of labor and trade within and among economies, these novel measures are associated with intra-ethnic trade related measures available in the SCCS. In particular, the new measures are positively associated with trade among communities of the same ethnic group, the existence and type of money (media of exchange) and credit, the type of credit source, and the existence of writing and records (Tables C.1-C.4), suggesting that the new measures indeed capture the phenomenon under study. A major concern with the SCCS data is that it is only available for a small subset of ethnicities, especially once the availability of population diversity measures is taken into account.

following a uniform method, ensuring comparability across populations and samples. This dataset contains information on 645 common single-nucleotide protein (SNP) loci for 5435 individuals from 267 independent ethnicities. There are two main advantages of using this data. First, it is based on predominantly indigenous populations (Pemberton et al., 2013), which ensures the population inhabited the same location for a prolonged period of time and lowers a potential concern generated by a possible admixture of populations. Second, the SNP's included in the analysis are "neutral" to selection, i.e. they are not involved in processes that encode proteins and thus are not subject to natural selection (Kimura, 1983).

Based on this data, this research constructs for each ethnicity a measure of genetic diversity based on what population geneticists call the expected heterozygosity within a population. In particular, the genetic diversity or expected heterozygosity of a population measures the average probability that two randomly chosen individuals in the population do not share the same allele of a gene, i.e. that they do not have the same variant form of the gene.[16] In order to ensure comparability across populations, the analysis constrains the construction of the genetic diversity to the set of 619 common SNP loci for which information exists for all ethnic groups.[17]

Out of the 267 ethnicities for which genetic data is available, this research is able to match a subset of 149 ethnicities to the Ethnographic Atlas (EA). This maps the genetic diversity data to the EA, and thus, to all the cultural, institutional and geographic data contained in the EA or to other datasets to which the EA can be mapped. In particular, and as discussed below, ethnicities can be mapped to the geographical characteristics of their historical homelands.

Additionally, the research uses measures of intra-ethnic linguistic diversity, i.e., diversity of the language spoken by an ethnic group,[18] as alternative proxies of population diversity. In particular, the analysis employs measures of consonant inventories, vowel quality inventories, and the number of genders as identified by linguists in the World Atlas of Language Structures - WALS (Dryer, 2013). WALS is the most comprehensive, authoritative and widely used database of language structures available. Linguists have suggested the three measures employed in this analysis capture plausibly neutral elements of intra-ethnic (language) diversity, which have been determined by historical migratory processes (Rogers et al., 2009; Atkinson, 2011; Creanza et al., 2015). The analysis employs the mapping between WALS and EA/SCCS created by Galor et al. (2016) in order to link these alternative measures of population diversity to the ethnographic and geographic data. This results in 3 different additional

[16]The literature on diversity has measured this population attribute using various characteristics like religion, language, ethnicity, or genetics. Diversity within a population is usually defined as the probability that two random individuals in a population do not share the same characteristic. For example, religious, linguistic or ethnic diversity/fractionalization estimate the probability that two random individuals in a population do not share the same religion, speak the same language or have the same ethnic background. Similarly, genetic diversity or expected heterozygosity measure the expected genetic similarity between any two individuals in a population. It is important to note that *all* these measures capture diversity and do not measure any innate superiority of a certain type of characteristic over another. For example, a population in which there exists only one religion, language, ethnicity, or blood type, will be less diverse than one in which there are many, but the measures of diversity do not and cannot be used to identify if one *specific* religion, language, ethnicity or blood type is better than others.

[17]The genetic diversity on the full set of 645 loci is almost perfectly correlated with the measure used in the paper for the 267 original ethnicities in Pemberton et al. (2013). Their correlation is 0.99 ($p < 0.01$).

[18]This approach contrasts with the usual approach employed in the literature which exploits variations in the *number* of languages or ethnic groups within a region. Thus, our analysis captures within ethnic group diversity as opposed to inter-ethnic diversity.

samples of ethnicities with population diversity data: 299 ethnicities based on consonant inventories, 301 ethnicities based on vowel quality inventories, and 130 ethnicities based on the number of genders. Unlike genetic diversity, these proxies of population diversity were potentially more affected by evolutionary processes (Creanza et al., 2015; Galor et al., 2016), decreasing the variation that could be explained by a serial founder effect. For this reason, the analysis focuses mostly on genetic diversity, but shows that qualitatively similar results are obtained when using these alternative proxies. Indeed, exploiting the predicted difference in the effect of the serial founder effect on these various proxies provides evidence for the assumption required in the identification of the lower bound of the true effect of population diversity. Moreover, given that only 48 ethnicities belong jointly to the genetic and the large linguistic diversity samples, while only 23 belong jointly to all samples with population diversity data, the robustness of the results to the measure of population diversity employed in the analysis suggests that sampling biases are not driving the results, and provide somewhat independent evidence for the effect of population diversity on economic specialization.

In order to expand the sample, the analysis generates predicted levels of population diversity for the full sample of 1265 ethnicities available in the EA. In particular, the analysis exploits the variations in the pre-historical migratory distance to East Africa (Addis Ababa) in order to generate the predicted population diversity for the full sample of ethnicities available in the EA. More specifically, the analysis uses the empirical relation between the proxies of population diversity and the migratory distance to East Africa (in the restricted subsamples) to construct an out-of-sample predicted population diversity measure. Additionally, the analysis employs bootstrapped standard errors to address the generated regressor bias in the estimation of standard errors (Murphy and Topel, 2002; Ashraf and Galor, 2013b).

3.4 Geographical Controls

An ethnicity's pattern of economic activities, opportunities to trade, as well as its genetic and linguistic diversity may be confounded with the geographical characteristics of the ethnicity's homeland. Thus, the analysis accounts for a large set of geographical controls in order to attenuate any concerns about omitted variable bias. In particular, using the mapping between geographic information systems (GIS) geometries of ethnic homelands and the EA and SCCS generated by Fenske (2014), the analysis constructs for each ethnicity a large set of geographical characteristics of its homeland. Tables B.1-B.2 show the list of all variables and their summary statistics for the various samples used in the paper.

4 Origins of Economic Specialization

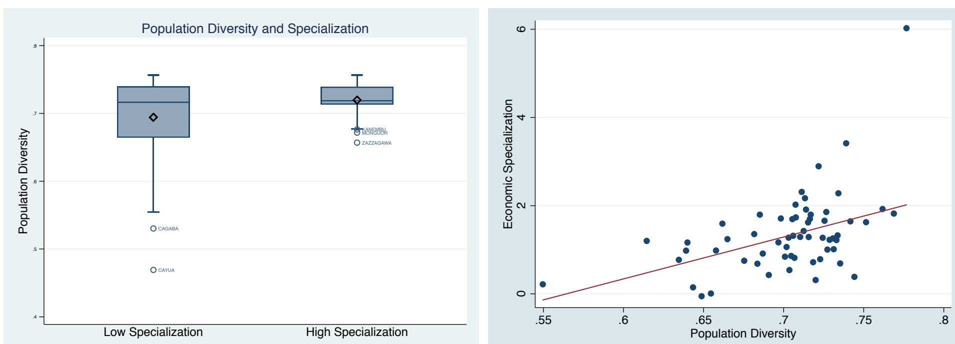
This section explores the deep historical origins of the division of labor. In particular, it exploits the exogenous variation in population diversity generated by serial founder effects (and the Out-of-Africa theory) to analyze the effect of population diversity, as measured by intra-ethnic genetic and linguistic diversity, on economic specialization of labor.[19] Although the analysis focuses on the causal effect of

[19]The main analysis focuses on genetic diversity as a proxy of population diversity in order to economize space and ease the presentation. Moreover, as shown in section 3.1, it should provide the lowest bound on the causal effect of population diversity. Robustness to the proxy of population diversity are included in various parts of the main text and appendices.

population diversity, it also presents evidence for other potential drivers of economic specialization like environmental diversity, geographically based market potential, and the effect of other geographical endowments.

4.1 Population Diversity and Economic Specialization (Ordinary Least Squares Analysis)

This subsection explores the statistical relationship between population diversity and economic specialization at the ethnicity level. It focuses on 116 ethnic groups for which both genetic and ethnographic data to construct the proposed measure of economic specialization is available. Figure 2(a) shows for these 116 ethnicities the distribution of population diversity for groups above and below the mean economic specialization. Clearly, more specialized groups also have higher population diversity. In order to analyze this relation more systematically, the analysis implements the empirical strategy presented in section 3.1 by exploring variations in equation (4) to identify the lower bound of the causal effect of population diversity, δ_1.[20,21] As explained in section 3.1, the estimated coefficient on the proxy of population diversity represents this lower bound. In order to simplify the exposition, the analysis below refers to δ_1 as the effect of population diversity.



(a) High/Low Specialization and Diversity (b) Conditional Association (Binned Scatterplot)

Figure 2: Population Diversity and Economic Specialization

Table 1 analyzes the association between economic specialization and population diversity accounting for a basic set of geographic characteristics of ethnicities' homelands using OLS. In particular, column 1 shows the unconditional relationship between population diversity and economic specialization. The estimated coefficient is statistically significant at the 1 percent level and is consistent with an economically significant effect of population diversity. In particular, a one standard deviation increase in population diversity is associated with a 0.27 standard deviation increase in economic specialization.

[20] Given space constraints, the results in the body of the paper focus on economic specialization measured by the number of activities that are specialized, i.e., s^1. Section D.4 in the appendix establishes that all results presented in the main body of the paper are robust to the measure of economic specialization employed.

[21] In order to ease the interpretation of the results and compare them across the different specifications presented in this paper, all tables report standardized coefficients. The standard coefficients report the number of standard deviation changes in the dependent variable for a one-standard deviation change in the independent variable.

Table 1: Population Diversity and Economic Specialization

	Economic Specialization (Count)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Population Diversity	0.27***	0.31***	0.27***	0.27***	0.25***	0.27***	0.36***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.09)
Absolute Latitude		0.15					0.80***
		(0.09)					(0.30)
Area			0.01				0.01
			(0.04)				(0.05)
Elevation (Avg.)				-0.03			0.31*
				(0.11)			(0.16)
Precipitation (Avg.)					-0.08		0.13
					(0.09)		(0.16)
Temperature (Avg.)						0.04	0.73***
						(0.08)	(0.25)
Adjusted-R^2	0.07	0.08	0.06	0.06	0.06	0.06	0.15
Observations	116	116	116	116	116	116	116

Notes: This table establishes the positive statistically and economically significant correlation between economic specialization and population diversity as measured by expected heterozygosity after accounting for a set of basic geographical controls. Economic specialization counts the number of specialized activities present in an ethnicity. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

A potential concern is that population diversity might be capturing the effect of absolute latitude. In particular, technologies and institutions have historically spread more easily across similar latitudes, where climate and the duration of days were not drastically different. Furthermore, the positive high correlation between absolute latitude and development, which has been widely documented in the economic growth and development literature (Spolaore and Wacziarg, 2013), might confound the effect of population diversity. In order to address this potential concern column 2 accounts for the effect of absolute latitude. Although absolute latitude enters positively (albeit statistically insignificantly) in this specification, the effect of population diversity remains highly statistically significant and increases by 10 percent. This increase in the point estimate for δ_1 accurately reflects the fact that there is a strong negative relationship between absolute latitude and diversity (Michalopoulos, 2012).

Column 3 accounts for the total area of the ethnic homeland, since all else equal, larger areas may contain a more diverse population by construction. In particular, cultural assimilation may be more difficult in large territories, thus, contributing to cultural diversity. Additionally, total area may confound the effect of market potential, which is a potential driver of economic specialization.[22] Nonetheless, the inclusion of this control does not affect the estimated effect of population diversity. Column 4 accounts for the effect of mean elevation, which has been shown to negatively correlate with ethnolinguistic heterogeneity at the country level (Michalopoulos, 2012); without affecting the results.

Another potential concern is that population diversity correlates with precipitation and temperature. In particular, it has been shown that both species and cultural diversity are positively correlated

[22]It is worth noting that total area is determined by ethnic homeland borders, which can be arguably endogenous to both heterogeneity and economic specialization.

with precipitation and net primary productivity, which in turn depends on temperature (Moore et al., 2002; Nettle, 1998). Furthermore, precipitation and temperature might directly affect economic activities and specialization. Thus, omission of precipitation and temperature might bias the results. Columns 5 and 6 address this potential concern by accounting for average precipitation and average temperature, respectively. As shown in the table, the estimated coefficients on both these controls are negative and not statistically nor economically significant. On the other hand, the effect of population diversity remains positive statistically and economically significant.

Finally, column 7 accounts for the joint effect of all these basic geographic controls. The statistical relationship between population diversity and economic specialization is statistically significant at the 1 percent level and implies an economically significant effect of population diversity. In particular, an increase of one standard deviation in population diversity increases economic specialization by more than one-third of its standard deviation.

While these results support the proposed hypothesis, the estimated effect of population diversity might be biased due to the omission of other variables. In order to address this potential concern and to account for other possible sources of economic specialization, Table 2 adds a further set of controls to the analysis. In order to compare with the previous results, column 1 includes all the controls in Table 1.

A potential concern is that higher population diversity may be a result of a hostile disease environment. For example, Birchenall (2014) argues that pathogen stress influenced pre-colonial ethnic diversity. Furthermore, a "bad" disease environment can also negatively affect economic activities. Thus, column 2 considers the potential confounding effect of the disease environment by accounting for the ecology of malaria (Kiszewski et al., 2004). As expected, malaria ecology negatively correlates with economic specialization. Given the positive correlation between the disease environment and population diversity, the inclusion of malaria ecology increases the size and statistical significance of the point estimate for population diversity.

Column 3 accounts for the diversity of the ecological environment, which could potentially affect specialization directly (Fenske, 2014) and be correlated with linguistic and cultural diversity (Michalopoulos, 2012; Moore et al., 2002). Reassuringly, although ecological diversity correlates strongly with economic specialization, the point estimate for population diversity is virtually unaltered.[23]

Columns 4 and 5 account for the potentially confounding effects of agricultural and caloric suitability. In particular, Michalopoulos (2012) shows that variation in soil quality correlates with inter-ethnic linguistic diversity, which could foster economic exchange. Moreover, variation in soil quality could potentially be conducive to specialization directly. On the other hand, Galor and Özak (2015, 2016) show that pre-industrial population (density) levels are highly correlated with their Caloric Suitability Index (CSI).[24] Since population (density) potentially affects market size and thus specialization (Smith, 1776), including the mean and the standard deviation of the CSI accounts for this potential

[23]Following Fenske (2014), ecological diversity is a Herfindahl index of the shares of each ethnic homeland's area occupied by each ecological type (Olson et al., 2001).

[24]The Caloric Suitability Index (CSI) measures for each cell of 10 kms $\times$ 10 kms in the world, the average number of calories that could be potentially produced given the climatic conditions in that cell and the crops available in the pre-1500CE period.

Table 2: Population Diversity and Economic Specialization

	Economic Specialization (Count)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Population Diversity	0.36***	0.41***	0.36***	0.37***	0.34***	0.33***	0.31***	0.40***	0.31***
	(0.09)	(0.10)	(0.10)	(0.09)	(0.11)	(0.10)	(0.09)	(0.11)	(0.10)
Malaria Ecology		-0.36***							-0.41***
		(0.12)							(0.12)
Ecological Diversity			0.26***						0.20*
			(0.10)						(0.11)
Agricultural Suitability (avg.)				0.00					0.13
				(0.13)					(0.10)
Agricultural Suitability (std.)				0.22*					0.32**
				(0.13)					(0.14)
Caloric Suitability (Pre-1500 ,avg.)					-0.24*				-0.34**
					(0.14)				(0.14)
Caloric Suitability (Pre-1500 ,std.)					0.30**				0.07
					(0.11)				(0.14)
Temperature (Spatial Corr., Avg.)						0.01			-0.05
						(0.09)			(0.08)
Temperature (Volatility, Avg)						-0.58***			-0.11
						(0.19)			(0.20)
Pct. Area within 100kms of Sea							0.02		-0.16
							(0.10)		(0.11)
Coast Length							0.49**		0.60***
							(0.22)		(0.20)
Ruggedness (Avg.)								-0.22	0.07
								(0.22)	(0.18)
Pre-Industrial Mobility (avg.)								0.81*	1.06**
								(0.41)	(0.46)
Pre-Industrial Mobility (std.)								-0.04	-0.36**
								(0.12)	(0.16)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.20	0.27	0.26	0.23	0.24	0.24	0.26	0.23	0.50
Adjusted-R^2	0.15	0.22	0.21	0.17	0.18	0.18	0.20	0.17	0.40
Observations	116	116	116	116	116	116	116	116	116

Notes: This table establishes the positive statistically and economically significant correlation between economic specialization and population diversity as measured by expected heterozygosity after accounting for the set of basic geographical controls of Table 1 and an extended set of confounders. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

confounding channel. Reassuringly, the qualitative results remain unaltered.

Column 6 controls for the confounding effects of both the spatial correlation and the intertemporal volatility of temperature. In particular, Dean et al. (1985) argue that trade alliances among communities were common in regions with high spatial variability in climate. In addition, pre-modern societies could have mitigated the negative impact of climatic variation by extending the set of subsistence activities. Additionally, Ahlerup and Olsson (2012) show that temperature variation predicts ethnic diversity. Accounting for these potential confounders does not alter the results.

Columns 7 and 8 account for a potential concern that ethnicities' isolation and access to the sea might jointly affect their population diversity and their economic specialization. In particular, proximity and access to the sea may ease contact with other societies, thus increasing population diversity and facilitating trade. Similarly, isolated ethnicities may be forced to specialize and also be less diverse. However, accounting for the fraction of the ethnic homeland located within 100 kilometers from the sea as well as the length of the ethnic homeland's coastline (Column 7), and for the average ruggedness of the terrain, the average and the standard deviation of the pre-industrial mobility index developed by Özak (2012, 2010) does not alter the qualitative results.

Finally, column 9 accounts for the joint effect of all the previous confounders. The estimated effect of population diversity on economic specialization remains positive statistically and economically significant. In particular, a one standard deviation increase in population diversity increases, on average, economic specialization by one-third of its standard deviation. Figure 2(b) depicts this conditional association using a binned scatterplot. While these results support the proposed theory, the point estimates reported so far may still be biased due to unobservable factors that correlate with both the proxy of population diversity and economic specialization. For this reason the next sections follow the instrumental variable approach presented in section 3.1 to identify the lower bound of the true effect of population diversity on economic specialization.

4.2 Population Diversity and Distance to East Africa

This section establishes the negative statistically and economically significant effect of the migratory distance from East Africa on population diversity as proxied by genetic and linguistic diversity. In particular, the Out-of-Africa theory predicts that population diversity decreases along the different migratory routes that humans followed out of East Africa. Thus, as suggested by the empirical strategy in section 3.1, the analysis estimates the effect of the migratory distance to East Africa β_{ij}, $j = genetic, linguistic$, in equation (2) on the proxies of population diversity. Moreover, it establishes that $\beta_{1genetic} < \beta_{1linguistic}$ providing evidence that supports the interpretation of δ_1 as a lower bound for the true causal effect of population diversity.

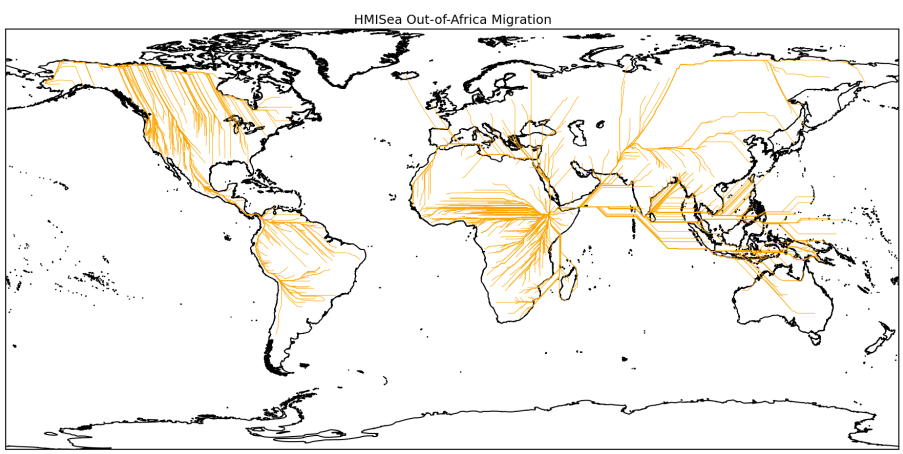


Figure 3: Potential Migratory Routes Out of East Africa

The analysis estimates the pre-industrial migratory distance to East Africa by finding the minimal travel times to East Africa (Addis Ababa) using the Human Mobility Index with Seafaring - HMISea

(Özak, 2010, 2012). HMISea estimates the time (in weeks) required to walk across each square kilometer of land, accounting for the topographic, climatic, terrain conditions, and human biological abilities, as well as the time required to cross major seas with pre-industrial technologies. Figure 3 shows the potential migratory routes out of East Africa to the historical ethnic homelands that minimize the travel time according to HMISea. To overcome potential concerns of endogeneity of the actual historical patterns of migration, the analysis employs the pre-industrial travel time to the ethnic homeland based on HMISea as an instrument for the proxies of population diversity.

Table 3: Population Diversity and Distance to East Africa

	Population Diversity (Genetic)								
	Full Sample								Specialization
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-Industrial Distance to East Africa	-0.85***	-0.80***	-0.80***	-0.81***	-0.80***	-0.79***	-0.80***	-0.82***	-0.85***
	(0.07)	(0.10)	(0.09)	(0.09)	(0.10)	(0.10)	(0.10)	(0.09)	(0.09)
Malaria Ecology			0.17***					0.20***	0.16**
			(0.05)					(0.07)	(0.08)
Agricultural Suitability (avg.)				-0.00				-0.01	-0.01
				(0.06)				(0.07)	(0.07)
Agricultural Suitability (std.)				0.08				0.13**	0.14*
				(0.06)				(0.06)	(0.07)
Caloric Suitability Index (Pre-1500CE)					0.02			0.07	0.09
					(0.07)			(0.07)	(0.09)
Caloric Suitability (Pre-1500 ,std.)					-0.08			-0.13**	-0.13*
					(0.05)			(0.06)	(0.07)
Pct. Area within 100kms of Sea						-0.00		0.13**	0.14**
						(0.06)		(0.06)	(0.07)
Coast Length						0.03		0.04	0.01
						(0.06)		(0.05)	(0.07)
Ruggedness (Avg.)							-0.03	-0.19	-0.19
							(0.12)	(0.13)	(0.16)
Pre-Industrial Mobility (avg.)							0.05	0.12	0.13
							(0.20)	(0.23)	(0.25)
Pre-Industrial Mobility (std.)							-0.13	-0.07	-0.07
							(0.08)	(0.11)	(0.12)
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Semi-partial R^2									
Pre-Industrial Distance	0.72	0.40	0.39	0.40	0.36	0.38	0.36	0.28	0.33
Sum of Semi-partial R^2									
All Other Controls	0.00	0.01	0.02	0.02	0.02	0.01	0.00	0.05	0.05
Adjusted-R^2	0.72	0.72	0.74	0.72	0.72	0.72	0.73	0.75	0.73
R^2	0.72	0.74	0.75	0.74	0.74	0.74	0.75	0.78	0.76
Observations	144	144	144	144	144	144	144	144	116

Notes: This table establishes the negative statistically and economically significant relation between expected heterozygosity and the distance to East Africa after accounting for the set of basic geographical controls of Table 1 and an extended set of confounders and measures of isolation. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table 3 explores the relationship between migratory distance to East Africa and genetic diversity (as measured by expected heterozygosity) for 144 ethnic groups for which geo-coded genetic and ethnographic data is available.[25] Two facts stand out from the results in Table 3: (i) migratory distance to East Africa alone explains 72 percent of the variation in population diversity (column 1); and (ii) accounting for the potential confounding effects of all the controls included in Tables 1 and 2, both individually and jointly, affects remarkably little the point estimates for pre-industrial migratory distance to East Africa. Furthermore, as shown in column 9, these results hold also for the restricted sample of 116 ethnic groups from previous section.

The importance of effect of the distance to East Africa on genetic diversity is further confirmed by its semi-partial R^2.[26] In particular, the distance to East Africa has the largest semi-partial R^2 in the analysis. As shown in Table 3, the semi-partial R^2 of the distance to East Africa, is even larger than the sum of the semi-partial R^2's of all other controls combined. Specifically, the results in column (8) imply the variation that is uniquely related to the distance to East Africa, explains 30% of the total variation in genetic diversity, while the combined variation that is specific to the each of other variables explains less that 5% of the total variation in genetic diversity.

Table 4: Population Diversity and Distance to East Africa

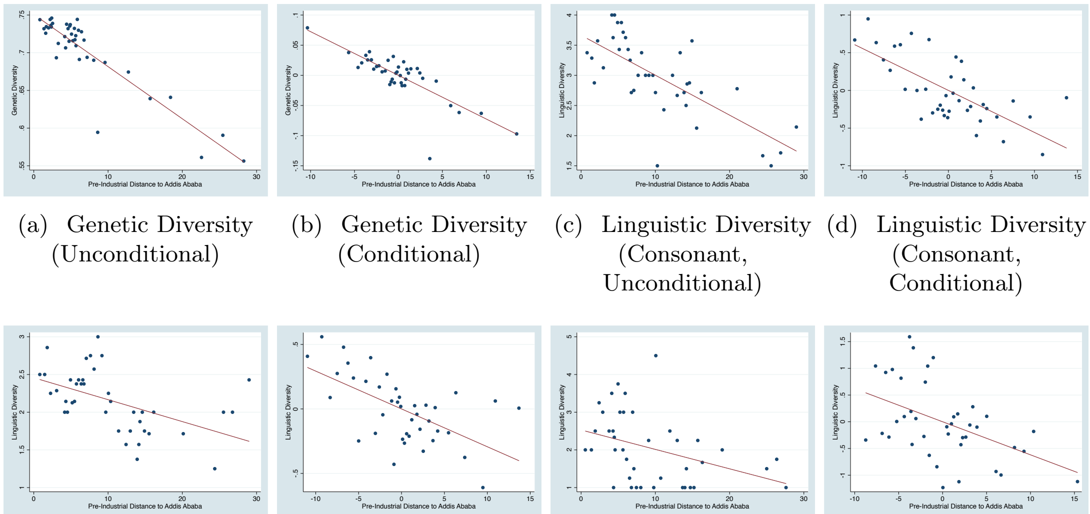
	Population Diversity (Linguistic)								
	Consonant Inventory			Vowel Quality Inventory			Number of Genders		
	Full Sample		Specia-lization	Full Sample		Specia-lization	Full Sample		Specia-lization
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-Industrial Distance to East Africa	-0.42*** (0.05)	-0.37*** (0.06)	-0.37*** (0.07)	-0.30*** (0.06)	-0.31*** (0.07)	-0.33*** (0.08)	-0.25*** (0.06)	-0.30*** (0.09)	-0.33*** (0.08)
Main Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Adjusted-R^2	0.17	0.27	0.27	0.08	0.19	0.22	0.06	0.20	0.23
R^2	0.17	0.31	0.32	0.09	0.23	0.27	0.06	0.28	0.32
Observations	299	299	255	301	301	256	152	152	131

Notes: Notes: This table establishes the negative statistically and economically significant relation between measures of linguistic diversity and the distance to East Africa after accounting for the set of basic geographical controls of Table 1 and an extended set of confounders and measures of isolation. Each column includes the same set of controls as the same column in Table 3. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Finally, the negative relation between the pre-industrial distance to East Africa and population diversity is further confirmed in Table 4, which shows the relation between this distance and 3 measures of linguistic diversity. Figure 4 depicts the unconditional and conditional strong negative relationship between all the proxies of population diversity employed in the analysis and the pre-industrial migratory distance to East Africa. As hypothesized, $\beta_{1genetic} < \beta_{1linguistic}$, thus providing support for the interpretation of the effect of genetic diversity, δ_1, as a lower bound of the true effect of population diversity (Proposition 3).

[25] Similar results are obtained in the full sample of 267 ethnicities for which genetic data alone is available. The analysis omits islands for which the HMISea does not provide travel speed estimates. Still, the results are robust to imputation based on geodesic distances or by using the HMIOcean measure, which includes more advanced navigation technologies available before the invention of the steam engine.

[26] Results not shown, but can be obtained from authors.



(a) Genetic Diversity (Unconditional)
(b) Genetic Diversity (Conditional)
(c) Linguistic Diversity (Consonant, Unconditional)
(d) Linguistic Diversity (Consonant, Conditional)
(e) Linguistic Diversity (Vowel, Unconditional
(f) Linguistic Diversity (Vowel, Conditional)
(g) Linguistic Diversity (Genders, Unconditional)
(h) Linguistic Diversity (Genders, Conditional)

Figure 4: Pre-Industrial Distance to East Africa and Population Diversity

4.3 Population Diversity and Economic Specialization (Instrumental Variable Analysis)

This section establishes the positive causal effect of population diversity on economic specialization by exploiting an instrumental variable strategy based on the migratory distance to East Africa. As shown in the previous section, the migratory distance to East Africa is a valid instrument for various proxies of population diversity, since (i) it is the main predictor of population diversity, due to the serial founder effect and the Out-of-Africa theory, and (ii) it only affects economic outcomes through its effect on diversity.[27]

Table 5 presents the results of this instrumental variables (IV) analysis, in which population diversity as proxied by genetic diversity is instrumented by the migratory distance to East Africa for the set of 116 ethnicities for which genetic, ethnographic and geographic data exists. In order to facilitate comparison with the OLS results, column 1 replicates the analysis of column 5 in Table 1 by accounting for the effect of the set of basic geographic controls. Columns 2 through 10 use this IV strategy to establish the positive effect of population diversity on economic specialization, accounting for the set of controls of Table 2. The estimated effect is 22-55% larger than in the OLS analysis, and ranges between 0.44 and 0.56, implying an economically significant effect of population diversity on economic specialization. In particular, after accounting for all the confounders analyzed in table 2, a one standard deviation increase in population diversity causes about half a standard deviation increase in economic specialization. Importantly, these results are not subject to a weak instrument problem, since the Kleibergen-Paap F-statistics for the first stage, reported at the bottom of the table, are all larger than the critical values suggested by Stock-Yogo.

[27]Section 4.6 presents additional evidence in support of the exclusion restriction.

Table 5: Population Diversity and Economic Specialization (IV)

	Economic Specialization (Count)									
	OLS	IV								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Population Diversity	0.36***	0.51***	0.53***	0.54***	0.54***	0.45***	0.49***	0.44***	0.56***	0.46***
	(0.09)	(0.12)	(0.12)	(0.12)	(0.13)	(0.14)	(0.13)	(0.11)	(0.14)	(0.14)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	-	-	Malaria	Eco. Div.	Agr. Suit.	CSI	Volatility	Sea	Mobility	All
First-stage F-statistic		56.99	59.31	59.04	65.63	52.61	55.27	53.29	63.44	81.54
Adjusted-R^2	0.15	0.14	0.21	0.19	0.15	0.17	0.16	0.19	0.15	0.39
Observations	116	116	116	116	116	116	116	116	116	116

Notes: This table establishes the positive statistically and economically significant effect of population diversity on economic specialization, by instrumenting population diversity with the distance to East Africa (see section 4.2). These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table 6: Population Diversity and Economic Specialization (IV)
Linguistic Diversity

	Economic Specialization (Count)								
	Linguistic Diversity (Consonant Inventory)			Linguistic Diversity (Vowel Quality Inventory)			Linguistic Diversity (Number of Genders)		
	OLS	IV		OLS	IV		OLS	IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Population Diversity	0.19***	1.13***	1.25***	0.39***	1.13***	1.34***	0.11	1.18***	0.90***
	(0.06)	(0.20)	(0.28)	(0.06)	(0.24)	(0.35)	(0.08)	(0.29)	(0.33)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	No	Yes	No	No	Yes	No	No	Yes
First-stage F-statistic		45.11	27.63		22.85	18.08		29.40	17.22
Observations	255	255	255	256	256	256	131	131	131

Notes: This table establishes the positive statistically and economically significant effect of population diversity on economic specialization, by instrumenting population diversity (as proxied by linguistic diversity measures) with the distance to East Africa (see section 4.2). These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Additionally, Table 6 establishes the robustness of the results to the measure of population diversity by replicating the main results of Table 5 for each of the three linguistic proxies of population diversity.[28] In particular, proxying population diversity with linguistic diversity as measured by consonant inventory, vowel quality inventory and the number of genders generates qualitatively similar results. The results of Tables 5 and 6 show some noteworthy patterns. First, regardless of the population diversity measure employed, the IV estimates are larger than the OLS estimates, suggesting a downward bias due to measurement error and potential omitted factors. Second, as could be expected, the ratio of IV to OLS estimates is larger for the linguistic measures of population diversity, since measurement

[28] Tables F.5-F.8 fully replicate Table 5 for each of the linguistic proxies of population diversity.

error and factors other than the serial founder effect, such as cultural evolution, may affect these measures more. And third, the standardized beta from the IV estimates for the linguistic measures are larger than the one based on genetic diversity. Thus, providing further support to the interpretation of the estimated effect of genetic diversity as a lower bound of the true effect of population diversity.

Finally, the results are robust to the measure of economic specialization used (see section 3.2 for the construction of the different measures). In particular, employing the alternative measures of economic specialization generates qualitatively identical results and imply a positive effect of population diversity on economic specialization (Tables D.9 and D.10). Moreover, varying both the measure of economic specialization and the proxy of population diversity does not affect the results either (Tables F.9 and F.10).

4.4 Predicted Population Diversity and Economic Specialization

This section provides additional support for the positive causal effect of population diversity on economic specialization. In particular, a potential concern with the previous analysis is that it is based on samples of ethnicities, for which both population diversity (either genetic or linguistic) and economic specialization data is available, which could be a potential source of bias. In order to address this potential concern and further explore this effect, this section employs a two-step econometric model to generate a measure of population diversity as predicted by the pre-industrial migratory distance to East Africa (Murphy and Topel, 2002; Ashraf and Galor, 2013b).[29] In particular, based on the estimated relation between the migratory distance to East Africa and population diversity in the subsamples of ethnicities analyzed in section 4.2, the analysis predicts population diversity for all ethnicities in the Ethnographic Atlas. This strategy expands roughly eightfold the sample of ethnicities for which the main proxy of population diversity and specialization data is available. Moreover, it allows the analysis to be performed on additional ethnographic data. Finally, as in the case of the previous IV approach, the estimated effect of predicted population diversity can be given a causal interpretation, since by construction it captures only the exogenous variation in diversity generated by the serial founder effect and the Out-of-Africa theory. Since this analysis exploits a generated regressor, standard errors are computed using a bootstrapping procedure.[30]

Based on this extended sample, the analysis replicates in columns 1 to 10 of Table 7 the main econometric specifications of Tables 1, 2, and 5. The positive effect of population diversity on economic specialization remains statistically and economically significant. Furthermore, the point estimates are remarkably stable across specifications, supporting the view that the effect of predicted population diversity is not biased by omitted factors. Moreover, the size of the estimated effect of population

[29] Two-step econometric procedures yield consistent estimates of second stage parameters, although the second-step standard error estimates may be incorrect, if they do not account for the additional uncertainty due to the two-step procedure (Murphy and Topel, 2002). In order to address this issue, the analysis employs a bootstrapping procedure to correctly estimate standard errors.

[30] In particular, a random sample of ethnicities with both diversity and migratory distance data is drawn with replacement out of the original sample. Then equation (2) is re-estimated, accounting for the same set of controls as in the second-stage. Using these new estimates population diversity is predicted again and equation (4) is re-estimated. This procedure is repeated 1001 times and the distribution of the bootstrapped coefficients is used to compute the standard errors. A similar procedure was proposed in Ashraf and Galor (2013b).

Table 7: Predicted Population Diversity and Economic Specialization

	Economic Specialization										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Predicted Population Diversity	0.44*** (0.02)	0.42*** (0.03)	0.49*** (0.03)	0.42*** (0.03)	0.41*** (0.03)	0.46*** (0.04)	0.40*** (0.03)	0.42*** (0.04)	0.42*** (0.03)	0.53*** (0.07)	0.59*** (0.21)
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	-	-	Malaria	Eco. Div.	Agr. Suit.	CSI	Volatility	Sea	Mobility	All	All
Continental FE	No	No	No	No	No	No	No	No	No	No	Yes
Semi-partial R^2											
Population Diversity	0.19	0.15	0.16	0.15	0.13	0.16	0.12	0.14	0.14	0.14	0.13
Sum of Semi-partial R^2											
All Other Controls	0.00	0.04	0.06	0.05	0.04	0.05	0.05	0.04	0.03	0.08	0.08
Adjusted-R^2	0.19	0.22	0.23	0.24	0.22	0.24	0.22	0.21	0.23	0.29	0.32
Observations	934	934	934	934	934	934	934	934	934	934	934

Notes: This table establishes the positive statistically and economically significant effect of population diversity as predicted by the distance to East Africa (see section 4.2) on economic specialization. These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Standardized coefficients. Bootstrapped standard error estimates in parenthesis; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

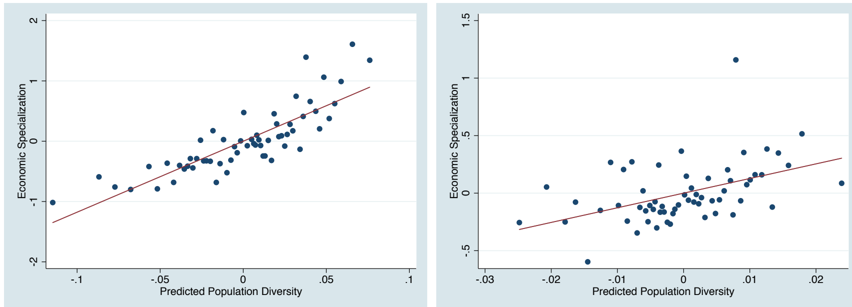
diversity on economic specialization in this expanded sample lies between the OLS and IV estimates of the reduced sample (see Tables 2 and 5).

Column 11 establishes that the positive effect of population diversity on economic specialization is robust to accounting for unobserved time-invariant continent-specific attributes. Indeed, if anything, the inclusion of continental fixed effects increases the estimated effect of diversity. In particular, the estimates in columns 10 and 11 imply that a standard deviation increase in predicted population diversity increases economic specialization by more than a half of a standard deviation.[31] Figure 5 depicts the conditional relations in columns (10) and (11) using binned scatter plots.

Table 7 also establishes the relative importance of population diversity as a determinant of economic specialization. Indeed, it shows that among all the determinants studied, predicted population diversity has the highest semi-partial R^2. Thus, the variation uniquely associated with population diversity is larger than the one associated with any other single determinant of economic specialization. Furthermore, it establishes that all other determinants jointly have a lower explanatory power than population diversity alone. This provides additional evidence for the fundamental role of population diversity as a determinant of economic specialization.

The estimated effect of predicted population diversity on economic specialization is robust to the measure of specialization used as well as to the estimation method employed in the analysis. In particular, Table D.10 establishes that all results presented so far hold for all three measures of economic specialization. Interestingly, population diversity's effect on economic specialization is stronger when the measure of economic specialization is based on the share of activities that are specialized. Since

[31] Table E.2 shows the point estimates of the reduced form economic specialization-distance to East Africa for all the specifications in Table 7. The point estimates for pre-industrial distance to East Africa are remarkably stable and strongly statistically significant. Indeed, the stability of the point estimates suggests that selection on unobservables is unlikely to drive the results, thus providing supportive evidence for the plausible exogeneity of the instrument.



(a) Without Continental FE (b) With Continental FE

Figure 5: Predicted Population Diversity and Economic Specialization Conditional Relations Accounting for All Geographical Controls

this measure should be the less affected by any potential confounding effect of development, this result suggests that other sources of development are not confounding the effect of population diversity.

A potential concern with these results is that they may be driven by the empirical specification chosen. In particular, the main measure of economic specialization is a count variable, while another is a share, which may cause OLS estimates to be biased. On the other hand, the results may be biased given the large number of societies that do not have economic specialization. In order to address these concerns, the research replicates the analysis employing Poisson, Negative Binomial, and fractional regression methods, as well as their zero-inflated variants and zero-inflated beta regressions (see Appendix D.2). Reassuringly, the results are robust to the empirical specification chosen and the estimated effect of predicted population diversity on economic specialization remains positive, statistically and economically significant. Moreover, accounting for the potential historical and spatial dependence of observations by allowing the error terms to be correlated within language phyla or across space does not alter the qualitative nature of the results (see Appendix D.3).

4.5 Complementary Effect of Population and Geographical Diversity on Economic Specialization

This section explores whether, as suggested by the theory, diverse populations enjoy complementarities with diverse geographical and ecological endowments. In particular, the effect of population diversity on economic specialization may be larger in locations with diverse geography, given that diverse preferences or skills could potentially allow diverse endowments and ecologies to be exploited better and, thus, generate higher levels of economic specialization.

Table 8 analyzes the potential complementarity between population and various measures of geographical diversity by analyzing the heterogenous effects of population diversity on economic specialization. In particular, it shows the main effect of population diversity and its interaction with ecological diversity, the standard deviation of agricultural suitability, temperature volatility, the standard deviation of ruggedness of the terrain, and the standard deviation of pre-industrial mobility.[32] As can be

[32]The estimated coefficients are again reported as standardized betas, which simplifies the comparison of the main effects across tables. Of course, this makes the interpretation of the interactions difficult, but given that both main

Table 8: Predicted Population Diversity and Economic Specialization
Complementarity with Heterogeneous Environments

	Economic Specialization					
	(1)	(2)	(3)	(4)	(5)	(6)
Predicted Population Diversity	0.59***	0.49***	0.45***	0.46***	0.55***	0.54***
	(0.25)	(0.26)	(0.26)	(0.30)	(0.26)	(0.28)
Predicted Population Diversity		0.80***				
× Ecological Diversity		(0.38)				
Predicted Population Diversity			1.16**			
× Precipitation (Volatility, Std.)			(0.57)			
Predicted Population Diversity				0.70*		
× Temperature (Spatial Corr., Std.)				(0.65)		
Predicted Population Diversity					0.77**	
× Precipitation (Spatial Corr., Std.)					(0.43)	
Predicted Population Diversity						1.08**
× Ruggedness (Avg.)						(0.59)
Main Controls & Main Effects	Yes	Yes	Yes	Yes	Yes	Yes
All Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.32	0.33	0.33	0.34	0.34	0.33
Observations	934	934	934	934	934	934

Notes: This table establishes the positive statistically and economically significant effect of population diversity as predicted by the distance to East Africa (see section 4.2) on economic specialization. Additionally, it establishes the heterogeneity of the effect and the complementarity between population diversity and variations in environmental and geographical factors. These results are robust to accounting for the set of geographical controls of Table 7, continental fixed effects and an extended set of geographical diversity measures (i.e., main/level effects and interactions). Standardized coefficients. Bootstrapped standard error estimates in parenthesis; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

seen there, all main effects and interactions of population diversity are positive and highly statistically and economically significant. The estimates imply that the more diverse a population and the more diverse the geography in which it lives, the higher the level of economic specialization.

This result lends support for the hypothesis that diverse populations leverage diverse geographical endowments, potentially generating larger complementarities and thus increasing economic specialization. Additionally, it provides a link between the seemingly contradictory theories based on the composition of the population (Ashraf and Galor, 2013a,b) and those based on geographical factors (Galor and Özak, 2015, 2016). In particular, it gives an explanation as to why economies with similar populations or environments might have different economic outcomes.

4.6 Population Diversity, Economic Specialization, and Historical Confounders

This section establishes that the estimated positive effect of population diversity on economic specialization is robust to accounting for other historical sources of pre-industrial development. Thus, overcoming the potential concern that population diversity is capturing the effect of factors like the transition to agriculture or the history of settlement or the existence of centralized institutions on economic specialization. Moreover, it provides supportive evidence for the validity of the exclusion

effects and interactions are positive, the qualitative nature of the effects is directly observable from the table.

restriction by establishing that the potential migratory distance to East Africa is not capturing the conceivable confounding effects of common ancestry or historical interaction with other societies. Additionally, it explores the robustness of the results to accounting for historical and spatial dependence.

Table 9: Predicted Population Diversity, Economic Specialization and Other Historical Confounders

	Economic Specialization							
	Full Sample							SCCS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Predicted Population Diversity	0.35**	0.35**	0.34**	0.34**	0.35**	0.36**	0.28**	0.51***
	(0.16)	(0.16)	(0.16)	(0.14)	(0.16)	(0.17)	(0.12)	(0.11)
Pre-Industrial Distance to Neolithic Frontier		-0.07**						
		(0.03)						
Pre-Industrial Distance to Technoligical Frontier (1500CE)			-0.12**					
			(0.05)					
Pre-Industrial Isolation from All Other Ethnicities				-0.08				
				(0.10)				
Pre-Industrial Distance to Closest 5 Ethnicities					0.07			
					(0.06)			
Pre-Industrial Distance to Closest 25 Ethnicities						0.03		
						(0.06)		
Duration of Continuous Human Presence							0.18	
							(0.14)	
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Language Phylum FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.45	0.46	0.46	0.46	0.46	0.45	0.46	0.48
Observations	921	921	921	921	921	921	921	166

Notes: This table establishes the positive statistically and economically significant effect of population diversity as predicted by the distance to East Africa (see section 4.2) on economic specialization after accounting for other potential historical sources of specialization and development. All columns account for the set of geographical controls of Table 7 and language phylum fixed effects. Standardized coefficients. Heteroskedasticity robust standard error estimates clustered at the language phylum level in parenthesis; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

One potential concern with the previous results is that migration and splitting of ancestral groups may have created historical and spatial correlation among ethnic outcomes. In order to address this potential concern, column 1 in Table 9 explores the effect of accounting for language phylum fixed effects and additionally clustering standard errors estimates at the same level. By exploiting only within-philum variation, the analysis mitigates potential biases due to historical or spatial dependence among ethnicities. Reassuringly, the results remain qualitatively unchanged. Column 2 additionally analyzes the potential confounding effect of the long-lasting influence of the Neolithic Revolution, by accounting for the pre-industrial distance to the closest Neolithic frontier (i.e., the closest location of animal or plant domestication).[33] As argued by Diamond (1997), an earlier transition from hunting and gathering practices to agriculture provided an initial advantage to some societies, which later translated

[33]The analysis estimates the minimal travel paths based on HMISea from the centroid of each ethnic homeland to the

into a persistent technological superiority. Moreover, it has been suggested that an earlier transition to agriculture allowed the creation of an economic surplus and the emergence of economic specialization (Boix, 2015). Additionally, country-level precolonial development has been positively associated with the time since the Neolithic Revolution (Ashraf and Galor, 2011). In line with these findings, column 2 shows that the pre-industrial distance to the closest Neolithic frontier does have a negative effect on economic specialization. Still, the estimated effect of predicted population diversity on economic specialization remains positive strongly statistically and economically significant, suggesting that the omission of the Neolithic transition was not spuriously driving the main results.[34]

Additionally, column 3 analyzes the potential confounding effect of the pre-modern distance from the closest technological frontier in the year 1500CE as identified by Ashraf and Galor (2011). In particular, if technology diffuses from a technological frontier, one can expect ethnicities close to the frontier to acquire more technologies and develop economically, all of which might potentially be conducive to economic specialization. Indeed, the estimated effect of the distance from the frontier on economic specialization is negative statistically and economically significant, in line with this prediction. Still, if the proposed theory is right, the effect of the distance to the technological frontier may in fact reflect the effect of population diversity. Despite this fact, the estimated positive effect of predicted population diversity on economic specialization remains statistically and economically significant.

Columns 4-6 explore the potential confounding effect of an ethnicity's location relative to other ethnicities. In particular, relative isolation from other ethnic groups may affect interethnic trade and conflict, as well as innovation (Ashraf et al., 2010; Özak, 2012). Thus, the analysis explores the effect of accounting for an ethnicity's level of pre-industrial isolation from all other ethnicities (i.e., its average pre-industrial distance to all other ethnicities), and its average distance to the closest 5 or 25 ethnic groups. Accounting for these average distances has no effect on the results.[35] Moreover, accounting for an ethnicity's centrality in the pre-industrial mobility network (Özak, 2010) does not alter the results either. In particular, Table D.11 establishes that the positive effect of population diversity on economic specialization remains significant after accounting for various network centrality measures for the minimum spanning tree of the network generated by the minimum travel time paths connecting all ethnicities.

Column 7 includes an indicator of the duration of human settlements since prehistoric times, which estimates the date since the first uninterrupted settlement by anatomically modern humans (Ahlerup and Olsson, 2012).[36] Clearly, this measure should be highly correlated with migratory distance to East Africa and population diversity, since the closer a location is to East Africa, the earlier it could have been populated by anatomically modern humans. Thus, the omission of the duration of continuous human presence may bias the estimated effect of population diversity documented above, if a longer

closest Neolithic frontier. The location of Neolithic frontiers is taken from various sources (Diamond, 1997; Smith, 1997; Benz, 2001; Denham et al., 2003; Pinhasi et al., 2005; Smith, 2006; Dillehay et al., 2007; Lu et al., 2009; Manning et al., 2011; Linseele, 2013).

[34] Alternatively, accounting for the degree of subsistence dependence on agriculture, as measured in the Ethnographic Atlas (v5), does not alter the results either.

[35] Similar results are obtained if one accounts for the closest 10 or 50 groups.

[36] Given that the original data is available at the country level, the analysis follows the literature and constructs ethnic level measures by creating population-weighted averages (Alesina et al., 2013; Giuliano and Nunn, 2013; Gennaioli and Rainer, 2007).

history of uninterrupted settlement facilitated the division of labor via, for example, a greater chance for the emergence of social stratification or a dominant elite.[37] However, the results in column 7 reveal that accounting for the duration of continuous human presence has a negligible impact on the estimated effect of predicted population diversity.

Column 8 replicates the analysis on the subsample of ethnic groups that belong to the Standard Cross Cultural Sample (SCCS). As explained in section 3.2, the SCCS sample was selected in order to minimize the potential spatial and historical dependence among ethnic groups in order to overcome Galton's independence problem. Encouragingly, the qualitative results remain unchanged, although the coefficient increases by almost 50%.

Table 10: Predicted Population Diversity and Economic Specialization
Ethnicities with and without Centralized States

	Economic Specialization					
	No Centralized State			Any Centralized State		
	(1)	(2)	(3)	(4)	(5)	(6)
Predicted Population Diversity	0.46***	0.39***	0.50***	0.30***	0.36***	0.40***
	(0.03)	(0.04)	(0.10)	(0.04)	(0.05)	(0.08)
Main Controls	No	Yes	Yes	No	Yes	Yes
Additonal Controls	No	No	Yes	No	No	Yes
Adjusted-R^2	0.21	0.24	0.30	0.09	0.14	0.24
Observations	433	433	433	479	479	479

Notes: This table establishes that the positive statistically and economically significant effect of population diversity as predicted by the distance to East Africa (see section 4.2) on economic specialization is not mediated by the existence of a (pre-industrial) State. These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Standardized coefficients. Bootstrapped standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Finally, the presence or absence of institutions and statehood may have directly affected both the population composition and economic specialization. In particular, States may have fostered the assimilation, segregation or isolation of its population, as well as set the rules of the game and thus affect the economic opportunities and incentives of its population. Table 10 explores whether the existence of centralized institutions underlies the effect of population diversity on economic specialization. In particular, the table replicates the analysis for the sample of ethnicities with and without a centralized state (Fenske, 2014). This ethnographic measure has been considered the main indicator of the strength and importance of institutions in pre-colonial times (Michalopoulos and Papaioannou, 2013; Gennaioli and Rainer, 2007; Fenske, 2014). As can be seen in Table 10 the positive effect of population diversity on economic specialization is not mediated by the existence of a state. Moreover, the fact that population diversity generates economic specialization in the sample of ethnicities that do not have a state, suggests that the existence of a state is not a necessary precondition for the emergence

[37]In fact, Ahlerup and Olsson (2012) show that the historical duration of human settlements is a strong predictor of ethnolinguistic fractionalization.

of economic specialization.[38]

5 Economic Specialization and Economic Development

This section explores the consequences of pre-modern economic specialization on economic development. In particular, it establishes a strong positive association between levels of economic specialization and economic development in the pre-modern era. Moreover, it shows that pre-modern economic specialization predicts modern economic development. This analysis should be regarded as providing suggestive evidence for the importance of pre-modern economic specialization for comparative development. Still, identifying the precise causal effect of pre-modern economic specialization on economic development, with any reasonable degree of certainty, is a difficult task given the potential bias due to omitted factors and reverse causality. Nonetheless, the following analysis advances the hypothesis of a persistent effect of pre-modern economic specialization on development, by accounting for a large set of potential confounders, regional fixed effects, and exploiting an instrumental variables approach with generated instruments. Specifically, the analysis explores the effect of economic specialization on development assuming the relation between them is given by

$$y_i = \phi_0 + \phi_1 s_i + \phi_2 d_{ip} + \sum_{k=1}^{K} \phi_{2k} x_{ik} + \vartheta_i, \qquad (7)$$

where y_i is the level of development of ethnic group i, s_i is its level of pre-modern economic specialization, d_{ip} its level of predicted population diversity, $\{x_{ik}\}_{k=1}^{K}$ is a set of geographical, historical and regional controls and fixed effects, and ϑ_i is the error term.

5.1 Pre-modern Economic Specialization and Pre-industrial Development

This section analyzes the effect of pre-modern economic specialization on pre-industrial economic development. In particular, Table 11 explores the potentially beneficial effects of economic specialization on technological specialization (column 1), socio-economic complexity (column 2), population density (column 3), mean size of local communities (column 4), levels of statehood (column 5), and the existence of class stratification (column 6).

Panel A shows the positive association between pre-modern economic specialization and these measures of pre-industrial development. In particular, the estimated OLS coefficients imply that a one standard deviation increase in economic specialization is associated with about 0.4 standard deviations increase in pre-industrial development. The specification in Panel A assumes $\phi_2 = 0$, i.e., that population diversity has no direct effect on development once specialization is accounted for. Clearly, if this assumption were true, population diversity could serve as an instrument for specialization. Following this strategy generates similar estimates of the positive effect of economic specialization on development as the OLS.[39] Still, population diversity may affect economic development directly, beyond its

[38] Accounting for the level of statehood directly by including state-level fixed-effects in the estimation of equation (4) does not affect the results either.

[39] The results in smaller samples is less robust when instrumenting and accounting for continental fixed effects, since

effect on economic specialization, thus, potentially violating the exclusion restriction.

Table 11: Economic Specialization and Pre-Industrial Development

	Pre-Industrial Development					
	Technological Specialization	Complexity	Population Density	Mean Size of Local Communities	Statehood Level	Class Stratification
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Effect of Specialization					
Economic Specialization	0.45***	0.52***	0.39***	0.38***	0.43***	0.22***
	(0.08)	(0.07)	(0.07)	(0.04)	(0.03)	(0.03)
Adjusted-R^2	0.50	0.57	0.51	0.46	0.48	0.32
	Panel B: Mediation (OLS)					
Economic Specialization	0.45***	0.52***	0.40***	0.40***	0.43***	0.21***
	(0.08)	(0.07)	(0.07)	(0.04)	(0.03)	(0.03)
Predicted Population Diversity	-0.16	-0.32	-0.33	-0.30*	0.15	0.38**
	(0.35)	(0.25)	(0.33)	(0.18)	(0.12)	(0.16)
Adjusted-R^2	0.49	0.57	0.51	0.46	0.48	0.32
	Panel C: Mediation (IV)					
Economic Specialization	0.38***	0.42***	0.34***	0.39***	0.42***	0.24***
	(0.09)	(0.09)	(0.08)	(0.04)	(0.04)	(0.03)
Predicted Population Diversity	-0.14	-0.30	-0.32	-0.29*	0.15	0.36**
	(0.32)	(0.23)	(0.30)	(0.17)	(0.12)	(0.15)
Breusch-Pagan F-stat	22.63	22.63	20.48	32.61	51.23	48.84
Breusch-Pagan p-value	0.00	0.00	0.00	0.00	0.00	0.00
First-stage F-statistic	26.21	26.21	27.43	47.88	54.85	51.89
Hansen's J-statistic	34.80	25.19	23.47	32.34	28.17	34.83
J-stat p-value	0.04	0.29	0.38	0.07	0.17	0.04
Adjusted-R^2	0.49	0.57	0.51	0.46	0.48	0.32
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	168	168	166	509	912	879

Notes: Notes: This table establishes the positive effect of economic specialization on pre-industrial development (Panel A). Panels B and C establish that economic specialization mediates the effect of population diversity on pre-industrial development. Panel C exploits an instrumental variable approach to establish the effect of economic specialization. These results account for the set of basic geographical controls of Table 1, an extended set of confounders and continental fixed effects. Standardized coefficients. Bootstrapped standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Panel B explores this possibility by estimating equation (7) without the constraint $\phi_2 = 0$. The results suggests that, with the exception of class stratification, any potential effect of population diversity on pre-industrial development appear to be mediated by its effect on economic specialization. In particular, predicted population diversity is not statistically significantly associated with pre-industrial development with the exception of its association with class stratification. Although it is reassuring

the instrument is weak. Reassuringly, the results are even stronger if instead of continental fixed effects one accounts for language phylum fixed effects. Furthermore, the results are similar if instead of predicted population diversity, the distance to East Africa is used as the instrument.

that economic specialization has a positive association with these measures of pre-industrial development, clearly, these associations cannot be given a causal interpretation due to endogeneity concerns. Particularly, the potential reverse causality from pre-industrial development to pre-modern economic specialization is a major concern. Moreover, it is difficult to find an instrument based on economic arguments, which affects economic specialization *without* having a potential direct effect on pre-industrial development.

In order to address potential endogeneity concerns due to reverse causality and omitted variables, the analysis exploits a second instrumental variable strategy based on the method of generated instrumental variables suggested by Lewbel (2012). This strategy exploits second moment conditions in the cross section of ethnicities to identify the structural parameters in the absence of traditional identifying information. Specifically, consider the set of controls $\tilde{x}_i = (d_{ip}, x_i)$ and the error terms ε_i and ϑ_i in equations (4) and (7). Appendix A.1 establishes that if the error term ε_i in equation (4) is heteroskedastic, i.e., $E(\tilde{x}_i \varepsilon_i^2) \neq 0$, and for some subset of controls $z_i \subseteq \tilde{x}_i$, the covariance between z_i and the correlation between ε_i and ϑ_i is zero, i.e., $Cov(z_i, \varepsilon_i \vartheta_i) = 0$, then the causal effect ϕ_1 is identified. In particular, under these assumptions, the generated instruments $\tilde{z}_{ik} = (z_{ik} - E(z_{ik}))\varepsilon_i$ are valid instruments for economic specialization in equation (7). Clearly, if z_i contains two or more elements, this strategy admits the implementation of over-identification tests. Similarly, Breusch-Pagan tests can be implemented to test for the heteroskedasticity assumption. While the last condition for identification cannot be tested directly, Appendix A.1 provides various sufficient conditions for it to hold. E.g., it suffices for ε_i and ϑ_i to be determined by a common homoskedastic (omitted) factor and heteroskedastic idiosyncratic shocks.

Panel C of Table 11 employs this method to establish the positive economically and statistically significant effect of economic specialization on pre-industrial development. The Breusch-Pagan test suggests the presence of heteroskedasticity, ensuring the main condition for identification is satisfied. Furthermore, the analysis exploits one of the strengths of Lewbel's method, which is the possibility of leveraging multiple instruments, thus allowing for over-identification tests. Indeed, the results of Hansen's J test for overidentification restrictions in Table 11 suggest that the instruments are valid for the analysis of the effect of economic specialization on socio-economic complexity, population density and statehood levels. Interestingly, the estimated effect is quite similar across measures of pre-industrial development and imply that a one standard deviation increase in economic specialization increased pre-industrial development by 0.4 standard deviations.

Taken together, these results suggest that economic specialization impacts pre-industrial development and is a major mediating channel through which predicted population diversity affects pre-industrial development.

5.2 Persistent Effects of Pre-Modern Economic Specialization on Contemporary Economic Development

This section explores whether historical levels of economic specialization have had a persistent effect on contemporary development. In particular, as established in the previous sections, pre-modern economic specialization had a positive effect on pre-industrial development, supporting the emergence of hierarchical structures, pre-modern states, economic complexity and technology. Thus, if these institutions or technologies persist across time, it is conceivable that pre-modern economic specialization might have a persistent effect on economic development. Moreover, pre-modern economic specialization may have fostered the emergence of certain cultural traits or the accumulation of a diverse set of production-specific knowledge (e.g., due to learning-by-doing processes), which may have persisted and might still affect contemporary development.

Table 12: Pre-Modern Economic Specialization and Contemporary Economic Development

	Average Light Density (Inverse Hyperbolic Sine Transformation)							
	Whole World				Old World			
	OLS			IV	OLS			IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre-modern Economic Specialization	0.13***	0.15***	0.12***	0.17***	0.16***	0.19***	0.15***	0.18***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
All Additional Controls	No	No	Yes	Yes	No	No	Yes	Yes
First-stage F-statistic				63.88				34.34
Hansen's J-statistic				40.32				40.31
J-stat p-value				0.29				0.18
Adjusted-R^2	0.37	0.42	0.53	0.25	0.41	0.48	0.56	0.25
Observations	932	932	932	932	591	591	591	591

Notes: This table establishes the persistent positive statistically and economically significant effect of pre-modern economic specialization on economic development. These results account for the set of geographical controls in Table 7 and regional fixed effects. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table 12 explores the potential persistent effect of pre-modern economic specialization on contemporary ethnic-level development.[40] In particular, it establishes the positive statistically and economically significant association between pre-modern levels of economic specialization and contemporary development as measured by the intensity of night-time lights (Henderson et al., 2012; Michalopoulos and Papaioannou, 2013). Columns 1-3 show that after accounting for the effect of unobserved regional heterogeneity and geography, ethnic groups with higher levels of pre-modern economic specialization have higher light density per area of their homeland, and thus higher levels of contemporary economic development.

Columns 5-7 exclude the New World from the analysis, since light density of ethnic homelands in the Americas might be capturing the effects of population replacement and migration after 1500CE.[41] In fact, the estimated positive effect of economic specialization on contemporary economic development is even larger in the Old World sample. In particular, the Old World sample suggests that a one-standard deviation increase in pre-modern economic development generates 0.15 standard deviations increase in

[40]The main dependent variable in Table 12 uses the inverse hyperbolic sine transformation of light density in order to account for the problem of zero light density. Similar results are obtained if instead one uses a log-transformation (see Tables G.1-G.3).

[41]Since an interregional, ethnic-level migration post-1500CE matrix, à la Putterman and Weil (2010) does not exist, the analysis cannot account for the ancestral composition of the contemporary population living in the ethnic homelands of aboriginal populations in the New World.

light density.

Clearly, the positive correlation between pre-modern economic specialization and contemporary economic development cannot be given a fully causal interpretation, since the analysis may be subject to omitted variable bias. In order to delve further into the potential positive and persistent effect of specialization on development, columns 4 and 8 again exploit the method for generating instrumental variables suggested by Lewbel (2012), to identify the effect of pre-modern economic specialization on contemporary economic development.[42] Instrumenting economic specialization increases its estimated effect on development. Moreover, the first-stage F-statistic shows that the instruments are strong, and Hansen's over-identification test cannot reject the hypothesis that the instruments satisfy the exclusion restriction. Thus, these results suggest a persistent effect of pre-modern economic specialization on contemporary development.

Table 13: Pre-colonial Economic Specialization and Contemporary Occupational Heterogeneity

	Contemporary Occupational Heterogeneity					
	Unweighted			Weighted		
	OLS		IV	OLS		IV
	(1)	(2)	(3)	(4)	(5)	(6)
Pre-modern Economic Specialization	1.01***	0.83**	0.80**	0.63**	0.65**	0.63**
	(0.36)	(0.37)	(0.31)	(0.30)	(0.29)	(0.25)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
All Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Regional FE	No	Yes	Yes	No	Yes	Yes
First-stage F-statistic			367.81			10643.43
Hansen's J-statistic			18.34			25.38
J-stat p-value			0.63			0.23
Adjusted-R^2	0.10	0.11	0.11	0.13	0.20	0.20
Observations	101	101	101	101	101	101

Notes: This table establishes the persistent positive statistically and economically significant effect of pre-modern economic specialization on contemporary occupational heterogeneity. These results account for the full set of geographical controls in Table 7 and regional fixed effects. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

5.2.1 Mechanisms

In order to further analyze potential channels through which pre-modern economic specialization might affect contemporary development, the analysis explores the effect of pre-modern economic specialization on contemporary occupational heterogeneity, i.e. the number of distinct economic occupations performed by members of an ethnicity. The analysis explores this hypothesis using the third round of the Afro-Barometer, which includes both data on ethnicity and occupation.[43] Columns 1-2 in Table 13 establish that pre-modern economic specialization has a positive statistically and economically

[42] See section 5.1 for a presentation of the idea behind this instrumental variable approach. Appendix A.1 presents a formal analysis and the main results behind this strategy.

[43] There does not seem to exist other systematic surveys providing data on ethnicity, educational attainment and occupation (especially outside Africa) that can be linked to enough groups in the Ethnographic Atlas.

significant association with contemporary occupational heterogeneity after accounting for the full set of geographical controls and for regional fixed effects. Column 3 again follows Lewbel (2012) and instruments pre-modern economic specialization without affecting the qualitative results. Moreover, the F-statistic for the first stage suggests that the instruments are strongly correlated with specialization, while Hansen's over-identification tests suggests that the instruments are valid. Columns 4-6 replicate the analysis, but weigh each ethnicity according to the number of individuals of the ethnicity surveyed in the Afro-barometer. Reassuringly, the results are qualitatively similar.[44] In particular, the estimates suggest that an additional specialized activity in pre-modern times is associated with 0.83 additional contemporary occupations performed by an ethnicity. Given the positive correlation between contemporary occupational heterogeneity and economic development, this result suggests a novel channel through which pre-modern economic specialization might affect comparative development.

Table 14: Pre-modern Economic Specialization and Contemporary Occupational Heterogeneity by Skill Level

	Contemporary Occupational Heterogeneity				
		Primary		Secondary	
	All	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)
Pre-modern Economic Specialization	0.83**	0.29**	0.54**	0.35**	0.48*
	(0.37)	(0.14)	(0.27)	(0.15)	(0.25)
Main Controls	Yes	Yes	Yes	Yes	Yes
All Additional Controls	Yes	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.11	0.16	0.10	0.18	0.10
Observations	101	101	101	101	101

Notes: This table establishes the persistent positive statistically and economically significant effect of pre-modern economic specialization on contemporary occupational heterogeneity by skill level. It suggests that pre-modern economic specialization has a skill-biased effect on contemporary occupational heterogeneity. High skill occupations are those which employ a higher share of individuals with completed primary/secondary school or higher level of education attainment than the African average. These results account for the full set of geographical controls in Table 7 and regional fixed effects. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table 14 further explores this channel. It analyzes the differential effect of pre-modern economic specialization on occupational heterogeneity of low- and high-skilled occupations.[45] It establishes a significant positive association between pre-modern economic specialization and occupational heterogeneity of both low- and high-skilled occupations (Columns 2 and 3, when high-skilled is defined as

[44] The very large F-statistics for the first stage reflect the strong joint predictive power of the set of instruments. In particular, in the case of the weighted regressions, the excluded instruments double the size of the first stage's R^2, decreasing the sum of squared errors, which leads to an increase of an order of magnitude in the F-statistic.

[45] Occupational heterogeneity of low-skilled occupations measures the number of distinct low-skilled economic occupations performed by members of an ethnicity. Similarly, for high-skilled occupations, which are those that employ a higher share of individuals with completed primary/secondary school or higher level of education attainment than the African average. It is important to note than in the African context only a small fraction of the population attains an educational level above primary schooling.

having primary school or more, and Columns 4 and 5 , when high-skilled is defined to include high-school or more). Importantly though, it suggests that the effect of pre-modern economic specialization is larger on high-skilled occupations. In particular, the estimates imply that of the 0.83 additional contemporary occupations associated with an additional specialized activity in the pre-modern era (Column 1), 35% are low-skill (Column 2) while 65% are high-skill (Column 3). Thus, the results suggest that pre-modern economic specialization may potentially have a persistent skill-biased effect on contemporary occupational heterogeneity. Tables G.5 and G.6 provide additional suggestive evidence for the skill-biased nature of the effect. In particular, Table G.5 establishes that the increase in high-skilled occupations accounts for more than half of the effect of pre-modern economic specialization. Additionally, Table G.6 shows that the share of low-skilled occupations is negatively associated with contemporary occupational heterogeneity, while the share of high-skilled occupations as well as the difference in the share of high- and low-skilled occupations are positively associated with contemporary occupational heterogeneity.

One potential mechanism that could explain the persistence of occupational heterogeneity and its potential skill-bias is learning-by-doing. In particular, societies that had higher levels of pre-modern economic specialization might have accumulated a more diverse set of production-specific human capital. This would allow them to produce a larger set of goods and thus have a more complex economic system. In particular, if the production of one type of good requires experience in the production of a related good, production processes will generate spillovers across sectors and products (Hausmann et al., 2014; Hausmann and Hidalgo, 2011; Hidalgo et al., 2007). Thus, societies with higher levels of pre-modern economic specialization would potentially have higher levels of contemporary economic complexity and produce a more diverse set of products.

Table 15: Pre-modern Economic Specialization and Contemporary Economic Complexity

	Contemporary Development											
	Economic Complexity Index			# Goods Exported			Ratio # Goods Exported/Imported			Share of Global GDP		
	Count	Share	Score	Count	Share	Score	Count	Share	Score	Count	Share	Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Pre-modern Economic Specialization	0.19*** (0.07)	0.22*** (0.07)	0.17*** (0.06)	0.21*** (0.08)	0.31*** (0.10)	0.16* (0.09)	0.19** (0.08)	0.28*** (0.10)	0.14* (0.08)	0.22*** (0.06)	0.22*** (0.07)	0.16** (0.06)
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Years Neolithic Transition	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.62	0.62	0.61	0.46	0.49	0.45	0.46	0.48	0.45	0.60	0.60	0.58
Observations	95	95	95	80	80	80	80	80	80	120	120	120

Notes: This table establishes the positive statistically and economically significant association between levels of pre-modern economic specialization and a country's contemporary economic complexity and the complexity of its production and export structure. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table 15 explores this prediction using country-level data. In particular, for each country the analysis constructs a pre-modern economic specialization measure, based on the population weighted average of pre-modern economic specialization across ethnicities located in the country.[46] Columns 1-3 show that all three pre-modern economic specialization measures have an economically and statistically significant association with the Economic Complexity Index (Hausmann et al., 2014), which measures the level of productive diversification in the country. In particular, a high value of the Economic Complexity Index suggests that a country produces complex goods that few other countries produce. Similarly, Table 15 shows that countries with high levels of pre-modern economic specialization tend to export a larger number of goods (Columns 4-6), tend to export more goods than they import (Columns 7-9), and have a larger share of global GDP (Columns 10-12).

6 Concluding Remarks

This research is the first attempt to identify the deep-rooted historical factors behind pre-modern economic specialization of labor, as well as its persistent effect on comparative economic development. It advances the hypothesis, and establishes empirically that population diversity had a positive effect on the division of labor in pre-modern times, which translated into persistent differences in economic development. To empirically test these hypotheses, this research combines geocoded ethnographic, linguistic and genetic data to construct a novel dataset of measures of population diversity, economic specialization and development for pre-modern societies. In particular, for over 1100 ethnicities, the research constructs novel measures of economic specialization, based on the number of economic activities in which specialization existed in the pre-modern era. Additionally, it constructs various proxies of historical population diversity based on genetic and linguistic data at the ethnic level. This allows the analysis to explore the effects of intra-ethnic diversity (as opposed to country-level inter-ethnic diversity) on economic specialization.

The analysis establishes that pre-modern population diversity is a fundamental driver of the division of labor in pre-modern times. Moreover, it provides evidence that the positive effect of population diversity on economic specialization is reinforced for populations inhabiting diverse geographical environments. Using various robustness checks, the analysis suggests that these findings are not confounding the effect of geographical, cultural or institutional factors, nor other historical processes. Furthermore, the results establish that the economic effect of population diversity is large and more important than alternative potential drivers of the division of labor.

The analysis provides support for the long-held believe in the central role of the division of labor in comparative development. Specifically, it establishes that pre-modern economic specialization was conducive to pre-modern statehood, urbanization and social hierarchy. Furthermore, it demonstrates that higher levels of pre-modern economic specialization are associated with greater skill-biased occupational heterogeneity, economic complexity and economic development in the contemporary era. The analysis suggests a novel channel through which societal characteristics shaped in the past may have a significant and persistent effect on comparative development today. Specifically, it suggests that the beneficial effect of the pre-modern division of labor may have persisted into the contemporary era through its effect on the accumulation of production-specific skills.

[46] This procedure is commonly used in the literature (Gennaioli and Rainer, 2007; Alesina et al., 2013).

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Online Appendix (Not for publication)

Additional Results and Supporting Material

A Population Diversity and Division of Labor: A Structural Model

This section presents a structural econometric model for the analysis of the effect of population diversity on economic specialization. In particular, it shows that if the level of population diversity of various traits has a common factor, then one measure of population diversity can be used as a proxy for *all* these other types of diversity. Additionally, it establishes that if the underlying factor is exogenous for an observable trait's diversity in the estimation of the effect on the division of labor, then it can be used as an instrument for population diversity. Moreover, the instrumental variable estimate of the effect of population diversity in the observed trait on specialization provides a lower bound to the effect of population diversity in all these traits. Finally, it establishes that although this estimated effect provides an unbiased and consistent estimate of the lower bound of the combined effect of *all population diversity*, it cannot identify which specific trait drives this effect.

Assume the structural equation for the relation between economic specialization and population diversity is

$$s_i = \alpha_0 + \sum_{j=1}^{J} \alpha_{1j} d_{ij} + \sum_{k=1}^{K} \alpha_{2k} x_{ik} + \epsilon_i \tag{8}$$

where s_i measures economic specialization, d_{ij} is the level of population diversity in trait $j = 1, \ldots, J$, x_{ik} is the level of geographical characteristic k and ϵ_i is the error term, all for ethnicity i. Additionally, assume that an ethnicity's diversity in trait k is determined by

$$d_{ij} = \beta_{0j} + \beta_{1j} D_i + \sum_{k=1}^{K} \beta_{2jk} x_{ik} + \eta_{ij}. \tag{9}$$

where D_i is the historical migratory distance from an ethnicity's homeland to the ancestral origin, i.e., the distance to the source that generates the serial founder effect (which in the case of this paper is East Africa).

Assumption 1. Let $x_i = (x_{ik})_{k=1}^{K}$ and assume that for all $j = 1, \ldots, J$:

(i) $\alpha_{1j} > 0$ and $\beta_{1j} < 0$,

(ii) $E(\epsilon_i \mid D_i, x_i) = E(\eta_i \mid D_i, x_i) = 0$,

(iii) $E(D_i \epsilon_{ij} \mid x_i) = E(D_i \eta_{ij} \mid x_i) = 0$,

i.e., D_i is exogenous for all measures of diversity.

Additionally, assume that some trait p is observable and so that diversity in p can be measured. Clearly,

Proposition 4. *d_{ip} serves as a proxy for all other measures of diversity.*

Proof. Notice that

$$D_i = \frac{d_{ip}}{\beta_{1p}} - \frac{\beta_{0p} + \sum_{k=1}^{K} \beta_{2pk} x_{ik} + \eta_{ip}}{\beta_{1p}} \tag{10}$$

and for all $j \neq l$,

$$
\begin{aligned}
d_{ij} =& \left(\beta_{0j} - \frac{\beta_{0p}}{\beta_{1l}}\right) + \frac{\beta_{1j}}{\beta_{1p}} d_{ip} + \sum_{k=1}^{K} \left(\beta_{2jk} - \frac{\beta_{2pk}}{\beta_{1p}}\right) x_{ik} + \left(\eta_{ij} - \frac{\eta_{ip}}{\beta_{1p}}\right) \\
=& \gamma_{0j} + \gamma_{1j} d_{ip} + \sum_{k=1}^{K} \gamma_{2jk} x_{ik} + \zeta_{ij},
\end{aligned}
\tag{11}
$$

where $\gamma_{1j} \neq 0$ for all $j \neq p$. □

Notice that this is precisely equation (3). Replacing it into (8), it follows that

$$
\begin{aligned}
s_i =& \left(\alpha_0 + \sum_{j\neq p} \alpha_{1j}\gamma_{0j}\right) + \left(\alpha_{1p} + \sum_{j\neq p} \alpha_{1j}\gamma_{1j}\right) d_{ip} + \sum_{k=1}^{K} \left(\alpha_{2k} + \sum_{j\neq p} \alpha_{1j}\gamma_{2jk}\right) x_{ik} + \left(\epsilon_i + \sum_{j\neq p} \alpha_{1j}\zeta_{ij}\right) \\
=& \delta_0 + \delta_1 d_{ip} + \sum_{k=1}^{K} \delta_{2k} x_{ik} + \varepsilon_i,
\end{aligned}
\tag{12}
$$

which is equation (4).

Proposition 5. *Clearly, for any two proxies* p *and* p'*,*

$$
\frac{\delta_1^p}{\delta_1^{p'}} = \frac{\beta_{1p'}}{\beta_{1p}}, \tag{13}
$$

i.e., the effect of population diversity as proxied by p *is identical to the effect of population diversity as proxied by* p'*, once one accounts for the differential effect of serial effect on both proxies.*

Proof. Since

$$
\delta_1^p = \alpha_{1p} + \sum_{j\neq p} \alpha_{1j}\gamma_{1j}^p, \qquad \delta_1^{p'} = \alpha_{1p'} + \sum_{j\neq p'} \alpha_{1j}\gamma_{1j}^{p'}, \qquad \Longrightarrow \qquad \beta_{1p}\delta_1^p = \beta_{1p'}\delta_1^{p'}.
$$

□

Proposition 6. *If assumption 1 holds,* D_i *is a valid instrumental variable for* d_{ip}*. Thus,* δ_1 *can be consistently estimated.*

Proof. By assumption, $E(D_i\varepsilon_i \mid x_i) = 0$ and $\beta_{1p} \neq 0$. Thus, D_i satisfies both the exogeneity and relevance conditions required for a valid instrument. Additionally, notice that it also satisfies the exclusion restriction, since D_i can only affect s_i via population diversity. □

Finally, notice that

Proposition 7. *If* $\delta_1 > 0$*, then* $\alpha_{1j} > 0$ *for at least one* $j = 1, \ldots, J$*. Moreover, if* $\alpha_{1j} > 0$ *for some* $j = 1, \ldots, J$*, then even if* $\alpha_{1l} = 0$*,* $\delta_1 > 0$*.*

Proof. Follows directly from equation (12). □

Moreover,

Proposition 8. *Assume that* $\beta_{1p} < \beta_{1j}$ *for all* $j = 1, \ldots, J$*. Then,*

$$
\delta_1 = \alpha_{1p} + \sum_{j\neq p} \alpha_{1j}\gamma_{1j} < \sum_{j} \alpha_{1j}, \tag{14}
$$

i.e., δ_1 provides a lower bound to the effect of all types of intergenerationally transmitted population diversity on economic specialization.

Proof. Follows directly from the assumption and the definition of γ_{1j}. □

These results imply that:

(i) Genetic and linguistic diversity can be used as proxies for population diversity of intergenerationally transmitted traits (affected by similar serial founder effects).

(ii) The distance to East Africa is a valid instrument for population diversity. The main concern being the exogeneity assumption $E(D_i \varepsilon_i) = 0$. The results in appendix E show that the reduced form estimates are very stable across specifications, suggesting that this condition may be satisfied in practice. Further supportive evidence in favor of this assumption is provided in Table 9.

(iii) The estimated effect of the proxies of population diversity presented in the body of the paper capture the combined effect of population diversity in all relevant intergenerationally transmitted traits.

(iv) The estimated effect of the proxies of population diversity do not necessarily imply that genetics or language are the fundamental mechanism behind the effect of population diversity on the division of labor.

A.1 Specialization and Development

This section establishes conditions for the identification of the effect of economic specialization on economic development when traditional identifying information is absent. In particular, in order to address potential endogeneity concerns due to reverse causality, the analysis exploits a second instrumental variable strategy based on the method of generated instrumental variables suggested by Lewbel (2012). This strategy exploits second moment conditions in the cross section of ethnicities to identify the structural parameters in the absence of traditional identifying information.

Consider the estimation of the effect of economic specialization s_i on some development outcome y_i, assuming the structural relation is given by

$$y_i = \tilde{\phi}_0 + \tilde{\phi}_1 s_i + \sum_{j=1}^{J} \tilde{\phi}_{2j} d_{ij} + \sum_{k=1}^{K} \tilde{\phi}_{2k} x_{ik} + \theta_i, \tag{15}$$

where $E(\theta_i \mid s_i, d_i, x_i) = 0$. Since d_{ip} can be used as a proxy for the other types of diversity, equation (4) implies that this equation can be rewritten as

$$y_i = \phi_0 + \phi_1 s_i + \phi_2 d_{ip} + \sum_{k=1}^{K} \phi_{2k} x_{ik} + \vartheta_i, \tag{16}$$

where $\tilde{\phi}_1 = \phi_1$. As explained in the main body of the text, traditional identification information for the estimation of the causal effect of specialization on development, ϕ_1, is hard to obtain, since that would require some factor x_{ik} to have only an effect on specialization without affecting development directly, i.e., $\delta_{2k} \neq 0$ in equation (4) and $\phi_{2k} = 0$ in equation (16). Moreover, population diversity may not satisfy a similar condition. Thus, the analysis exploits second moment conditions in the cross section of ethnicities to identify the structural parameter ϕ_1. In particular,

Proposition 9. *Let $x_i = (x_{ik})_{k=1}^{K}$, $\tilde{x}_i = (d_{ip}, x_i)$ and let $z_i = (z_{im})_{m=1}^{M} \subseteq \tilde{x}_i$ be some subset of factors. Assume assumption 1 and the following conditions hold:*

(i) $E(\tilde{x}_i \varepsilon_i^2) \neq 0$,

(ii) $E(\tilde{x}_i \vartheta_i^2) \neq 0$,

(iii) $Cov(z_i, \varepsilon_i \vartheta_i) = 0$.

Then $\tilde{z}_{ik} = (z_{ik} - E(z_{ik}))\varepsilon_i$ *are valid instruments for* s_i *and allow the identification of the causal effect* ϕ_1.

Proof. By assumption, the conditions required for identification in Theorem 1 in Lewbel (2012) are satisfied. Thus, Lewbel (2012) implies the results in this proposition. □

Clearly, as suggested by Lewbel (2012) the first two conditions can be tested using a Breusch-Pagan test for the presence of heteroskedasticity. So, the main requirement for identification is the last condition. Since

$$\varepsilon_i = \epsilon_i + \sum_{j \neq p} \alpha_{1j} \zeta_{ij}, \qquad \vartheta_i = \theta_i + \sum_{j \neq p} \phi_{1j} \zeta_{ij}, \qquad \zeta_{ij} = \eta_{ij} - \frac{\eta_{ip}}{\beta_{1p}},$$

it follows that

$$\varepsilon_i \vartheta_i = \epsilon_i \theta_i + \epsilon_i \sum_{j \neq p} \phi_{1j} \zeta_{ij} + \theta_i \sum_{j \neq p} \alpha_{1j} \zeta_{ij} + \left(\sum_{j \neq p} \alpha_{1j} \zeta_{ij} \right) \left(\sum_{j \neq p} \phi_{1j} \zeta_{ij} \right), \tag{17}$$

and by assumption $E(\varepsilon_i) = E(\vartheta_i) = 0$. Clearly, there are various sufficient conditions for the last condition for identification to hold. Specifically,

Proposition 10. *Assume* $\phi_{1j} = 0$ *for all* $j = 1, \ldots, J$, *i.e. that population diversity has no direct effect on development. Then* $Cov(z_i, \varepsilon_i \theta_i) = 0$ *is sufficient for identification.*

Proof. The result follows directly from equation (17), since $Cov(z_i, \varepsilon_i \vartheta_i) = Cov(z_i, \varepsilon_i \theta_i)$ in this case. □

Importantly,

Proposition 11. *If* ϵ_i, θ_i, *and* η_{ij} *are all independent of each other (conditional on* z_i*), then all conditions for identification are satisfied.*

Proof. Clearly in this case

$$Cov(z_i, \varepsilon_i \vartheta_i) = E(z_i \varepsilon_i \vartheta_i) = E(z_i \varepsilon_i \vartheta_i) = E(z_i \varepsilon_i) E(\vartheta_i) = E(z_i \vartheta_i) E(\varepsilon_i) = 0. \quad \square$$

The sufficient conditions for identification in this proposition would require, in particular, that in the estimation of the effect of specialization on development, no common factors are omitted in the regression. Based on a weaker restriction, one gets the following result:

Proposition 12. *Assume all* η_{ij} *are independent of each other, and are also independent of* ϵ_i *and* θ_i *(conditional on* z_i*). In this case, the last condition for identification is* $Cov(z_i, \epsilon_i \theta_i) = 0$.

Proof. The result follows directly from equation (17), since it implies $Cov(z_i, \varepsilon_i \vartheta_i) = Cov(z_i, \epsilon_i \theta_i)$. □

The assumptions of this proposition seem plausible, since they only require that conditional on z_i, the error terms of the various types of diversity d_{ij} be independent of each other. For example, this may hold if the diversity in these traits only have $\tilde{x}_i$ as their common determinant. Furthermore,

Proposition 13. *Additionally assume that*

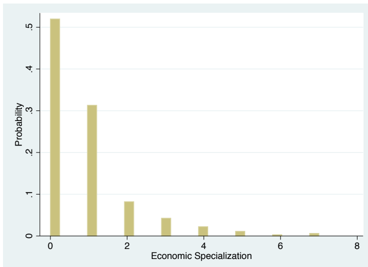
$$\epsilon_i = \rho_1 \mu_i + \nu_i^\epsilon \qquad \text{and} \qquad \theta_i = \rho_2 \mu_i + \nu_i^\theta, \tag{18}$$

where μ_i *is some common (omitted) factor that determines both specialization* s_i *and development* y_i*, and* ν_i^ϵ *and* ν_i^θ *are independent idiosyncratic errors. If the common factor is homoskedastic then the model is identified.*

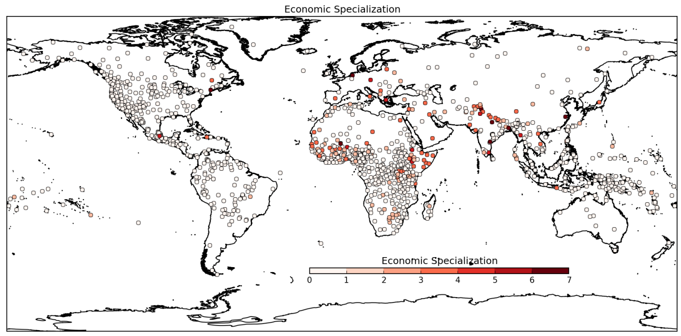
Proof. From the previous proposition, in this case $Cov(z_i, \varepsilon_i \vartheta_i) = Cov(z_i, \epsilon_i \theta_i)$. By assumption,

$$Cov(z_i, \epsilon_i \theta_i) = Cov(z_i, \rho_1 \rho_2 \mu_i^2 + \rho_1 \mu_i \nu_i^\theta + \rho_2 \mu_i \nu_i^\epsilon + \nu_i^\epsilon \nu_i^\theta) = \rho_1 \rho_2 Cov(z_i, \mu_i^2) = 0. \qquad \square$$

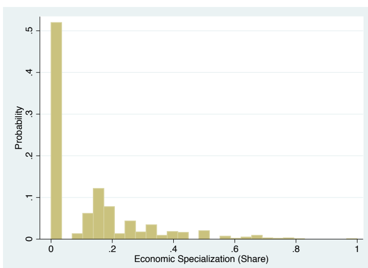
B Summary Statistics



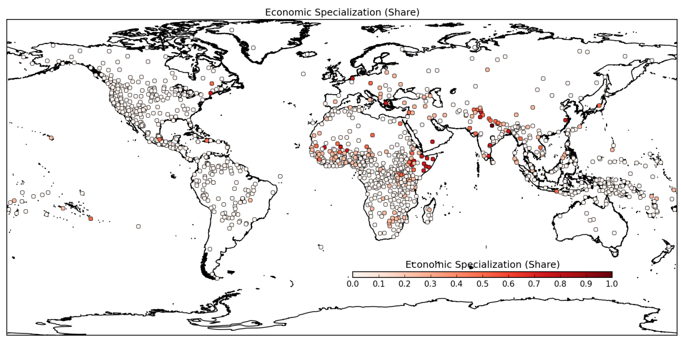
(a) Number of specialized activities (s_e^1)



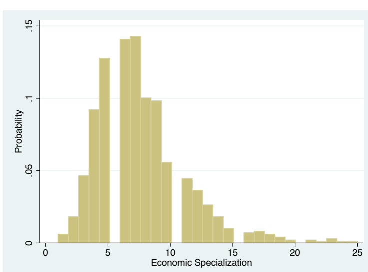
(b) Number of specialized activities (s_e^1)



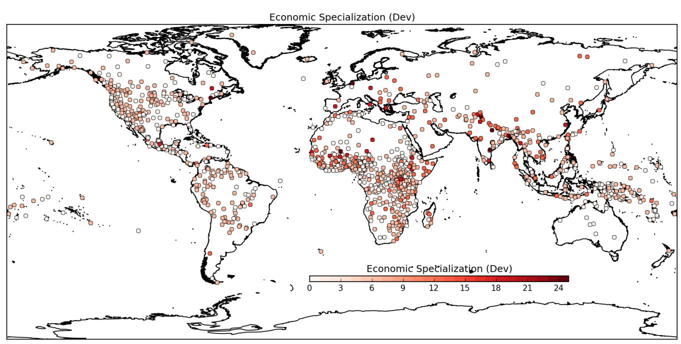
(c) Share of activities that are specialized (s_e^2)



(d) Share of activities that are specialized (s_e^2)



(e) Score of economic specialization (s_e^3)



(f) Score of economic specialization (s_e^3)

Figure B.1: Distribution of Economic Specialization Measures

Table B.1: Summary Statistics on Base Sample

	Mean	Std	Min	Max	N
Economic Specialization	1.34	(1.41)	0.00	7.00	116
Economic Specialization (Share)	0.20	(0.19)	0.00	0.80	116
Economic Specialization (Dev)	9.02	(3.96)	2.00	25.00	116
Population Diversity	0.70	(0.05)	0.47	0.76	116
Absolute Latitude	15.95	(15.22)	0.04	68.67	116
Area	0.18	(0.85)	0.00	8.97	116
Elevation (Avg.)	823.71	(727.51)	27.79	3581.35	116
Precipitation (Avg.)	91.00	(57.54)	11.77	334.73	116
Temperature (Avg.)	20.69	(8.43)	-13.44	28.27	116
Malaria Ecology	7.88	(9.07)	0.00	29.36	116
Ecological Diversity	0.26	(0.22)	0.00	0.67	116
Agricultural Suitability (avg.)	0.76	(0.33)	0.00	1.00	116
Agricultural Suitability (std.)	0.08	(0.11)	0.00	0.45	116
Caloric Suitability Index (Pre-1500CE)	2699.11	(1040.20)	0.00	5030.97	116
Caloric Suitability (Pre-1500 ,std.)	418.27	(360.47)	0.00	1520.41	116
Temperature (Spatial Corr., Avg.)	0.93	(0.17)	0.00	1.00	116
Temperature (Volatility, Avg)	0.84	(0.48)	0.27	2.87	116
Pct. Area within 100 kms of Sea	0.19	(0.33)	0.00	1.00	116
Coast Length	0.49	(2.16)	0.00	19.65	116
Ruggedness (Avg.)	110.62	(149.48)	1.27	1076.01	116
Pre-Industrial Mobility (avg.)	0.27	(0.06)	0.07	0.37	116
Pre-Industrial Mobility (std.)	0.05	(0.04)	0.01	0.25	116

Table B.2: Summary Statistics on Full Sample

	Mean	Std	Min	Max	N
Economic Specialization	0.85	(1.20)	0.00	7.00	934
Economic Specialization (Share)	0.13	(0.17)	0.00	1.00	934
Economic Specialization (Dev)	7.74	(3.59)	1.00	25.00	934
Predicted Population Diversity	0.68	(0.05)	0.54	0.76	934
Absolute Latitude	20.77	(16.59)	0.02	71.22	934
Area	0.07	(0.37)	0.00	8.97	934
Elevation (Avg.)	755.14	(676.82)	1.06	4417.96	934
Precipitation (Avg.)	105.83	(71.13)	0.00	499.24	934
Temperature (Avg.)	19.09	(8.60)	-15.31	29.58	934
Malaria Ecology	5.58	(8.05)	0.00	33.95	934
Ecological Diversity	0.19	(0.21)	0.00	0.82	934
Agricultural Suitability (avg.)	0.76	(0.34)	0.00	1.00	934
Agricultural Suitability (std.)	0.07	(0.10)	0.00	0.47	934
Caloric Suitability Index (Pre-1500CE)	2673.34	(1282.61)	0.00	6955.56	934
Caloric Suitability (Pre-1500 ,std.)	362.60	(333.18)	0.00	2436.89	934
Temperature (Spatial Corr., Avg.)	0.86	(0.28)	0.00	1.00	934
Temperature (Volatility, Avg)	0.98	(0.57)	0.00	3.08	934
Pct. Area within 100 kms of Sea	0.30	(0.41)	0.00	1.00	934
Coast Length	0.34	(2.97)	0.00	81.92	934
Ruggedness (Avg.)	137.45	(160.05)	0.05	1137.67	934
Pre-Industrial Mobility (avg.)	0.27	(0.07)	0.06	0.47	934
Pre-Industrial Mobility (std.)	0.06	(0.05)	0.00	0.27	934

C Relation between Economic Specialization and Other Exchange Related Measures

Table C.1: Correlation of Economic Specialization and Trade Measures

	Economic Specialization and Trade Measures									
	Economic Specialization	Economic Specialization (Share)	Economic Specialization (Dev)	Importance of Trade	Intercommunity Trade as Food Source	Money	Credit Source	Writing and Records	Technological Specialization	Complexity
Pre-modern Economic Specialization	1.00									
Pre-modern Economic Specialization (Share)	0.94***	1.00								
Pre-modern Economic Specialization (Dev)	0.87***	0.74***	1.00							
Importance of Trade	0.20***	0.19**	0.13*	1.00						
Intercommunity Trade as Food Source	0.32***	0.32***	0.25***	0.77***	1.00					
Money	0.35***	0.38***	0.30***	0.29***	0.43***	1.00				
Credit Source	0.25***	0.21***	0.26***	0.28***	0.31***	0.35***	1.00			
Writing and Records	0.55***	0.55***	0.47***	0.24***	0.31***	0.38***	0.38***	1.00		
Technological Specialization	0.60***	0.58***	0.67***	0.18**	0.28***	0.37***	0.26***	0.49***	1.00	
Complexity	0.61***	0.59***	0.63***	0.27***	0.36***	0.55***	0.39***	0.70***	0.73***	1.00

Notes: This Table shows the pairwise correlation between different measures of economic specialization and measures related to economic exchange and technologies that facilitate it; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table C.2: Pre-modern Economic Specialization and Other Intra-Community Trade Related Outcomes

	Pre-Industrial Measures of Trade				
	Importance of Trade	Intercommunity Trade as Food Source	Money	Credit	Writing and Records
	(1)	(2)	(3)	(4)	(5)
Pre-modern Economic Specialization	0.16*	0.22***	0.22**	0.49***	0.51***
	(0.09)	(0.07)	(0.09)	(0.08)	(0.07)
Main Controls	Yes	Yes	Yes	Yes	Yes
All Additonal Controls	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.07	0.22	0.19	0.29	0.49
Observations	177	174	174	162	177

Notes: This Table establishes the positive economically and statistically positive association between pre-modern economic specialization and other pre-modern intre-community trade related outcomes at the ethnic level. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table C.3: Pre-modern Economic Specialization (Share) and Other Intra-Community Trade Related Outcomes

	Pre-Industrial Measures of Trade				
	Importance of Trade	Intercommunity Trade as Food Source	Money	Credit	Writing and Records
	(1)	(2)	(3)	(4)	(5)
Pre-Modern Economic Specialization (Share)	0.15*	0.24***	0.28***	0.49***	0.54***
	(0.09)	(0.07)	(0.08)	(0.08)	(0.07)
Main Controls	Yes	Yes	Yes	Yes	Yes
All Additonal Controls	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.07	0.23	0.21	0.28	0.51
Observations	177	174	174	162	177

Notes: This Table establishes the positive economically and statistically positive association between pre-modern economic specialization and other pre-modern intra-community trade related outcomes at the ethnic level. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table C.4: Pre-modern Economic Specialization (Dev) and Other Intra-Community Trade Related Outcomes

	Pre-Industrial Measures of Trade				
	Importance of Trade	Intercommunity Trade as Food Source	Money	Credit	Writing and Records
	(1)	(2)	(3)	(4)	(5)
Pre-Modern Economic Specialization (Dev)	0.06	0.15*	0.17**	0.38***	0.38***
	(0.09)	(0.08)	(0.09)	(0.07)	(0.06)
Main Controls	Yes	Yes	Yes	Yes	Yes
All Additonal Controls	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.06	0.20	0.18	0.25	0.43
Observations	177	174	174	162	177

Notes: This Table establishes the positive economically and statistically positive association between pre-modern economic specialization and other pre-modern intra-community trade related outcomes at the ethnic level. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

D Robustness

D.1 Robustness to Continental Fixed Effects

Table D.1: Predicted Population Diversity and Economic Specialization
(Robustness to Continental Fixed Effects)

	Economic Specialization									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Predicted Population Diversity	0.73***	0.57***	0.58***	0.51***	0.51***	0.53***	0.59***	0.55***	0.57***	0.58***
	(0.15)	(0.15)	(0.15)	(0.15)	(0.16)	(0.16)	(0.15)	(0.15)	(0.15)	(0.17)
Malaria Ecology			-0.13***							-0.09*
			(0.05)							(0.05)
Ecological Diversity				0.12***						0.09***
				(0.03)						(0.03)
Agricultural					-0.07*					-0.16***
Suitability (avg.)					(0.04)					(0.04)
Agricultural					0.04					0.01
Suitability (std.)					(0.05)					(0.05)
Caloric Suitability						0.06*				0.11***
Index (Pre-1500CE)						(0.03)				(0.03)
Caloric Suitability						0.08*				0.07
(Pre-1500 ,std.)						(0.04)				(0.05)
Temperature (Spatial							0.01			0.03
Corr., Avg.)							(0.03)			(0.04)
Temperature							-0.25***			-0.14*
(Volatility, Avg)							(0.06)			(0.08)
Pct. Area within								0.05		-0.02
100kms of Sea								(0.03)		(0.04)
Coast Length								0.01		0.01
								(0.03)		(0.03)
Ruggedness (Avg.)									0.10	0.08
									(0.06)	(0.07)
Pre-Industrial									0.15	0.28**
Mobility (avg.)									(0.10)	(0.11)
Pre-Industrial									-0.04	-0.14*
Mobility (std.)									(0.08)	(0.08)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.26	0.29	0.29	0.30	0.29	0.29	0.29	0.29	0.29	0.32
Observations	934	934	934	934	934	934	934	934	934	934

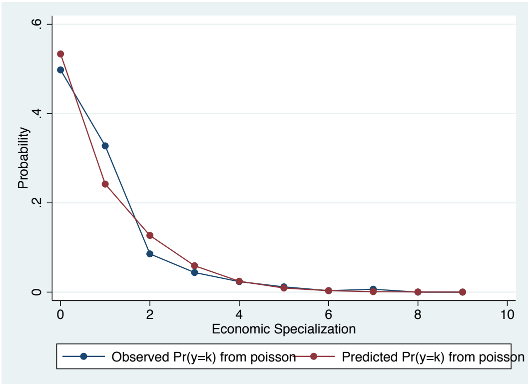
Notes: This Table establishes the robustness of the results in 7 to the inclusion of continental fixed effets. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

D.2 Robustness to Empirical Specification

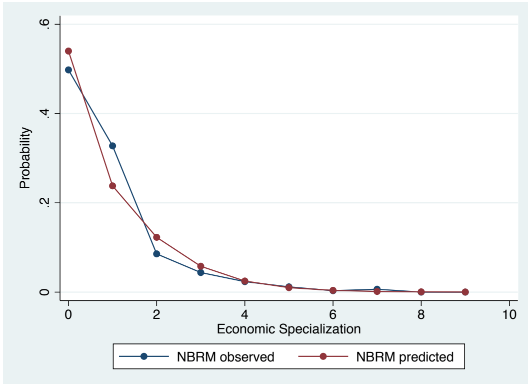
Table D.2: Predicted Population Diversity and Economic Specialization
Robustness to Estimation Method

	Economic Specialization			
	Poisson	Negative Binomial	Zero-inflated Poisson	Zero-inflated Negative Binomial
	(1)	(2)	(3)	(4)
	Panel A: Economic Specialization			
Predicted Population Diversity	0.59***	0.59***	0.62***	0.62***
	(0.22)	(0.23)	(0.22)	(0.23)
	Panel B: Probability Economic Specialization is always equal to Zero			
Predicted Population Diversity			-10.54**	-10.69**
			(4.72)	(4.91)
Continental FE	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes
Additonal Controls	Yes	Yes	Yes	Yes
Pseudo-R^2	0.25	0.21		
Observations	934	934	934	934
α		0.05		0.04
Log-likelihood	-932.93	-932.07	-911.76	-911.08
BIC	2043.70	2048.81	2049.23	2054.70
AIC	1917.87	1918.14	1889.53	1890.16

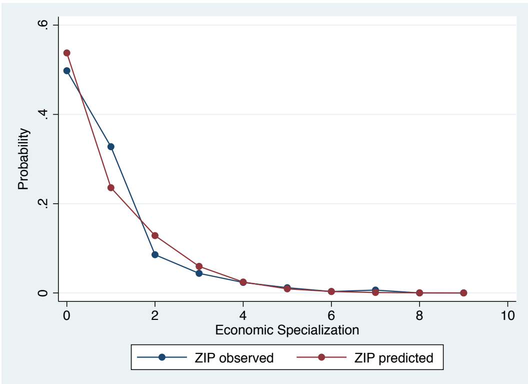
Notes: This Table establishes the robustness of the results to estimation method. In particular, the results employ estimation method better suited for count variables. Column 1 shows the results of a Poisson regression, column 2 of a Negative-Binomial, and columns 3 and 4 the results of zero-inflated Poisson and Negative Binomial regressions respectively. Panel A establishes the positive effect of predicted population on economic specialization (conditional on having economic specialization). Additionally, Panel B establishes the negative effect of population diversity on the probability of not having any economic specialization. Coefficients show effect of increasing predicted population diversity by 1 standard deviation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.



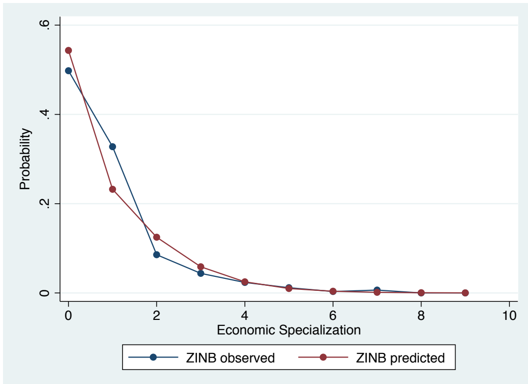
(a) Poisson



(b) Negative Binomial



(c) Zero-Inflated Poisson



(d) Zero-Inflated Negative Binomial

Figure D.1: Robustness to Estimation Method
Observed and Predicted Probabilities in Count Regressions

Table D.3: Predicted Population Diversity and Economic Specialization
Robustness to Estimation Method (Shares)

	Economic Specialization (Share)		
	Fractional Regression		
	Logit	Probit	Zero-inflated Beta
	(1)	(2)	(3)
			Panel A: Economic Specialization
Predicted Population Diversity	0.88***	0.49***	0.42*
	(0.28)	(0.15)	(0.22)
Std-β	0.09***	0.09***	0.11***
	(0.03)	(0.03)	(0.02)
	Panel B: Probability Economic Specialization is always equal to Zero		
Predicted Population Diversity			-1.85***
			(0.19)
Continental FE	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes
Additonal Controls	Yes	Yes	Yes
Observations	934	934	934
Log-likelihood	-303.26	-303.19	-68.34
BIC	784.36	784.20	369.22
AIC	658.53	658.37	204.68

Notes: This Table establishes the robustness of the results to estimation method. In particular, the results employ estimation method better suited for fractional outcome variables. Column 1 shows the results of a fractional Logit regression, column 2 of a fractional Probit regression, and columns 3 the results of a Beta regression. Panel A establishes the positive effect of predicted population on economic specialization (conditional on having economic specialization). Additionally, Panel B establishes the negative effect of population diversity on the probability of not having any economic specialization. Coefficients show effect of increasing predicted population diversity by 1 standard deviation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

D.3 Robustness to Clustering and Spatial-Autocorrelation

Table D.4: Expected Heterozygosity and Economic Specialization

	Economic Specialization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Expected	0.27***	0.31***	0.27***	0.27***	0.25**	0.27***	0.36**
Heterozygosity	(0.05)	(0.09)	(0.09)	(0.09)	(0.10)	(0.09)	(0.14)
Absolute Latitude		0.15					0.80
		(0.13)					(0.47)
Area			0.01				0.01
			(0.05)				(0.06)
Elevation (Avg.)				-0.03			0.31*
				(0.07)			(0.17)
Precipitation (Avg.)					-0.08		0.13
					(0.07)		(0.21)
Temperature (Avg.)						0.04	0.73*
						(0.08)	(0.37)
Adjusted-R^2	0.07	0.08	0.06	0.06	0.06	0.06	0.15
Observations	116	116	116	116	116	116	116

Notes: This Table establishes the robustness of the OLS results in Table 1 to correlation in the error term within a language phylum level. Standardized coefficients. Heteroskedasticity robust standard error estimates clustered at the language phylum level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table D.5: Population Diversity and Economic Specialization
(Robustness to Clustering and Spatial Auto-Correlation)

	Economic Specialization								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Population Diversity	0.36***	0.41***	0.36***	0.37***	0.34***	0.33***	0.31***	0.40***	0.31***
	(0.09)	(0.10)	(0.10)	(0.09)	(0.11)	(0.10)	(0.09)	(0.11)	(0.10)
	([0.14])	([0.14])	([0.15])	([0.13])	([0.16])	([0.15])	([0.13])	([0.16])	([0.12])
	[0.11]	[0.10]	[0.11]	[0.10]	[0.12]	[0.11]	[0.10]	[0.12]	[0.09]
	{0.10}	{0.10}	{0.09}	{0.10}	{0.10}	{0.10}	{0.10}	{0.10}	{0.09}
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.15	0.22	0.21	0.17	0.18	0.18	0.20	0.17	0.40
Observations	116	116	116	116	116	116	116	116	116

Notes: This Table establishes the robustness of the OLS results to clustering by language phylum and spatial auto-correlation. The additional controls in each column are the ones of the same column in Table 2. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses, clustered at the language phylum in parenthesis and squared brackets, spatial auto-correlation corrected standard errors (Conley, 1999) in squared brackets and Cliff-Ord ML in curly brackets. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table D.6: Population Diversity and Distance to East Africa
(Robustness to Clustering and Spatial Auto-Correlation)

	Population Diversity								
	Full Sample								Specialization
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-Industrial	-0.85***	-0.80***	-0.80***	-0.81***	-0.80***	-0.79***	-0.80***	-0.82***	-0.85***
Distance	(0.07)	(0.10)	(0.09)	(0.09)	(0.10)	(0.10)	(0.10)	(0.09)	(0.09)
to East Africa	([0.09])	([0.12])	([0.11])	([0.11])	([0.13])	([0.12])	([0.12])	([0.10])	([0.10])
	[0.08]	[0.10]	[0.10]	[0.09]	[0.11]	[0.11]	[0.10]	[0.08]	[0.08]
	{0.04}	{0.05}	{0.05}	{0.05}	{0.06}	{0.06}	{0.06}	{0.06}	{0.10}
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.72	0.72	0.74	0.72	0.72	0.72	0.73	0.75	0.73
R^2	0.72	0.74	0.75	0.74	0.74	0.74	0.75	0.78	0.76
Observations	144	144	144	144	144	144	144	144	116

Notes: This Table establishes the robustness of the negative effect of the migratory distance on population diversity to clustering by language phylum and spatial auto-correlation. The additional controls in each column are the ones of the same column in Table 3. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses, clustered at the language phylum in parenthesis and squared brackets, spatial auto-correlation corrected standard errors (Conley, 1999) in squared brackets and Cliff-Ord ML in curly brackets. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table D.7: Population Diversity and Economic Specialization (Reduced Form)
(Robustness to Clustering and Spatial Auto-Correlation)

	Economic Specialization								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-Industrial	-0.41***	-0.43***	-0.44***	-0.45***	-0.37***	-0.40***	-0.36***	-0.46***	-0.39***
Distance to Addis	(0.10)	(0.10)	(0.10)	(0.09)	(0.12)	(0.10)	(0.09)	(0.11)	(0.13)
Ababa	([0.12])	([0.13])	([0.12])	([0.11])	([0.15])	([0.13])	([0.11])	([0.15])	([0.15])
	[0.09]	[0.10]	[0.10]	[0.09]	[0.11]	[0.10]	[0.09]	[0.10]	[0.10]
	{0.10}	{0.10}	{0.10}	{0.10}	{0.11}	{0.10}	{0.10}	{0.10}	{0.10}
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.17	0.23	0.25	0.21	0.19	0.21	0.22	0.19	0.42
Observations	116	116	116	116	116	116	116	116	116

Notes: This Table establishes the robustness of the OLS results to clustering by language phylum and spatial auto-correlation. The additional controls in each column are the ones of the same column in Table E.1. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses, clustered at the language phylum in parenthesis and squared brackets, spatial auto-correlation corrected standard errors (Conley, 1999) in squared brackets and Cliff-Ord ML in curly brackets. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table D.8: Population Diversity and Economic Specialization (Reduced Form)
(Robustness to Clustering and Spatial Auto-Correlation)

	Economic Specialization										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Pre-Industrial	-0.45***	-0.42***	-0.45***	-0.42***	-0.41***	-0.45***	-0.40***	-0.42***	-0.42***	-0.47***	-0.36***
Distance to	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.10)
East Africa	([0.08])	([0.08])	([0.09])	([0.07])	([0.07])	([0.09])	([0.07])	([0.08])	([0.08])	([0.09])	([0.20])
	[0.07]	[0.06]	[0.06]	[0.06]	[0.06]	[0.07]	[0.06]	[0.06]	[0.06]	[0.06]	[0.18]
	{0.03}	{0.03}	{0.03}	{0.03}	{0.03}	{0.03}	{0.03}	{0.03}	{0.03}	{0.03}	{0.09}
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	-	-	Malaria	Eco. Div.	Agr. Suit.	CSI	Volatility	Sea	Mobility	All	All
Continental FE	No	No	No	No	No	No	No	No	No	No	Yes
Adjusted-R^2	0.20	0.22	0.23	0.24	0.24	0.24	0.24	0.22	0.23	0.29	0.32
Observations	932	932	932	932	932	932	932	932	932	932	932

Notes: This Table establishes the robustness of the OLS results to clustering by language phylum and spatial auto-correlation. The additional controls in each column are the ones of the same column in Table E.1. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses, clustered at the language phylum in parenthesis and squared brackets, spatial auto-correlation corrected standard errors (Conley, 1999) in squared brackets and Cliff-Ord ML in curly brackets. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

D.4 Robustness to Measure of Economic Specialization

Table D.9: Population Diversity and Economic Specialization: Robustness to Specialization Measure

	Economic Specialization Measures					
	Count		Share		Score	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Population Diversity	0.27***	0.46***	0.33***	0.37***	0.13**	0.31**
	(0.05)	(0.14)	(0.05)	(0.12)	(0.06)	(0.14)
Main Controls	No	Yes	No	Yes	No	Yes
All Additional Controls	No	Yes	No	Yes	No	Yes
First-stage F-statistic		81.54		81.54		81.54
R^2	0.08	0.49	0.11	0.49	0.02	0.46
Adjusted-R^2	0.07	0.39	0.10	0.39	0.01	0.35
Observations	116	116	116	116	116	116

Notes: This Table establishes the robustness of the OLS and IV main results in Tables 1 and 5 to the election of the specialization measure. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table D.10: Population Diversity and Specialization Measures

	Economic Specialization Measures								
	Count			Share			Score		
	OLS	IV	Full	OLS	IV	Full	OLS	IV	Full
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Population Diversity	0.27***	0.46***	0.59***	0.33***	0.37***	0.73***	0.13**	0.31**	0.41**
	(0.05)	(0.14)	(0.21)	(0.05)	(0.12)	(0.17)	(0.06)	(0.14)	(0.18)
Main Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
All Additional Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Continental FE	No	No	Yes	No	No	Yes	No	No	Yes
First-stage F-statistic		81.54			81.54			81.54	
R^2	0.08	0.49	0.34	0.11	0.49	0.40	0.02	0.46	0.25
Adjusted-R^2	0.07	0.39	0.32	0.10	0.39	0.39	0.01	0.35	0.23
Observations	116	116	934	116	116	934	116	116	934

Notes: This table establishes the positive statistically and economically significant effect of population diversity as predicted by the distance to East Africa (see section 4.2) on various measures of economic specialization. These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Standardized coefficients. Bootstrapped standard error estimates in parenthesis; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

D.5 Robustness to Network Centrality

Table D.11: Predicted Population Diversity, Economic Specialization and Network Centrality

	Economic Specialization						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Predicted Population Diversity	0.36**	0.36**	0.36**	0.36**	0.36**	0.36**	0.36**
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
Betweeness Network Centrality	0.04*						
	(0.02)						
Closeness Network Centrality		0.01					
		(0.05)					
Closeness Vitality Network Centrality			0.04*				
			(0.02)				
Degree Network Centrality				-0.00			
				(0.02)			
Eigenvalue Network Centrality					-0.01		
					(0.01)		
Katz Network Centrality						-0.01	
						(0.01)	
Load Network Centrality							0.04*
							(0.02)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Language Family FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Observations	932	932	932	932	932	932	932

Notes: This table establishes the robustness of the positive statistically and economically significant effect of population diversity on economic specialization to measures of an etnicity's network centrality. The network of ethnicities is the minimum spanning tree of the network that connects all ethnic groups by their minimum travel time paths. All columns account for the set of basic geographical controls of Table 1, the extended set of confounders from Table 2, and language phylum fixed effects. Standardized coefficients. Heteroskedasticity robust standard error estimates clustered at the language phylum level are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

E Reduced Form Analysis: Distance to East Africa and Economic Specialization

Table E.1: Population Diversity and Economic Specialization (Reduced Form)

	Economic Specialization								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-Industrial	-0.41***	-0.43***	-0.44***	-0.45***	-0.37***	-0.40***	-0.36***	-0.46***	-0.39***
Distance to East Africa	(0.10)	(0.10)	(0.10)	(0.09)	(0.12)	(0.10)	(0.09)	(0.11)	(0.13)
Malaria Ecology		-0.31***							-0.34***
		(0.12)							(0.11)
Ecological Diversity			0.30***						0.23**
			(0.10)						(0.10)
Agricultural				0.00					0.06
Suitability (avg.)				(0.13)					(0.10)
Agricultural				0.28**					0.36**
Suitability (std.)				(0.13)					(0.14)
Caloric Suitability					-0.18				-0.23
(Pre-1500 ,avg.)					(0.15)				(0.15)
Caloric Suitability					0.25**				-0.01
(Pre-1500 ,std.)					(0.12)				(0.15)
Temperature (Spatial						0.04			-0.01
Corr., Avg.)						(0.10)			(0.07)
Temperature						-0.64***			-0.21
(Volatility, Avg)						(0.20)			(0.20)
Pct. Area within							0.02		-0.12
100kms of Sea							(0.10)		(0.11)
Coast Length							0.47**		0.59***
							(0.21)		(0.18)
Ruggedness (Avg.)								-0.32	-0.05
								(0.23)	(0.19)
Pre-Industrial								0.93**	1.15**
Mobility (avg.)								(0.42)	(0.49)
Pre-Industrial								-0.08	-0.36**
Mobility (std.)								(0.13)	(0.16)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.17	0.23	0.25	0.21	0.19	0.21	0.22	0.19	0.42
Observations	116	116	116	116	116	116	116	116	116

Notes: This table shows the point estimates of the reduced form economic specialization-distance to East Africa for all the specifications in the reduced sample. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.2: Distance to East Africa and Economic Specialization

	Economic Specialization										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Pre-Industrial Dist.	-0.45***	-0.42***	-0.45***	-0.42***	-0.41***	-0.45***	-0.40***	-0.42***	-0.42***	-0.47***	-0.36***
to East Africa	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.10)
Malaria Ecology			-0.10**							-0.07	-0.06
			(0.04)							(0.05)	(0.05)
Ecological Diversity				0.15***						0.10***	0.09***
				(0.03)						(0.03)	(0.03)
Agricultural					-0.05					-0.17***	-0.14***
Suitability (avg.)					(0.04)					(0.04)	(0.04)
Agricultural					0.13***					0.09**	0.07
Suitability (std.)					(0.04)					(0.04)	(0.04)
Caloric Suitability						0.09***				0.15***	0.11***
Index (Pre-1500CE)						(0.03)				(0.03)	(0.03)
Caloric Suitability						0.08*				0.06	0.07
(Pre-1500 ,std.)						(0.05)				(0.05)	(0.05)
Temperature (Spatial							0.02			0.02	0.03
Corr., Avg.)							(0.02)			(0.04)	(0.04)
Temperature							-0.32***			-0.23***	-0.14*
(Volatility, Avg)							(0.06)			(0.07)	(0.08)
Pct. Area within								0.02		-0.05	0.01
100kms of Sea								(0.03)		(0.04)	(0.04)
Coast Length								0.04		0.04	0.04
								(0.04)		(0.04)	(0.03)
Ruggedness (Avg.)									0.12*	0.05	0.05
									(0.07)	(0.07)	(0.07)
Pre-Industrial									0.27***	0.41***	0.28**
Mobility (avg.)									(0.10)	(0.11)	(0.11)
Pre-Industrial									-0.12	-0.21***	-0.14*
Mobility (std.)									(0.08)	(0.08)	(0.08)
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continental FE	No	No	No	No	No	No	No	No	No	No	Yes
Adjusted-R^2	0.20	0.22	0.23	0.24	0.24	0.24	0.24	0.22	0.23	0.29	0.32
Observations	934	934	934	934	934	934	934	934	934	934	934

Notes: This table shows the point estimates of the reduced form economic specialization-distance to East Africa for all the specifications in the extended sample. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.3: Distance to East Africa and Economic Specialization

	Economic Specialization									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pre-Industrial Distance	-0.48***	-0.37***	-0.33***	-0.35***	-0.36***	-0.36***	-0.40***	-0.39***	-0.36***	-0.36***
to East Africa	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)	(0.10)	(0.10)	(0.11)	(0.10)
Malaria Ecology			-0.09*							-0.06
			(0.05)							(0.05)
Ecological Diversity				0.13***						0.09***
				(0.03)						(0.03)
Agricultural					-0.05					-0.14***
Suitability (avg.)					(0.04)					(0.04)
Agricultural					0.10**					0.07
Suitability (std.)					(0.04)					(0.04)
Caloric Suitability						0.05*				0.11***
Index (Pre-1500CE)						(0.03)				(0.03)
Caloric Suitability						0.09**				0.07
(Pre-1500 ,std.)						(0.04)				(0.05)
Temperature (Spatial							0.00			0.03
Corr., Avg.)							(0.03)			(0.04)
Temperature							-0.25***			-0.14*
(Volatility, Avg)							(0.06)			(0.08)
Pct. Area within								0.06**		0.01
100kms of Sea								(0.03)		(0.04)
Coast Length								0.04		0.04
								(0.03)		(0.03)
Ruggedness (Avg.)									0.10	0.05
									(0.06)	(0.07)
Pre-Industrial									0.16	0.28**
Mobility (avg.)									(0.11)	(0.11)
Pre-Industrial									-0.06	-0.14*
Mobility (std.)									(0.08)	(0.08)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.26	0.28	0.29	0.30	0.29	0.29	0.29	0.29	0.29	0.32
Observations	934	934	934	934	934	934	934	934	934	934

Notes: This table shows the point estimates of the reduced form economic specialization-distance to East Africa for all the specifications in the extended sample when accounting for continental fixed effects. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.4: Heterogeneous Effects of Distance to East Africa on Economic Specialization

	Economic Specialization					
	(1)	(2)	(3)	(4)	(5)	(6)
Pre-Industrial Distance	-0.07***	-0.05***	-0.06***	-0.02**	-0.05***	-0.05***
to East Africa	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)
Ecological Diversity		1.55***				
		(0.32)				
Pre-Industrial Distance to East Africa		-0.07***				
× Ecological Diversity		(0.02)				
Agricultural			3.84***			
Suitability (std.)			(0.91)			
Pre-Industrial Distance to East Africa			-0.24***			
× Agricultural Suitability (std.)			(0.07)			
Temperature				-0.01		
(Volatility, Avg)				(0.20)		
Pre-Industrial Distance to East Africa				-0.05***		
× Temperature (Volatility, Avg)				(0.01)		
Ruggedness (Avg.)					0.00***	
					(0.00)	
Pre-Industrial Distance to East Africa					-0.00***	
× Ruggedness (Avg.)					(0.00)	
Pre-Industrial						6.93***
Mobility (std.)						(1.99)
Pre-Industrial Distance to East Africa						-0.44***
× Pre-Industrial Mobility (std.)						(0.14)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.22	0.25	0.25	0.25	0.26	0.24
Observations	934	934	934	934	934	934

Notes: This table shows the point estimates of the reduced form economic specialization-distance to East Africa for all the specifications in the extended sample when accounting for complementarity with heterogeneous environments. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.5: Distance to East Africa, Pre-Industrial Development, and Economic Specialization

	Economic Specialization					
	Full Sample				Community Size Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Pre-Industrial Distance to East Africa	-0.42***	-0.44***	-0.35***	-0.43***	-0.41***	-0.28***
	(0.03)	(0.06)	(0.02)	(0.03)	(0.03)	(0.03)
Origtime		-0.03				
		(0.07)				
Years Since Neolithic Revolution			0.27***			
			(0.04)			
Population Density (1500CE)				0.11***		
				(0.04)		
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
Community Size FE	No	No	No	No	No	Yes
Adjusted-R^2	0.22	0.22	0.29	0.24	0.22	0.47
Observations	938	927	926	913	512	512

Notes: This table shows the point estimates of the reduced form economic specialization-distance to East Africa for all the specifications in the extended sample when accounting for other historical confounders and fixed effects at the community size level. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table E.6: Distance to East Africa, Pre-Industrial Development, and Economic Specialization

	Economic Specialization					
	Full Sample				Community Size Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Pre-Industrial Distance to East Africa	-0.42***	-0.44***	-0.35***	-0.43***	-0.41***	-0.27***
	(0.03)	(0.06)	(0.02)	(0.03)	(0.03)	(0.03)
Origtime		-0.03				
		(0.07)				
Years Since Neolithic Revolution			0.27***			
			(0.04)			
Population Density (1500CE)				0.11***		
				(0.04)		
Mean Size of Local Communities						0.45***
						(0.05)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.22	0.22	0.29	0.24	0.22	0.39
Observations	938	927	926	913	512	512

Notes: This table shows the point estimates of the reduced form economic specialization-distance to East Africa for all the specifications in the extended sample when accounting for other historical confounders and a community size indicator. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

F Linguistic Diversity and Economic Specialization

This section explores the relation between economic specialization and another proxy of population diversity, as measured by linguistic diversity. In this paper linguistic diversity refers to a language's diversity in terms of number of genders, consonant inventory, and vowel quality inventory (Dryer, 2013) and not to the number of languages in a location, i.e., in captures diversity *within* a population and *not across* populations.

Table F.1: Linguistic Diversity and Distance to East Africa

	Linguistic Diversity								
	Full Sample								Speciali-zation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Panel A: Linguistic Diversity (Consonant Inventory)								
Pre-Industrial Distance	-0.42***	-0.36***	-0.35***	-0.35***	-0.36***	-0.36***	-0.38***	-0.37***	-0.37***
to East Africa	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.07)
Adjusted-R^2	0.17	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27
R^2	0.17	0.27	0.27	0.28	0.28	0.28	0.28	0.31	0.31
Observations	299	299	299	299	299	299	299	299	254
	Panel B: Linguistic Diversity (Vowel Quality Inventory)								
Pre-Industrial Distance	-0.29***	-0.32***	-0.27***	-0.32***	-0.34***	-0.34***	-0.36***	-0.31***	-0.33***
to East Africa	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)
Adjusted-R^2	0.08	0.14	0.17	0.14	0.15	0.16	0.15	0.19	0.22
R^2	0.09	0.16	0.19	0.16	0.17	0.19	0.18	0.23	0.27
Observations	301	301	301	301	301	301	301	301	255
	Panel C: Linguistic Diversity (Number of Genders)								
Pre-Industrial Distance	-0.25***	-0.25***	-0.23***	-0.26***	-0.27***	-0.25***	-0.31***	-0.30***	-0.33***
to East Africa	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.08)	(0.09)	(0.08)
Adjusted-R^2	0.06	0.17	0.17	0.18	0.18	0.16	0.19	0.20	0.23
R^2	0.06	0.20	0.21	0.22	0.23	0.20	0.23	0.28	0.32
Observations	152	152	152	152	152	152	152	152	130
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	-	-	Malaria	Agr. Suit.	CSI	Sea	Mobility	All	All

Notes: This table establishes the negative statistically and economically significant relation between measures of linguistic diversity and the distance to East Africa after accounting for the set of basic geographical controls of Table 1 and an extended set of confounders and measures of isolation. Each column includes the same set of controls as the same column in Table 3. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.2: Linguistic Diversity and Distance to East Africa

	Linguistic Diversity (Consonant Inventory)								
	Full Sample								Specialization
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-Industrial Distance	-0.42***	-0.36***	-0.35***	-0.35***	-0.36***	-0.36***	-0.38***	-0.37***	-0.37***
to East Africa	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.06)	(0.07)
Malaria Ecology			0.04					-0.00	-0.04
			(0.06)					(0.07)	(0.08)
Agricultural				-0.05				-0.05	-0.04
Suitability (avg.)				(0.06)				(0.08)	(0.08)
Agricultural				0.05				0.09	0.06
Suitability (std.)				(0.05)				(0.06)	(0.06)
Caloric Suitability					0.01			0.03	0.03
(Pre-1500 ,avg.)					(0.06)			(0.07)	(0.08)
Caloric Suitability					-0.11*			-0.13*	-0.11
(Pre-1500 ,std.)					(0.06)			(0.07)	(0.07)
Pct. Area within						-0.07		-0.08	-0.10
100kms of Sea						(0.06)		(0.06)	(0.07)
Coast Length						0.11		0.13	0.14
						(0.09)		(0.08)	(0.09)
Ruggedness (Avg.)							0.10	0.10	0.07
							(0.12)	(0.13)	(0.14)
Pre-Industrial							0.30	0.30	0.26
Mobility (avg.)							(0.22)	(0.25)	(0.27)
Pre-Industrial							-0.17	-0.14	-0.06
Mobility (std.)							(0.11)	(0.12)	(0.13)
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.17	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27
R^2	0.17	0.27	0.27	0.28	0.28	0.28	0.28	0.31	0.31
Observations	299	299	299	299	299	299	299	299	254

Notes: This table establishes the negative statistically and economically significant relation between linguistic diversity based on consonant inventory and the distance to East Africa after accounting for the set of basic geographical controls of Table 1 and an extended set of confounders and measures of isolation. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.3: Linguistic Diversity and Distance to East Africa

	Linguistic Diversity (Vowel Quality Inventory)								
	Full Sample								Specialization
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-Industrial Distance	-0.29***	-0.32***	-0.27***	-0.32***	-0.34***	-0.34***	-0.36***	-0.31***	-0.33***
to East Africa	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)
Malaria Ecology			0.20***					0.21***	0.23***
			(0.06)					(0.07)	(0.07)
Agricultural				0.01				-0.16**	-0.19**
Suitability (avg.)				(0.06)				(0.08)	(0.08)
Agricultural				0.05				0.03	0.03
Suitability (std.)				(0.06)				(0.06)	(0.07)
Caloric Suitability					0.14**			0.20**	0.25***
(Pre-1500 ,avg.)					(0.07)			(0.08)	(0.08)
Caloric Suitability					-0.08			-0.04	-0.04
(Pre-1500 ,std.)					(0.07)			(0.07)	(0.07)
Pct. Area within						-0.19***		-0.09	-0.12
100kms of Sea						(0.06)		(0.07)	(0.07)
Coast Length						0.07		0.10	0.12
						(0.09)		(0.10)	(0.11)
Ruggedness (Avg.)							-0.17	-0.22*	-0.19
							(0.12)	(0.12)	(0.13)
Pre-Industrial							0.36	0.35	0.28
Mobility (avg.)							(0.26)	(0.26)	(0.27)
Pre-Industrial							-0.16	-0.04	-0.02
Mobility (std.)							(0.12)	(0.12)	(0.13)
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.08	0.14	0.17	0.14	0.15	0.16	0.15	0.19	0.22
R^2	0.09	0.16	0.19	0.16	0.17	0.19	0.18	0.23	0.27
Observations	301	301	301	301	301	301	301	301	255

Notes: This table establishes the negative statistically and economically significant relation between linguistic diversity based on vowel quality inventory and the distance to East Africa after accounting for the set of basic geographical controls of Table 1 and an extended set of confounders and measures of isolation. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.4: Linguistic Diversity and Distance to East Africa

	Linguistic Diversity (Number of Genders)								
	Full Sample								Specialization
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pre-Industrial Distance	-0.25***	-0.25***	-0.23***	-0.26***	-0.27***	-0.25***	-0.31***	-0.30***	-0.33***
to East Africa	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.08)	(0.09)	(0.08)
Malaria Ecology			0.11					0.05	0.04
			(0.12)					(0.15)	(0.16)
Agricultural				0.18**				0.14	0.17*
Suitability (avg.)				(0.07)				(0.09)	(0.09)
Agricultural				-0.08				-0.11	-0.08
Suitability (std.)				(0.07)				(0.09)	(0.09)
Caloric Suitability					0.21**			0.18	0.13
(Pre-1500 ,avg.)					(0.10)			(0.12)	(0.10)
Caloric Suitability					-0.15			-0.13	-0.08
(Pre-1500 ,std.)					(0.11)			(0.12)	(0.11)
Pct. Area within						-0.05		-0.00	-0.01
100kms of Sea						(0.09)		(0.09)	(0.10)
Coast Length						0.10		0.18	0.23
						(0.13)		(0.13)	(0.16)
Ruggedness (Avg.)							0.23	0.33**	0.38***
							(0.15)	(0.13)	(0.14)
Pre-Industrial							-0.06	-0.47	-0.58
Mobility (avg.)							(0.26)	(0.33)	(0.35)
Pre-Industrial							-0.31*	-0.19	-0.20
Mobility (std.)							(0.16)	(0.20)	(0.19)
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.06	0.17	0.17	0.18	0.18	0.16	0.19	0.20	0.23
R^2	0.06	0.20	0.21	0.22	0.23	0.20	0.23	0.28	0.32
Observations	152	152	152	152	152	152	152	152	130

Notes: This table establishes the negative statistically and economically significant relation between linguistic diversity based on number of genders and the distance to East Africa after accounting for the set of basic geographical controls of Table 1 and an extended set of confounders and measures of isolation. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.5: Population Diversity and Economic Specialization (IV)
Linguistic Diversity

	Economic Specialization									
	OLS	IV								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Panel A: Linguistic Diversity (Consonant Inventory)					
Linguistic Diversity	0.20***	1.13***	1.15***	1.12***	1.13***	1.18***	1.12***	1.13***	1.15***	1.22***
	(0.06)	(0.20)	(0.22)	(0.20)	(0.21)	(0.21)	(0.21)	(0.20)	(0.22)	(0.28)
First-stage F-statistic		46.23	44.68	45.37	43.58	44.29	43.27	44.19	36.73	27.68
Adjusted-R^2	0.06	-0.67	-0.71	-0.61	-0.68	-0.73	-0.67	-0.68	-0.72	-0.75
Observations	254	254	254	254	254	254	254	254	254	254
					Panel B: Linguistic Diversity (Vowel Quality Inventory)					
Linguistic Diversity	0.39***	1.15***	1.38***	1.16***	1.14***	1.13***	1.02***	1.06***	1.05***	1.29***
	(0.06)	(0.24)	(0.34)	(0.24)	(0.25)	(0.22)	(0.21)	(0.21)	(0.22)	(0.33)
First-stage F-statistic		22.60	16.32	24.31	21.43	26.88	27.78	30.08	26.28	18.78
Adjusted-R^2	0.17	-0.39	-0.69	-0.39	-0.37	-0.35	-0.19	-0.24	-0.24	-0.52
Observations	255	255	255	255	255	255	255	255	255	255
					Panel C: Linguistic Diversity (Number of Genders)					
Linguistic Diversity	0.13	1.19***	1.30***	1.16***	1.18***	1.21***	1.09***	1.16***	0.91***	0.87***
	(0.08)	(0.28)	(0.34)	(0.28)	(0.29)	(0.29)	(0.26)	(0.28)	(0.22)	(0.31)
First-stage F-statistic		29.97	24.50	29.02	29.16	28.00	30.19	28.64	33.65	17.21
Adjusted-R^2	-0.01	-1.03	-1.25	-0.96	-0.96	-1.07	-0.85	-1.00	-0.52	-0.43
Observations	130	130	130	130	130	130	130	130	130	130
Main Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	-	-	Malaria	Eco. Div.	Agr. Suit.	CSI	Volatility	Sea	Mobility	All

Notes: This table establishes the positive statistically and economically significant effect of population diversity (based on linguistic traits) on economic specialization, by instrumenting population diversity with the distance to East Africa (see section 4.2). These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Each column includes the same set of controls as the same column in Table 5. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.6: Population Diversity and Economic Specialization (IV)
Linguistic Diversity (Consonant Inventories)

	Economic Specialization									
	OLS	IV								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Linguistic Diversity	0.20***	1.13***	1.15***	1.12***	1.13***	1.18***	1.12***	1.13***	1.15***	1.22***
	(0.06)	(0.20)	(0.22)	(0.20)	(0.21)	(0.21)	(0.21)	(0.20)	(0.22)	(0.28)
Malaria Ecology			-0.03							0.01
			(0.10)							(0.11)
Ecological Diversity				0.26***						0.22**
				(0.09)						(0.11)
Agricultural					-0.00					-0.19
Suitability (avg.)					(0.10)					(0.12)
Agricultural					0.12					-0.03
Suitability (std.)					(0.11)					(0.12)
Caloric Suitability						0.07				0.09
(Pre-1500 ,avg.)						(0.11)				(0.12)
Caloric Suitability						0.21*				0.23
(Pre-1500 ,std.)						(0.12)				(0.15)
Temperature (Spatial							-0.11			-0.27**
Corr., Avg.)							(0.09)			(0.13)
Temperature							0.22			0.31
(Volatility, Avg)							(0.23)			(0.28)
Pct. Area within								-0.05		-0.14
100kms of Sea								(0.09)		(0.11)
Coast Length								0.14		0.15
								(0.21)		(0.19)
Ruggedness (Avg.)									-0.16	-0.17
									(0.18)	(0.19)
Pre-Industrial									-0.00	0.42
Mobility (avg.)									(0.31)	(0.35)
Pre-Industrial									0.03	-0.17
Mobility (std.)									(0.17)	(0.20)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic		46.23	44.68	45.37	43.58	44.29	43.27	44.19	36.73	27.68
Adjusted-R^2	0.06	-0.67	-0.71	-0.61	-0.68	-0.73	-0.67	-0.68	-0.72	-0.75
Observations	254	254	254	254	254	254	254	254	254	254

Notes: This table establishes the positive statistically and economically significant effect of population diversity (based on consonant inventories) on economic specialization, by instrumenting population diversity with the distance to East Africa (see section 4.2). These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.7: Population Diversity and Economic Specialization (IV)
Linguistic Diversity (Vowel Quality Inventories)

	Economic Specialization									
	OLS	IV								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Linguistic Diversity	0.39***	1.15***	1.38***	1.16***	1.14***	1.13***	1.02***	1.06***	1.05***	1.29***
	(0.06)	(0.24)	(0.34)	(0.24)	(0.25)	(0.22)	(0.21)	(0.21)	(0.22)	(0.33)
Malaria Ecology			-0.36**							-0.34**
			(0.14)							(0.17)
Ecological Diversity				-0.07						-0.19
				(0.10)						(0.12)
Agricultural					-0.04					0.01
Suitability (avg.)					(0.09)					(0.15)
Agricultural					0.08					0.10
Suitability (std.)					(0.09)					(0.11)
Caloric Suitability						-0.10				-0.11
(Pre-1500 ,avg.)						(0.08)				(0.14)
Caloric Suitability						0.19*				0.20*
(Pre-1500 ,std.)						(0.10)				(0.11)
Temperature (Spatial							-0.06			-0.05
Corr., Avg.)							(0.08)			(0.12)
Temperature							-0.42***			-0.27
(Volatility, Avg)							(0.16)			(0.23)
Pct. Area within								0.11		0.00
100kms of Sea								(0.09)		(0.14)
Coast Length								0.19**		0.15
								(0.09)		(0.09)
Ruggedness (Avg.)									0.06	-0.06
									(0.15)	(0.20)
Pre-Industrial									-0.04	0.42
Mobility (avg.)									(0.29)	(0.36)
Pre-Industrial									0.13	-0.11
Mobility (std.)									(0.17)	(0.22)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic		22.60	16.32	24.31	21.43	26.88	27.78	30.08	26.28	18.78
Adjusted-R^2	0.17	-0.39	-0.69	-0.39	-0.37	-0.35	-0.19	-0.24	-0.24	-0.52
Observations	255	255	255	255	255	255	255	255	255	255

Notes: This table establishes the positive statistically and economically significant effect of population diversity (based on vowel quality inventories) on economic specialization, by instrumenting population diversity with the distance to East Africa (see section 4.2). These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.8: Population Diversity and Economic Specialization (IV)
Linguistic Diversity (Number of Genders)

	Economic Specialization									
	OLS	IV								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Linguistic Diversity	0.13	1.19***	1.30***	1.16***	1.18***	1.21***	1.09***	1.16***	0.91***	0.87***
	(0.08)	(0.28)	(0.34)	(0.28)	(0.29)	(0.29)	(0.26)	(0.28)	(0.22)	(0.31)
Malaria Ecology			-0.20							0.01
			(0.23)							(0.21)
Ecological Diversity				0.20						0.04
				(0.12)						(0.13)
Agricultural					-0.20					-0.35**
Suitability (avg.)					(0.13)					(0.16)
Agricultural					0.26*					0.17
Suitability (std.)					(0.13)					(0.17)
Caloric Suitability						-0.01				0.23
(Pre-1500 ,avg.)						(0.15)				(0.16)
Caloric Suitability						0.19				0.09
(Pre-1500 ,std.)						(0.17)				(0.18)
Temperature (Spatial							-0.07			-0.03
Corr., Avg.)							(0.14)			(0.17)
Temperature							-0.34			-0.45
(Volatility, Avg)							(0.30)			(0.30)
Pct. Area within								0.02		-0.14
100kms of Sea								(0.14)		(0.18)
Coast Length								0.15		0.29
								(0.33)		(0.30)
Ruggedness (Avg.)									-0.47**	-0.59***
									(0.19)	(0.20)
Pre-Industrial									0.13	0.66
Mobility (avg.)									(0.35)	(0.53)
Pre-Industrial									0.46***	0.26
Mobility (std.)									(0.16)	(0.20)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-statistic		29.97	24.50	29.02	29.16	28.00	30.19	28.64	33.65	17.21
Adjusted-R^2	-0.01	-1.03	-1.25	-0.96	-0.96	-1.07	-0.85	-1.00	-0.52	-0.43
Observations	130	130	130	130	130	130	130	130	130	130

Notes: This table establishes the positive statistically and economically significant effect of population diversity (based on number of genders) on economic specialization, by instrumenting population diversity with the distance to East Africa (see section 4.2). These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.9: Population Diversity and Economic Specialization (IV)
Linguistic Diversity

	Economic Specialization								
	Linguistic Diversity (Consonant Inventory)			Linguistic Diversity (Vowel Quality Inventory)			Linguistic Diversity (Number of Genders)		
	OLS	IV		OLS	IV		OLS	IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Population Diversity	0.21***	1.30***	1.43***	0.40***	1.30***	1.53***	0.12	1.38***	1.05***
	(0.06)	(0.22)	(0.31)	(0.06)	(0.27)	(0.37)	(0.08)	(0.32)	(0.35)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes	No	No	Yes
First-stage F-statistic		45.11	27.63		22.85	18.08		29.40	17.22
Adjusted-R^2	0.09	-0.92	-1.09	0.21	-0.56	-0.88	0.00	-1.43	-0.70
Observations	255	255	255	256	256	256	131	131	131

Notes: This table establishes the positive statistically and economically significant effect of population diversity on economic specialization (Share), by instrumenting population diversity (as proxied by linguistic diversity measures) with the distance to East Africa (see section 4.2). These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Each column includes the same set of controls as the same column in Table 5. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table F.10: Population Diversity and Economic Specialization (IV)
Linguistic Diversity

	Economic Specialization								
	Linguistic Diversity (Consonant Inventory)			Linguistic Diversity (Vowel Quality Inventory)			Linguistic Diversity (Number of Genders)		
	OLS	IV		OLS	IV		OLS	IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Population Diversity	0.15**	0.81***	0.97***	0.31***	0.82***	1.04***	0.11	1.01***	0.68**
	(0.06)	(0.18)	(0.25)	(0.07)	(0.22)	(0.32)	(0.08)	(0.28)	(0.28)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes	No	No	Yes
First-stage F-statistic		45.11	27.63		22.85	18.08		29.40	17.22
Adjusted-R^2	0.01	-0.36	-0.46	0.09	-0.16	-0.33	-0.03	-0.75	-0.18
Observations	255	255	255	256	256	256	131	131	131

Notes: This table establishes the positive statistically and economically significant effect of population diversity on economic specialization (Score), by instrumenting population diversity (as proxied by linguistic diversity measures) with the distance to East Africa (see section 4.2). These results are robust to accounting for the set of basic geographical controls of Table 1 and the extended set of confounders from Table 2. Each column includes the same set of controls as the same column in Table 5. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

G Persistence

Table G.1: Pre-modern Economic Specialization and Contemporary Economic Development

	Log(Average Light Density + 0.01)					
	Whole World				Old World	
	(1)	(2)	(3)	(4)	(5)	(6)
Economic Specialization	0.07**	0.19***	0.16***	0.12***	0.20***	0.16***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
Main Controls	Yes	No	Yes	Yes	Yes	Yes
Continental FE	No	Yes	Yes	Yes	Yes	Yes
Neolithic + Origtime	No	No	No	Yes	No	Yes
Adjusted-R^2	0.26	0.35	0.40	0.41	0.31	0.33
Observations	900	900	900	900	565	565

Notes: This table establishes the persistent positive statistically and economically significant effect of pre-modern economic specialization on economic development. These results account for the main set of geographical controls in Table 7, continental fixed effects, the timing of transition to the Neolithic and the number of years of continuous settlement. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table G.2: Pre-Modern Economic Specialization and Contemporary Economic Development

	Log(Average Light Density + 0.01)							
	Whole World				Old World			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre-modern Economic Specialization	0.09***	0.09***	0.07***	0.06**	0.10***	0.11***	0.09***	0.09**
	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
All Additional Controls	No	No	Yes	Yes	No	No	Yes	Yes
Neolithic + Origtime	No	No	No	Yes	No	No	No	Yes
Adjusted-R^2	0.43	0.47	0.57	0.57	0.40	0.45	0.54	0.53
Observations	900	900	900	900	565	565	565	565

Notes: This table establishes the persistent positive statistically and economically significant effect of pre-modern economic specialization on economic development. These results account for the set of geographical controls in Table 7, regional fixed effects, the timing of transition to the Neolithic and number of years of continuous settlement. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table G.3: Pre-modern Economic Specialization and Contemporary Economic Development

	Log(Average Light Density + 0.01)							
	Whole World				Old World			
	OLS		IV		OLS		IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre-modern Economic Specialization	0.06**	0.06**	0.10***	0.10***	0.09**	0.09**	0.12***	0.10**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.04)
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Neolithic + Origtime	No	Yes	No	Yes	No	Yes	No	Yes
First-stage F-statistic			75.85	76.73			31.06	30.31
Hansen's J-statistic			51.12	53.88			44.83	49.14
J-stat p-value			0.04	0.04			0.07	0.04
Adjusted-R^2	0.25	0.25	0.23	0.23	0.23	0.23	0.20	0.20
Observations	898	898	898	898	563	563	563	563

Notes: This table establishes the persistent positive statistically and economically significant effect of pre-modern economic specialization on economic development. These results account for the main set of geographical controls in Table 7, regional fixed effects, the timing of transition to the Neolithic and number of years of continuous settlement. Standardized coefficients. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table G.4: Pre-modern Economic Specialization and Contemporary Occupational Heterogeneity by Skill Level

	Contemporary Occupational Heterogeneity				
	All	Primary		Secondary	
		Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)
Pre-modern Economic Specialization	1.09***	0.46***	0.63***	0.53***	0.56***
	(0.23)	(0.12)	(0.16)	(0.14)	(0.16)
Main Controls	Yes	Yes	Yes	Yes	Yes
All Additional Controls	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.09	0.03	0.13	0.08	0.11
Observations	118	118	118	118	118

Notes: This table establishes the robustness of the results in Table 14 to the inclusion of country fixed effects. High skill occupations are those which employ a higher share of individuals with completed primary/secondary school or higher level of education attainment than the African average. These results account for the full set of geographical controls in Table 7 and regional fixed effects. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table G.5: Pre-modern Economic Specialization and Contemporary High Skill Occupational Heterogeneity

	Contemporary High Skill Occupational Heterogeneity							
	Primary				Secondary			
	OLS		IV		OLS		IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre-modern Economic Specialization	0.62**	0.54**	0.69***	0.51**	0.56**	0.48*	0.65***	0.45**
	(0.25)	(0.27)	(0.24)	(0.23)	(0.25)	(0.25)	(0.24)	(0.22)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional FE	No	Yes	No	Yes	No	Yes	No	Yes
First-stage F-statistic			32.22	367.81			32.22	367.81
Hansen's J-statistic			15.31	17.88			15.28	18.48
J-stat p-value			0.57	0.66			0.58	0.62
Adjusted-R^2	0.12	0.10	0.12	0.10	0.11	0.10	0.11	0.10
Observations	101	101	101	101	101	101	101	101

Notes: This table establishes the persistent positive statistically and economically significant effect of pre-modern economic specialization on contemporary occupational heterogeneity by skill level. High skill occupations are those which employ a higher share of individuals with completed primary/secondary school or higher level of education attainment than the African average. These results account for the full set of geographical controls in Table 7 and regional fixed effects. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table G.6: Skill Shares in Contemporary Occupational Heterogeneity

	Skill Shares in Contemporary Occupational Heterogeneity					
	Primary			Secondary		
	Low	High	Dif	Low	High	Dif
	(1)	(2)	(3)	(4)	(5)	(6)
Occupational Heterogeneity (All)	-0.01***	0.01***	0.02***	-0.01***	0.01***	0.02***
	(0.002)	(0.002)	(0.004)	(0.002)	(0.002)	(0.005)
Main Controls	Yes	Yes	Yes	Yes	Yes	Yes
All Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.45	0.45	0.45	0.46	0.46	0.46
Observations	101	101	101	101	101	101

Notes: This table establishes the positive association between contemporary occupational heterogeneity and the share of high-skill and the difference in shares between high- and low-skill contemporary occupational heterogeneity. High skill occupations are those which employ a higher share of individuals with completed primary/secondary school or higher level of education attainment than the African average. These results account for the full set of geographical controls in Table 7 and regional fixed effects. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table G.7: Pre-modern Economic Specialization and Contemporary Economic Complexity

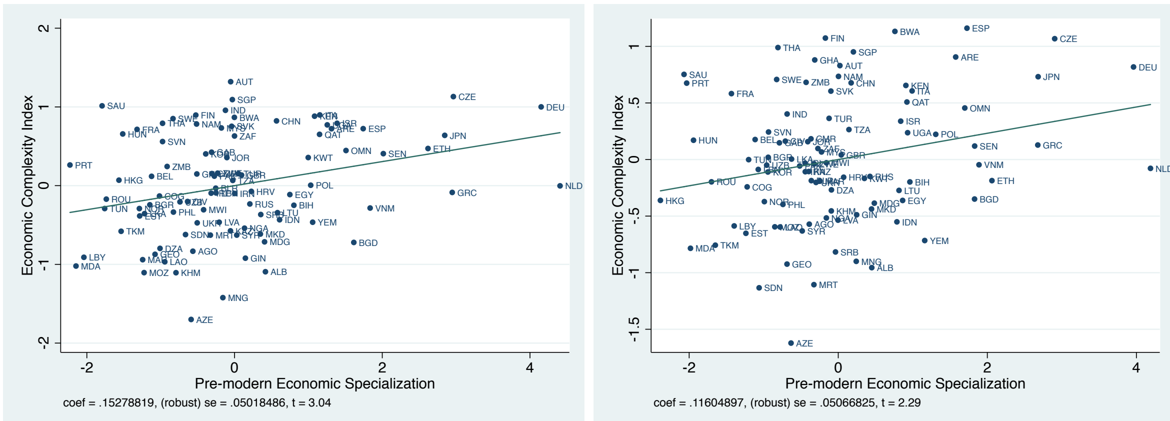
	Economic Complexity Index (2010)							
	Count						Share	Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre-modern Economic Specialization	0.17**	0.20***	0.21***	0.20***	0.19***	0.16**	0.17**	0.14**
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.06)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Caloric Suitability Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Diversity Controls	No	No	No	Yes	Yes	Yes	Yes	Yes
Disease Controls	No	No	No	No	Yes	Yes	Yes	Yes
Years Since Neolithic Transition	No	No	No	No	No	Yes	Yes	Yes
Adjusted-R^2	0.49	0.59	0.61	0.64	0.66	0.67	0.68	0.67
Observations	95	95	95	95	95	95	95	95

Notes: This table establishes the positive statistically and economically significant association between levels of pre-modern economic specialization and contemporary economic complexity at the country-level. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table G.8: Pre-modern Economic Specialization and Contemporary Economic Complexity

	Economic Complexity Index (2010)					
	(1)	(2)	(3)	(4)	(5)	(6)
Pre-modern Economic Specialization	0.17**	0.20***	0.21***	0.20***	0.19***	0.16**
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes
Caloric Suitability Controls	No	No	Yes	Yes	Yes	Yes
Geographical Diversity Controls	No	No	No	Yes	Yes	Yes
Disease Controls	No	No	No	No	Yes	Yes
Years Since Neolithic Transition	No	No	No	No	No	Yes
Adjusted-R^2	0.49	0.59	0.61	0.64	0.66	0.67
Observations	95	95	95	95	95	95

Notes: This table establishes the positive statistically and economically significant association between levels of pre-modern economic specialization and contemporary economic complexity at the country-level. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.



(a) Basic Controls (Column 3)   (b) All Controls (Column 6)

Figure G.1: Pre-modern Economic Specialization and Contemporary Economic Complexity

Table G.9: Pre-modern Economic Specialization and Contemporary Economic Complexity

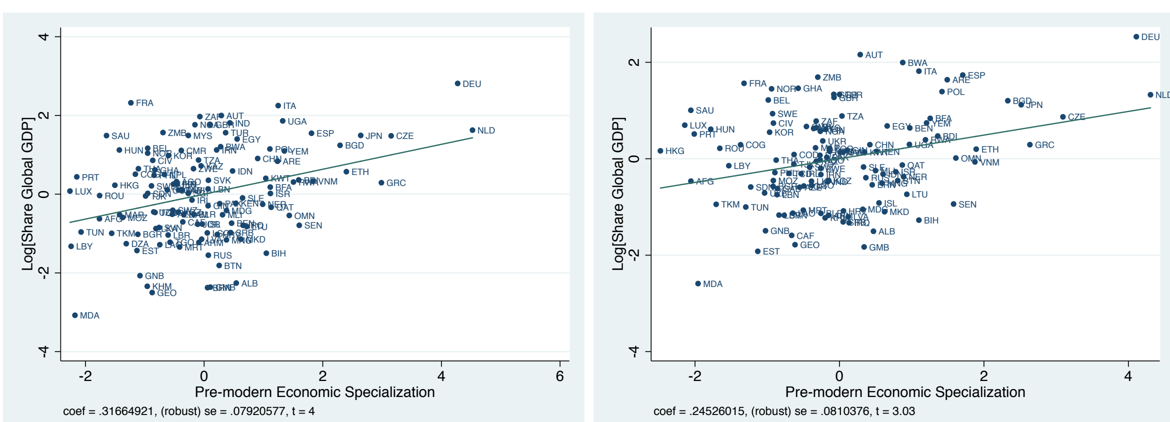
	Contemporary Development			
	Economic Complexity Index	# Goods Exported	Ratio # Goods Exported/Imported	Share Global GDP
	(1)	(2)	(3)	(4)
Pre-modern Economic Specialization	0.19***	0.21***	0.19**	0.22***
	(0.07)	(0.08)	(0.08)	(0.06)
Regional FE	Yes	Yes	Yes	Yes
Geographical Controls	Yes	Yes	Yes	Yes
Years Since Neolithic Transition	Yes	Yes	Yes	Yes
Adjusted-R^2	0.62	0.46	0.46	0.60
Observations	95	80	80	120

Notes: This table establishes the positive statistically and economically significant association between levels of pre-modern economic specialization and a country's contemporary economic complexity and the complexity of its production and export structure. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table G.10: Pre-modern Economic Specialization and Share of Global GDP

	Log[Share of Global GDP] (2005)							
	Count						Share	Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pre-modern Economic Specialization	0.21***	0.19***	0.24***	0.23***	0.19***	0.18***	0.20***	0.13**
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.06)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Caloric Suitability Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Diversity Controls	No	No	No	Yes	Yes	Yes	Yes	Yes
Disease Controls	No	No	No	No	Yes	Yes	Yes	Yes
Years Since Neolithic Transition	No	No	No	No	No	Yes	Yes	Yes
Adjusted-R^2	0.35	0.52	0.60	0.61	0.70	0.70	0.70	0.69
Observations	120	120	120	120	120	120	120	120

Notes: This table establishes the positive statistically and economically significant association between levels of pre-modern economic specialization and a country's contemporary importance in global production. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.



(a) Basic Controls (Column 3)

(b) All Controls (Column 6)

Figure G.2: Pre-modern Economic Specialization and Share of Global GDP