In-Group – Out-Group Trust: Origins and Consequences*

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Abstract

Why do societies differ in the extent to which they trust beyond the in-group? This paper tests the hypothesis that the ecological and institutional demands of transhumant pastoralism shaped long-run variation in the scope of trust. Combining global data from 104 countries, individual-level surveys, and within-country evidence from Kyrgyzstan and Sudan, we show that ancestral reliance on transhumant pastoralism predicts higher trust in in-group members relative to out-group members. We then uncover the mechanism using a newly assembled Atlas of Transhumance Routes: the effect is significantly stronger along flatter, more "horizontal" routes that historically generated recurrent encounters with other pastoralists under weak external enforcement. These routes intersect more ethnic boundaries, and the intensity of such encounters amplifies the transhumance-trust relationship, especially where interactions involved competing pastoral groups. A natural experiment, the 2011 partition of Sudan, which abruptly obstructed long-standing migration corridors, shows that conflict rises sharply along historical routes once mobility becomes constrained. Finally, we show that a narrower scope of trust constrains organizational hierarchies: firms located in historically transhumant regions are more likely to be manager-owned, less likely to be incorporated or have dispersed ownership, and employ fewer workers. Together, these findings reveal how the ecological logic of mobile pastoralism forged enduring trust boundaries that continue to shape patterns of cooperation, conflict, and economic organization today.

Keywords: Transhumant pastoralism, trust, moral universalism, kinship, culture, firms.

JEL Classification: Z1, Z10, N9, O1

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1. Introduction

How much people trust others as social distance increases varies widely across societies (see Figure 1). While an extensive literature has examined the determinants of levels of trust in society, focusing on the role of institutions, historical events, and social structures (see e.g. Tabellini (2010), Nunn and Wantchekon (2011), Moscona, Nunn and Robinson (2017)), we know less about what affects trust of in-group members relative to out-group members (Hruschka and Henrich, 2013a,b, Enke, 2019, 2020, Schulz, Bahrami-Rad, Beauchamp and Henrich, 2019, Enke, Rodríguez-Padilla and Zimmermann, 2023). This is important because the scope of moral values has been shown to affect a wide variety of outcomes, such as policy preferences, willingness to redistribute, and altruism (Enke, 2020, Enke et al., 2023, Cappelen, Enke and Tungodden, 2025). It is also important because it can have direct economic consequences such as how firms are managed around the world and can potentially help rationalize economic puzzles such as the lack of large firms in some economies.

To illustrate the potential economic relevance of in-group trust bias, Figure 2 presents a simple cross-country scatter plot between average establishment size, measured across manufacturing, services, and non-agriculture sectors, against a measure of parochial trust, defined as the difference between trust in in-group members and trust in out-group members derived from the Integrated Values Surveys. A clear pattern emerges: countries where individuals place substantially more trust in their in-group tend to have smaller establishments across all sectors. Although purely descriptive, the figure suggests that variation in the structure of trust within societies may help explain cross-country differences in the scale of economic organizations.

This paper tests the hypothesis that global differences in the scope of trust can be traced, in part, to historical mobility regimes, and in particular to the ecological and institutional pressures associated with transhumant pastoralism. We find that societies whose ancestors practiced seasonal, long-distance pastoralism – what we will refer to as transhumant pastoralism – developed norms that emphasize strong in-group cohesion and relatively low trust toward outsiders, and that this legacy persists today and has real economic consequences.[1]

Transhumant pastoralism remains a widespread livelihood today, practiced by more than 250

[1]See Figure B1 for the differences in trust by reliance on transhumant pastoralism.

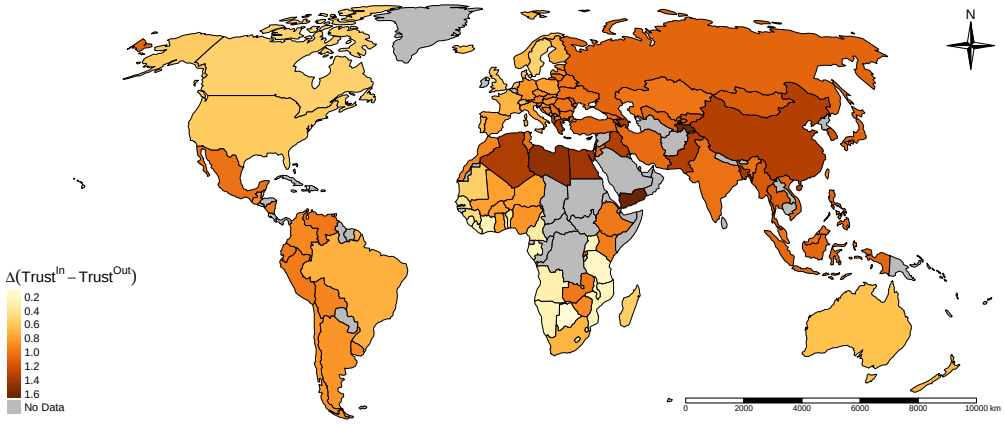


Figure 1: Distribution of In-Group Trust Bias

Notes: This map displays the distribution of trust in in-group relative to out-group by country. Data is from the Integrated Values Surveyss Time Series 1981-2022 and Afrobarometer round 9. When a country's Δ (Trust^{In} - Trust^{Out}) equals zero, the population of that country trusts in-group and out-group members equally; positive values measure the degree of in-group bias. Neither the IVS, nor the Afrobarometer provide data for the countries colored in grey.

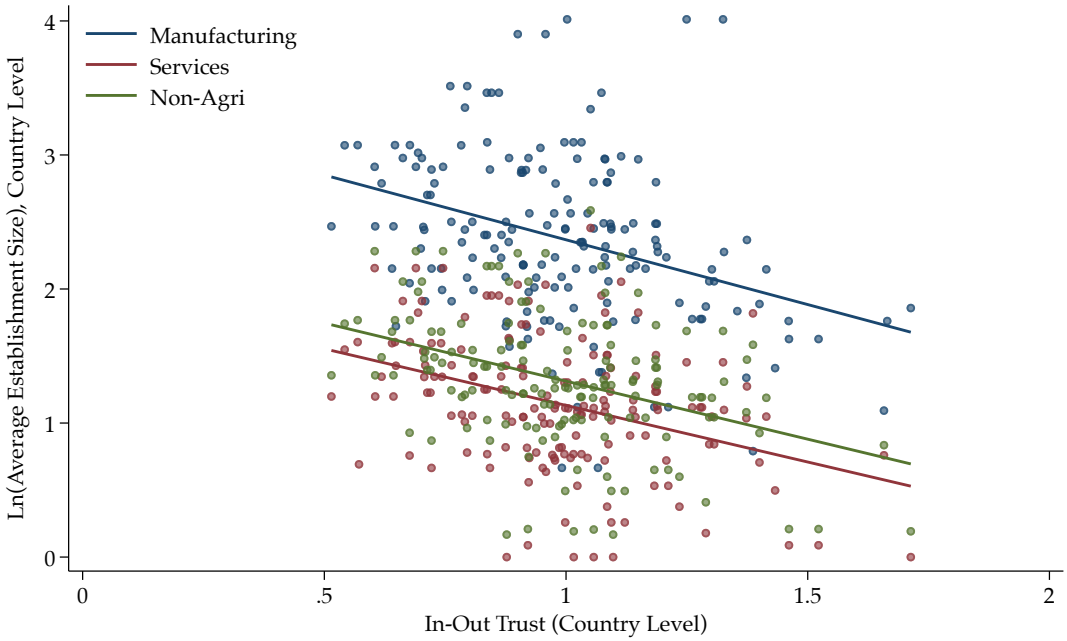


Figure 2: Relationship Between In-Out Trust and Average Establishment Size Across Sectors

Notes: This figure plots the log of the average establishment size in Manufacturing, Services, and Non-Agriculture sectors from (Bento and Restuccia, 2021) against a measure of parochial trust ("In-Out Trust") across countries. Data on trust are drawn from the Integrated Values Surveys. The figure shows simple bivariate relationships, with linear fit lines displayed for each sector. Appendix Table B15 provides robustness to the inclusion of standard country-level controls including average generalized trust (level).

million people across the world. Transhumant pastoralists raise livestock such as cattle, sheep, and camels (FAO, 2018).[2] Additionally, in contrast to sedentary pastoralist groups, they undertake some form of seasonal migration, known as transhumance. The benefit of transhumance is that it allows animals access to fodder year-round.

Mobility among transhumant pastoralists creates exposure to others, but the structure of mobility determines whether that exposure fosters cooperation or parochialism. Transhumant pastoralism required groups to move livestock seasonally along relatively fixed routes in search of pasture and water. Along horizontal, low-relief routes, these seasonal movements routinely brought pastoralists into contact with other mobile groups competing for overlapping resources. These interactions occurred in institutional environments characterized by weak external enforcement, limited state reach, and strong incentives for collective defense. Under such conditions, repeated encounters with other pastoral groups, both interdependent and adversarial, encouraged the development of strong internal cohesion and in-group trust, while fostering caution toward outsiders. In contrast, movement through agriculturalist territories historically involved more complementary exchange and less competition, generating little pressure to develop parochial trust norms.[3] This paper assembles new data to test this mechanism and examines its long-run consequences.

Our empirical analysis proceeds in four steps. First, combining the Ethnographic Atlas with the Integrated Values Surveys, we show that historical reliance on transhumant pastoralism predicts higher in-group relative to out-group trust across 104 countries. Using the World Values Survey, we further document that this relationship holds between districts and between individuals within countries, as well as among second-generation immigrants living in the same destination country, and is robust to rich ethnographic, geographic, and ecological controls.[4] Evidence from Afrobarometer Round 9 demonstrates the same pattern within Africa, using

[2]Historically, 71 of 225 countries have had some reliance on transhumant pastoralism. For 31 countries, at least 10% of caloric intake is from transhumant pastoralism. At the ethnic group level, 106 of 1202 ethnic groups in the Ethnographic Atlas relied on transhumant pastoralism (Murdock, 1967).

[3]A recent literature shows that this historically symbiotic relationship has shifted under contemporary climatic pressures. Eberle, Rohner and Thoenig (2025) and McGuirk and Nunn (2025) document that climate change has intensified competition between pastoralists and agriculturalists in parts of Africa, increasing the likelihood of conflict in areas that were previously characterized by cooperation and resource complementarity.

[4]Results for second-generation immigrants use the Integrated Values Surveys.

entirely different data and measures.

Second, we provide micro-level evidence from Kyrgyzstan: households that continue to practice seasonal transhumance today exhibit higher parochial trust, even relative to neighbors living in the same oblast. Third, using maximum entropy modeling, we construct a new instrument based on the relative environmental suitability for transhumant pastoralism relative to agriculture and use this instrument to estimate the causal effect of historical reliance on transhumant pastoralism on the scope of trust.

We then study the mechanism through which transhumant pastoralism shapes the scope of trust. Our hypothesis is that the effect of historical transhumance on the scope of trust operates through the structure of mobility and the nature of cross-group interactions it generated and competition for resources. In particular, we posit that groups whose transhumance required recurrent encounters with other mobile pastoralists developed strong in-group cohesion and cautious attitudes toward outsiders.

We provide evidence for this mechanism in four steps. First, using a new global dataset of 2,013 digitized historical transhumance routes that we construct for this paper, we show that the association between ancestral transhumance and parochial trust is significantly stronger along flatter, more "horizontal" routes, which historically facilitated greater cross-group exposure. Second, we document that these horizontal routes systematically intersect more ethnic boundaries, and that the intensity of such encounters amplifies the transhumance-trust relationship, especially when the encounters involved other pastoralists. Third, we show that this pattern aligns closely with ethnographic and ecological evidence on pastoral-pastoral resource competition, as opposed to the more symbiotic historical relations between pastoralists and agriculturalists. Finally, we test a key behavioral implication of the mechanism using a natural experiment: the 2011 partition of Sudan, which abruptly disrupted long-standing pastoral migration corridors. Using an event-study design comparing pre- and post-partition periods, we find a sharp and persistent rise in conflict along historical transhumance routes after independence, consistent with the collapse of long-standing reciprocal grazing arrangements when mobility is curtailed.

Taken together, the evidence shows that the structure of historical mobility shaped the scope of trust, with enduring consequences for social cohesion, cooperation, and conflict.

Finally, we examine the economic and social consequences of a narrower scope of trust. First,

we show that inherited parochial trust norms help rationalize an economic puzzle: the coexistence of many small firms and the near absence of large firms in some economies. A prominent hypothesis is that firm owners in such settings face managerial capacity constraints because they are unwilling, or unable due to parochial trust, to delegate decision-making authority to individuals outside the family, thereby limiting organizational scale. Using data from the World Bank Enterprise Survey, we find that firms located in regions with a stronger historical presence of transhumant pastoralism are more likely to be manager-owned, are less likely to be incorporated, and are less likely to have dispersed ownership.These firms are systematically smaller, consistent with the idea that a historically inherited, more parochial scope of trust constrains the formation of impersonal managerial hierarchies and hinders firm growth.

Second, we take advantage of a quasi-experiment using data from the Afrobarometer to ask how those from transhumant pastoralist groups are perceived. Interviewers randomly select households to interview based on a sampling protocol, and eligible individuals are randomly selected within the household, prior to knowing the ethnic identity of the respondent (Afrobarometer, 2022). The Afrobarometer includes exit questions for the interviewer on the attitude of the respondent during the interview. Interviewers are asked to rate the extent to which the respondent is: friendly, cooperative, honest, and at ease. Across these various measures we find that interviewers perceive individuals from transhumant pastoralist societies as less friendly, less cooperative, less honest, and less at ease. This is the case regardless of whether the respondent and enumerator share the same mother tongue. This effect is specific to transhumant pastoralism, rather than to pastoralist or nomad groups.

We make several contributions to the literature. First, we contribute to the literature exploring the causes and consequences of moral universalism. For example, Enke (2019) explores how kinship tightness affects a variety of traits related to universal morality. Enke (2020) find that moral universalism is correlated with political views, and Cappelen et al. (2025) document substantial global variation in universalism. Other work highlights the role of moralizing big god religions in increasing the scope of moral values (Norenzayan, 2013, Norenzayan, Shariff, Gervais, Willard, McNamara, Slingerland and Henrich, 2016). For example, Bergeron (2020) finds that exposure to Christian missions decreases in-group favoritism by improving views of the out-group. Other work suggests material insecurity, inter-group conflict, and institutions

may generate parochial behavior (Hruschka and Henrich, 2013a,b, Tabellini, 2008). We provide important global evidence on how historical forms of economic production shapes cultural values related to moral universalism, and we show that this continues to have economic implications.[5]

Second, we contribute to the literature on the origins of different managerial cultures that are at the root of the large productivity gap we observe between countries. Recent work has found that firms in developing countries tend to be small and highlight the role that family ties and lack of trust may play in constraining firm growth (Bloom, Eifert, Mahajan, McKenzie and Roberts, 2013, Akcigit, Alp and Peters, 2021). We provide empirical evidence consistent with this hypothesis. Firms located in areas with greater reliance on transhumant pastoralism use less objective criteria in promotion and tend be smaller in size. These results suggest the continued important economic relevance of limited moral universalism.

Third, we contribute to the literature examining how historical livelihoods shape development and culture, specifically: restrictions on women's agency (Becker, 2024), a culture of honor (Grosjean, 2014, Cao, Enke, Falk, Giuliano and Nunn, 2020), conflict (McGuirk and Nunn, 2025), belief in witchcraft (Araújo, Carrillo and Sampaio, 2021), and poverty and education (Michalopoulos, Putterman and Weil, 2019). For example, Cao et al. (2020) find that historical reliance on pastoralism is associated with greater conflict and norms of negative reciprocity. We focus on transhumant pastoralism, and we find consistent evidence across and within countries that the intersection of transhumance and pastoralism generates more parochial trust.

Finally, we contribute to the literature on pastoralism by assembling a new Atlas of Transhumance Routes that documents 2,013 digitized historical routes worldwide, providing the most comprehensive global dataset on transhumant mobility to date.

The remainder of the paper is organized as follows. Section 2 develops the background and historical motivation. Section 3 introduces the data. Section 4 presents the main empirical results. Section 5 examines mechanisms, focusing on the structure of mobility and cross-group interactions and concluding with evidence from the Sudan natural experiment. Section 7 concludes.

[5]We also contribute to a related literature on the historical and ecological determinants of levels of trust, such as work on the slave trade (Nunn and Wantchekon, 2011), land productivity (Litina, 2016), biogeographical conditions (Falk, Becker, Dohmen, Enke, Huffman and Sunde, 2018), and ancestral irrigation (Buggle et al., 2017, Talhelm and English, 2020).

2. Background and Hypothesis

Transhumant pastoralist groups are mainly found along an axis stretching from the Sahel to Central Asia and passing through the Middle East and the Horn of Africa (see Figure 3). Anthropological research suggests that transhumant pastoralism creates a distinctive institutional environment that can shape the scope of trust. We view this influence as a continuum: the core features of mobile herding push societies toward stronger in-group cohesion, and the nature and frequency of historical encounters along transhumance routes amplify or attenuate this tendency.

Transhumant pastoralism may shape the scope of trust for several reasons. First, the intrinsic features of the pastoral livelihood create baseline incentives for internal solidarity. Livestock are vulnerable to theft, raiding, and predation, fostering cultures of honor designed to deter external threats (Goldschmidt, 1965, 1971, Edgerton, 1971, Cao et al., 2020). Herding is labor-intensive and requires entrusting animals to kin and clan members, increasing the value of reliable in-group cooperation (Bolton, Bolton, Gross, Koel, Michelson, Munroe and Munroe, 1976). Livestock are also susceptible to pests and diseases that can devastate herds; pastoralists developed insurance institutions such as "cattle kin," whereby herds are partially distributed among trusted relatives to mitigate catastrophic loss (Boutrais, 2008). Seasonal migrations frequently placed pastoralists outside their home territory and beyond formal enforcement, making internal cohesion essential for safety and survival. These features alone push transhumant societies toward stronger in-group trust relative to out-group trust.

Second, the structure of cross-group encounters during seasonal mobility conditions how strong this parochial orientation becomes. Encounters with other pastoralists, who share ecological niches and compete for grazing land and water, were historically characterized by rivalry, delicate negotiations over timing and access, and recurrent risks of theft and disease transmission (Dyson-Hudson and Dyson-Hudson, 1980). As Salzman notes, "competition between pastoral groups over grazing and water has historically produced more conflict than relations between pastoralists and farming communities" (Salzman, 2004). In contrast, interactions with agriculturalists were often complementary: pastoralists supplied manure and animal products; farmers provided crop residues and post-harvest stubble, generating cooperative rather than adversarial relationships (Evans-Pritchard, 1940, Johnson and Galaty, 1990). These agro-pastoral

complementarities eroded only recently with climate change. Because the frequency and nature of encounters are shaped by the topography of transhumance routes, with flatter, "horizontal" routes more likely to generate repeated cross-group contact, we expect greater parochialism where such encounters were more common.

Taken together, this leads to the central hypothesis: Historical transhumant pastoralism narrows the scope of trust, and the strength of this effect increases with the intensity and competitive nature of historical encounters along transhumance routes.

3. Data

3.1. Measuring Transhumant Pastoralism

We measure historical reliance on transhumant pastoralism using several ethnographic databases. First, and foremost, we use the *Ethnographic Atlas* (hereafter EA) (Murdock, 1967).[6] The EA is a cross-sectional anthropological database covering 1,267 pre-industrial societies. In the EA, ethnic groups were observed around 1900 by colonial anthropologists, christian missionaries, and ethnographers. The aim of the EA is to describe *historical* livelihoods, cultural practices, and social structures of ethnic groups, where historical refers to an idealized past before European contact and colonial rule. The EA provides latitude and longitude for each ethnic group. The EA serves as our main ethnographic database.

Following Giuliano and Nunn (2021), we supplement this database with three additional ethnographic samples: *Peoples of Easternmost Europe*, *Peoples of Siberia*, and *World Ethnographic Sample* (WES). These additional samples were published in the early 2000s in the journal *Ethnology* for the first two ones, and in 1957 by George Peter Murdock. Most groups from the WES were also later included in the *Ethnographic Atlas* and Nathan Nunn and Paola Giuliano only added groups from the WES that were initially not included in the EA by Murdock because of incomplete information. These extensions increase the number of ethnic groups by 44 groups and improve

[6]The Ethnographic Atlas is the leading anthropological database used in Economics. Since the earliest work of (Gennaioli and Rainer, 2007) and (Alesina, Giuliano and Nunn, 2013) this database has been used a number of times in the literature (Fenske, 2015, Michalopoulos and Papaioannou, 2013, Michalopoulos et al., 2019, Lowes, 2020, Michalopoulos and Xue, 2021, Le Rossignol, Lowes and Montero, 2024). Recent work outside of Economics has validated the EA (Bahrami-Rad, Becker and Henrich, 2021).

the coverage of Europe.[7] Hence the number of groups in the most extensive database is 1,309 groups.

We build on Becker (2024) to construct from this ethnographic database a measure of *historical reliance on transhumant pastoralism*. Becker (2024) constructs a continuous measure of pastoralism based on reliance on animal husbandry (v4) and the predominant type of animal husbandry (v40). Reliance on herding is defined as the share of caloric intake derived from animal husbandry taking values from 0, 0-5% dependence, to 9, 86-100% dependence. Predominant type of animal husbandry takes the following values: 1, absence of near absence of domestic animals other than bees, eats, dogs, fowl, guinea pigs or the like, 2, pigs the only domestic animal of consequence, 3, sheep and/or goats when larger domestic animals are absent or much less important, 4, equine animals, e.g., horses, donkeys, 5, deer, e.g., reindeer, 6, camels or other animals of related genera, e.g., alpacas, llamas, 7, bovine animals, e.g., cattle, mithun (gayal, a domestic bovine), water buffaloes, yaks. From v40, Becker (2024) generates a dummy variable equal to one if the predominant type of animal husbandry corresponds to herding animals (values 3 to 7) and zero otherwise. She interacts the reliance on animal husbandry variable with the dummy variable for herding animals, thus defining pastoral societies as those societies that historically relied on raising herding animals, such as goats, cattle, or camelids, rather than chickens or pigs. However, this measure is not intended to capture the mobility dimension that characterizes transhumant pastoralist groups.

Based on our reading of the ethnographic literature, the mobility of pastoralist groups is particularly important for shaping norms of cooperation and trust. Thus, we construct a measure of transhumant pastoralism that incorporates information on the permanence of a society's settlement. We interact the measure described above with a dummy variable equal to one if a society's settlement pattern is impermanent. Variable v30 informs about an ethnic group's prevailing type of settlement pattern. Potential values include: 1 nomadic or fully migratory, 2 semi-nomadic, 3 semi-sedentary, 4 compact but impermanent settlements, 5 neighborhoods of dispersed family homesteads, 6 separated hamlets, forming a single community, 7 compact and relatively permanent, and 8 complex settlements. We classify groups as residing in impermanent

[7]The *Peoples of Easternmost Europe* increase the database by 17 observations, the Peoples of Siberia by 10, and the *World Ethnographic Sample* by 17.

settlement if variable v30 equals 1 nomadic or fully migratory, 2 seminomadic, 3 semisedentary, or 4 compact but impermanent settlements.[8] Our resulting *Transhumant Pastoralism* variable is an index from 0 to 100 in 10 percent intervals. Specifically, we construct the index as follows:

$$\begin{aligned} Transhumant\ Pastoralism_e = &\ Animal\ Husbandry_e \\ &\times Herding\ Animals_e \\ &\times Impermanent\ Settlement_e \end{aligned}$$

where $Animal\ Husbandry_e \in$ [0;100] reflects percentage dependence on animal husbandry; $Herding\ Animals_e$ equals one if a society raises sheep, goats, equine animals, deer, camelids, or bovine animals, and zero otherwise; and $Impermanent\ Settlement_e$ equals one if a society's settlement pattern is either "nomadic or fully migratory", "seminomadic", "semisedentary", "compact but impermanent settlements", or "neighborhoods of dispersed family homes", and zero otherwise.

For a number of groups, our ethnographic database contains missing values for some of the key variables in our sample: v4, v30, and v40. Specifically, one group has missing values for reliance on animal husbandry (v4), 109 groups have missing values for predominant type of animal husbandry (v40), and 104 groups have missing values for settlement pattern (v30). We use the different volumes of the *Encyclopedia of World Cultures* (EWC) published in the 1990s to fill in missing information (Levinson, 1991). The EWC is a series of 11 standardized volumes providing detailed information on ethnic groups, including their culture, background, subsistence, kinship structure, land tenure and beliefs. Published recently, most of its content describes present-day or recent historical practices (typically from the second half of the 20th century). However, in some cases, it includes historical information or descriptions of traditional practices and lifestyles. Using this information and other sources, we are able to reduce the amount of information to zero for variable v4, 14 groups for v30, and 23 groups for v40. Figure 3 displays the distribution of transhumant pastoralist groups in the Ethnographic Atlas.

[8] This measure has also been used in recent literature (McGuirk and Nunn, 2025).

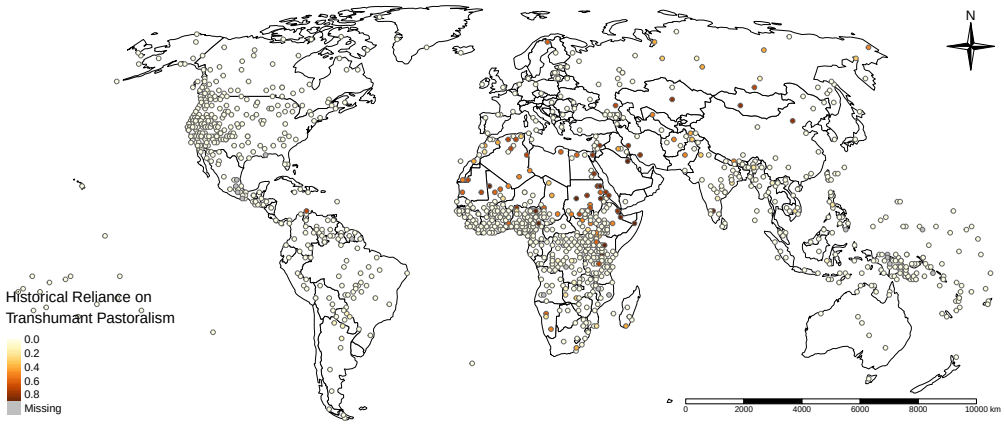


Figure 3: Distribution of Transhumant Pastoral Groups in the Ethnographic Atlas

Notes: This map displays the distribution of transhumant pastoralist groups in the Ethnographic Atlas (Murdock, 1967, Gray, 1999). Transhumant Pastoralism ϵ [0;100], is based on variable v4 (animal husbandry), variable v40 (predominant type of animal husbandry), and v30 (impermanent settlement).

3.2. *Measuring In-Group and Out-Group Trust*

To construct our measure of in-group relative to out-group trust, we primarily rely on the World Values Survey (Haerpfer, Inglehart, Moreno, Welzel, Kizilova, Diez-Medrano, Lagos, Norris, Ponarin, Puranen et al., 2022) and the European Values Study (EVS, 2022), which together form the Integrated Value Survey.

The Integrated Value Survey (IVS) contains data on trust for 285,569 respondents residing in 104 countries. In this study we are interested in the difference in how much people trust in-group members relative to out-group members. Therefore, we rely on six trust questions to construct a measure of in-group relative to out-group trust. In-group trust is measured as average trust in: (i) family members, (ii) neighbors, (iii) other people known by the respondent. Out-group trust is measured as average trust in: (iv) people met for the first time, (v) people of other religion, and (vi) foreigners.[9] In the Integrated Values Surveys, each trust question is coded on a four-point ordinal scale corresponding to the respondent's reported level of trust in that group: 1 = not at all, 2 = not very much, 3 = somewhat, and 4 = completely. For ease of interpretation, we rescale these responses to range from 0 to 3, preserving the ordinal structure while centering the lowest

[9]The exact wording of the survey question is as follows: "I'd like to ask you how much you trust people from various groups. Could you tell me for each whether you trust people from this group completely, somewhat, not very much or not at all?" (Read out and code one answer each) [Your family ; Your neighborhood, People you know personally, People you meet for the first time, People of another religion, People of another nationality].

trust category at zero. Our outcome variable is defined as:

$$\Delta(Trust^{In} - Trust^{Out}) = AvgTrust(i,ii,iii) - AvgTrust(iv,v,vi)$$

The outcome varies from -3 to 3. People who do not differentially trust their in-group relative to their out-group receive a value of 0. People that are perfectly in-group biased score 3, while those who are perfectly out-group biased receive a score of -3. Variations of this measure of in-group relative to out-group trust have been used in the recent literature (Moscona et al., 2017, Buggle et al., 2017, Enke, 2019, Enke et al., 2023).

Figure 1 plots the distribution of our main outcome variable across countries. All groups show greater trust of the in-group relative to the out-group. Among the sampled countries, Libya, Uzbekistan, and Yemen have the highest level of in-group relative to out-group trust with a $\Delta(Trust^{In} - Trust^{Out})$ around 1.65; Iceland, Sweden, and the United States have the lowest levels of in-group relative to out-group trust with scores below .65.

3.3. Additional Data

Appendix A describes the additional datasets used in our analysis. We draw on trust measures from Round 9 of the Afrobarometer (Afrobarometer, 2023), which provides questions that are symmetric to those in the Integrated Values Surveys. We also use exit questions from Afrobarometer Rounds 3 to 9, the 2016 wave of the Life in Kyrgyzstan Study (Life in Kyrgyzstan Study, 2013), and data on firm ownership and firm size outcomes from the World Bank Enterprise Surveys.

4. Empirical Strategy and Results

This section describes our empirical strategy and presents the results. We start by documenting how an historical reliance on transhumant pastoralism correlates with average in-group relative to out-group trust across countries (Section 4.1). Second, we leverage within country variation in ancestral reliance on transhumant pastoralism between individuals belonging to different ethnic groups living in a same country (Section 4.2). Third we present a series of additional results: across districts within countries, among second generation immigrants, using data from the

Afrobarometer Surveys round 9. We also use ethnographic data to document that the pattern we observe was already present in pre-industrial times (Section 4.3). Finally, we also provide contemporary evidence using a household survey from Kyrgyzstan.

4.1. Cross-Country Estimates

We first examine the correlation between historical reliance on transhumant pastoralism and in-group relative to out-group trust across countries. Here, we collapse the Integrated Values Surveys data at the country-wave level. To measure historical reliance on transhumant pastoralism at the country level, we follow the methodology developed by (Giuliano and Nunn, 2021) to construct an ancestry-adjusted measure. The method consists in matching contemporary populations to their ancestors in the EA based on the language they speak. This method allows us to construct a population-weighted average of ancestral reliance on transhumant pastoralism for every country in the world. Figure B2 plots the distribution of historical reliance on transhumant pastoralism across countries.

We estimate variations on the following equation:

$$\Delta(Trust^{In} - Trust^{Out})_{ct} = \alpha + \beta Transhumant\ Pastoralism_c + \mathbf{X_c'\Gamma} + \delta_{r(c)} + \lambda_t + \varepsilon_{ct} \quad (1)$$

Where $\Delta(Trust^{In} - Trust^{Out})_{ct}$ denotes the average in-group minus out-group trust at the country c level at time t, and $TranshumantPastoralism_c$ is our country-level index of historical reliance on transhumant pastoralism. The vector $\mathbf{X_c'}$ includes geographic, disease, climate, and ethnographic controls that are strong correlates of historical pastoralism and may also affect in-out trust through independent channels. We further control for the country's average log number of years since an ethnic group was last observed in the Ethnographic Atlas. Our country-level regressions use the Integrated Values Surveys, which pool the World Values Survey and the European Values Study, and we include survey fixed effects in all specifications. We also control for year-of-interview fixed effects, λ_t, and, in some specifications, continent fixed effects, $\delta_{r(c)}$, where $r(c)$ maps each country to its continent, to capture time-invariant regional differences. Finally, ε_{ct} is the error term. We expect a positive coefficient on β, indicating that greater historical reliance on transhumant pastoralism is associated with stronger in-group relative to out-group trust.

Table 1 presents the estimates from equation 1. Column (1) reports the unconditional estimate of the relationship between historical reliance on transhumant pastoralism and in-group relative to out-group trust. The raw data gives a strong positive correlation between historical reliance on transhumant pastoralism and in-group relative to out-group trust. In column (2) we we control for the log average number of years since a country's ethnic groups were observed in the Ethnographic Atlas since some groups were observed earlier than others. In columns (3) we add geographic, disease, and climate controls. The vector of geographic controls include absolute latitude, longitude, ruggedness, land suitability for agriculture, elevation, elevation squared, and distance to the nearest coast. Holding constant geographic features halves the size of the effect. Disease environment controls include suitability for the tsetse fly, and malaria. Climate controls include historical average temperature and precipitation. In column (4), we add ethnographic controls, including political complexity, mean size of the local community, and historical irrigation presence as ethnographic controls. Column (5) includes Africa, Asia, Europe, North America, Oceania, and South America indicator variables. Finally, given that there are many possible potential choices of covariates, in column (6) we use Lasso to select which covariates to include in the estimation of our coefficient of interest (Belloni, Chernozhukov and Hansen, 2014a,b).

The estimated coefficients imply that a one standard deviation increase in historical reliance on transhumant pastoralism leads to a .16 to .34 standard deviation increase in in-group relative to out-group trust bias. To give one concrete example: Iraq scores .8 in our transhumant pastoralism index and 1.4 (90^{th} percentile) in delta trust. According to our point estimate, if the population of Iraq had not relied on transhumant pastoralism in the past, Iraq's average delta trust would have been 1.07 (50^{th} percentile), a level similar to Czech Republic who scores 0 in our transhumant pastoralism index. Taken together, the cross-country evidence supports the hypothesis that greater historical reliance on transhumant pastoralism is associated with stronger in-group bias in trust.

In Appendix Table B1, we show that the results are robust to controlling for proxies for historical and contemporary development. This includes log country size in square kilometers from, population in the year 1500 from Ashraf and Galor (2013), population in the year 2000 from Feenstra, Inklaar and Timmer (2015), log GDP in $2015 from Feenstra et al. (2015), legal origins

Table 1: Cross-Country Estimates: Transhumant Pastoralism and In-Group Trust Bias

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})					
	(1)	(2)	(3)	(4)	(5)	(6)
Transhumant Pastoralism	0.609***	0.631***	0.493***	0.432***	0.293*	0.445**
	(0.148)	(0.161)	(0.167)	(0.123)	(0.163)	(0.176)
Baseline Control	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Disease Controls	N	N	Y	Y	Y	Y
Climate Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Continent FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	1.015	1.015	1.015	1.015	1.015	1.015
Adjusted R2	0.231	0.225	0.354	0.439	0.467	.
Beta Coef.	0.335	0.347	0.271	0.237	0.161	0.244
Num. of Observations	210	210	210	210	210	210
Num. of Clusters	104	104	104	104	104	104

Notes: The table presents OLS estimates with standard errors clustered at the country level in parentheses. The unit of observation is a country and data is from the Integrated Value Survey. *Transhumant Pastoralism* is an index [0/1] measuring a country's population historical reliance on transhumant pastoralism. The dependent variable in every column is the difference between average in-group trust (family, neighbors, people known) and average out-group trust (people first met, people of another religion, foreigners). *Baseline control* includes the ancestry-adjusted log number of years since the ethnic groups present in a country were first recorded in the Ethnographic Atlas. *Geographic controls* include the ancestry-adjusted absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include the ancestry-adjusted historical tsetse fly suitability and malaria ecology. *Climate controls* include the ancestry-adjusted mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include the ancestry-adjusted political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. * p < 0.1; ** p < 0.05; *** p < 0.01.

from La Porta, Lopez-de Silanes, Shleifer and Vishny (1999), democracy from the Polity V project, ethnic, religious, and linguistic fractionalization from Alesina, Devleeschauwer, Easterly, Kurlat and Wacziarg (2003), share of population from the top five religions from the PEW Research Center, number of inter-state wars between 1950 and 2000, and number of extra-state wars over the same period from Correlates of War Project.

Importantly, in Appendix Table B2, we show that the results are specific to transhumant pastoralism. We re-estimate equation 1 controlling for all major historical subsistence strategies and using agriculturalists as the omitted category. We find that the positive association between transhumant pastoralism and in-group relative to out-group trust remains strong and statistically significant across specifications, whereas other livelihoods do not exhibit comparable patterns. These results confirm that the trust pattern we document is specific to the social and organizational features of transhumant pastoralism.

To further probe the historical roots of our results, we turn to archaeological data from Stephens, Fuller, Boivin, Rick, Gauthier, Kay, Marwick, Armstrong, Barton, Denham et al. (2019), whose ArchaeoGLOBE project provides systematic, expert-coded information on the timing of widespread adoption of major subsistence strategies across the world. These data identify the century in which different livelihoods, such as hunting and gathering, intensive and extensive agriculture, and pastoral systems, became prevalent within each region. The ArchaeoGLOBE results indicate that pastoral systems were already widespread in many parts of the world by 4000-3000 BP, suggesting a long historical horizon during which livelihood-specific social norms could become culturally entrenched.

We exploit this temporal dimension by re-estimating equation 1, replacing our measure of historical reliance on transhumant pastoralism with the number of years since the widespread adoption of transhumant pastoralism. The results, reported in Table B3, show that earlier adoption of transhumant pastoralism is strongly and positively associated with contemporary in-group trust bias. Moreover, consistent with our previous findings, this pattern is specific to transhumant pastoralism: the coefficients for early adoption of hunting and gathering, intensive agriculture, and extensive agriculture are small, often of the opposite sign, and statistically indistinguishable from zero. These results further reinforce the view that the cultural legacy shaping in-group favoritism today is rooted in the particular social ecology of transhumant

pastoralism.

4.2. Within-Country Estimates

Countries differ widely in institutional quality, development, education, governance, and survey implementation. If these country-level factors are correlated both with historical subsistence strategies and with contemporary trust norms, cross-country comparisons may conflate within-country cultural legacies with broad national differences. To address this concern, we estimate specifications that exploit within-country variation across ethnic groups and individuals. Our estimating equation at the individual level is:

$$\Delta(Trust^{In} - Trust^{Out})_{iect} = \alpha + \beta Transhumant\ Pastoralism_e + \mathbf{X_i'\Phi} + \mathbf{X_e'\Psi} + \mu_{ct} + \varepsilon_{iect} \quad (2)$$

where $\Delta(Trust^{In} - Trust^{Out})_{iect}$ is the difference between average in-group trust and average out-group trust for respondent i, belonging to ethnic group e, in country c, and survey-wave t. The term $Transhumant\ Pastoralism_e$ measures the historical reliance of group e on transhumant pastoralism. We include a set of respondent-level controls $\mathbf{X_i'}$, a vector of geographic, disease, climate and ethnographic controls $\mathbf{X_e'}$, country-year fixed effects μ_{ct}, which absorb all country-level factors that vary over time. Finally ε_{iect} is an error term.

Because the European Values Study does not report respondents' ethnicity, this analysis relies exclusively on the World Values Survey. Table 2 presents the results. Across all specifications, the coefficient on Transhumant Pastoralism is positive and statistically significant. In the simplest specification without individual covariates (Column 1), individuals whose ancestors relied on transhumant pastoralism exhibit a 0.234-point increase in the difference between in-group and out-group trust relative to other individuals in the same country. Given that the dependent variable has a mean of 1.104, this effect is substantial: it corresponds to roughly 21% of the average level of trust bias. The coefficient remains stable when we add respondent demographics (Column 2), baseline controls (Column 3), geographic, disease, and climate controls (Column 4), ethnographic controls (Column 5).

In Table B4, we re-estimate our individual-level specification this time controlling for potentially endogenous control variables: education low, middle, high, religiosity, subjective social

Table 2: Individual-Level Estimates: Transhumant Pastoralism and In-Group Trust Bias

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})					
	(1)	(2)	(3)	(4)	(5)	(6)
Transhumant Pastoralism	0.234***	0.238***	0.226***	0.327***	0.303***	0.254***
	(0.078)	(0.080)	(0.073)	(0.052)	(0.093)	(0.074)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Control	N	N	Y	Y	Y	Y
Geographic Controls	N	N	N	Y	Y	Y
Disease Controls	N	N	N	Y	Y	Y
Climate Controls	N	N	N	Y	Y	Y
Ethnographic Controls	N	N	N	N	Y	Y
Country-Wave FEs	Y	Y	Y	Y	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	1.104	1.104	1.104	1.104	1.090	1.090
Adjusted R2	0.129	0.130	0.130	0.133	0.123	.
Beta Coef.	0.083	0.084	0.080	0.115	0.104	0.088
Num. of Observations	61,719	61,719	61,719	61,719	59,800	59,800
Num. of Clusters	124	124	124	124	121	121

Notes: The table reports OLS estimates with robust standard errors clustered at the language sub-family level reported in parentheses. The unit of observation is an individual respondent in the World Values Survey. *Transhumant Pastoralism* is an index [0/1] measuring the historical reliance on transhumant pastoralism of the respondent's ethnic group. The dependent variable in all columns is the difference between average in-group trust (trust in family, neighbors, and people known personally) and average out-group trust (trust in people met for the first time, people of another religion, and foreigners). *Respondent Demographics* include a respondent's age, age squared, and gender. *Baseline control* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. All specifications include country-wave fixed effects. * p < 0.1; ** p < 0.05; *** p < 0.01.

class indicator, employment status, and scale of income indicator. Again, we find that an individual's ancestry of transhumance pastoralism is associated with greater in-group bias.

4.3. Additional Analysis

Appendix B presents a series of complementary analyses that extend and reinforce our main findings. First, in Table B5, we compute an ancestry-adjusted measure of historical reliance on transhumant pastoralism at the district level within countries. We then examine how this district-level variation correlates with the average in-group versus out-group trust differential in each district. This analysis allows us to test whether the relationship identified at the individual and country level also holds at an intermediate geographic scale. We find that districts with a greater historical reliance on transhumant pastoralism exhibit a stronger in-group trust bias, consistent with the main results.

Second, we replicate the individual-level analysis using data from Round 9 of the Afrobarometer survey, hence focusing specifically on African countries. Here, as before, historical reliance on transhumant pastoralism is measured at the ethnic-group level, and the empirical specification mirrors that used in the individual-level World Values Survey analysis. As reported in Table B6, the results again indicate that greater historical reliance on transhumant pastoralism is associated with higher levels of in-group trust bias. This result confirms the robustness of the relationship across an alternative dataset.

Third, we adopt an epidemiological approach to assess whether the observed pattern persists among second-generation immigrants. The literature documents that several cultural traits linked to ancestral environments and livelihoods are transmitted across generations and persist across national contexts (see, e.g., Fernández and Fogli (2009), Algan and Cahuc (2010), Alesina et al. (2013)). We test whether this is also the case for the relationship between historical reliance on transhumant pastoralism and the scope of trust. In Table B7, we show that greater historical reliance on transhumant pastoralism in the respondent's parents' countries of origin, whether on the maternal or paternal side, or both sides, is significantly correlated with stronger in-group trust bias among second generation immigrants residing in their country of birth. This finding supports the interpretation that the effects of historical reliance on transhumance pastoralism

operate through persistent cultural channels rather than contemporaneous local conditions.

Fourth, we examine whether the relationship between reliance transhumance on transhumance pastoralism and in-group trust bias also appears among people who still practice transhumant pastoralism. For this, we turn to household survey data from Kyrgyzstan, where seasonal migration to high-altitude summer pastures (*jailoo*) remains part of contemporary livelihoods. Using the Life in Kyrgyzstan Study (2013), in Table B8 we find that households participating in *jailoo* migration exhibit greater in-group trust bias than both the general population and other agro-pastoral households.

Fifth, in Figure B3, we re-estimate equation 2 separately for each component of the in-out trust index. The figure shows that historical reliance on transhumant pastoralism is associated with higher trust in in-group members, especially relatives and neighbors, and with markedly lower trust in all categories of out-group members, including people met for the first time, individuals of another religion, and foreigners. This pattern indicates that the overall effect documented in the main results reflects both stronger in-group trust and systematic distrust of out-groups.

Sixth, using detailed ethnographic data from the Standard Cross-Cultural Sample, a subset of 186 societies from the Ethnographic Atlas with rich information on norms about the acceptability of violence toward different groups, we find results that are consistent with our main findings.[10] Table B9 shows that societies historically reliant on transhumant pastoralism exhibit greater in-group favoritism in the domain of violence norms. These results are important because they demonstrate that the pattern we observe in contemporary survey data was already present prior to colonization, forced sedentarization, the establishment of national borders, and industrialization.

Finally, Tables B10 and B11, consistent with our previous findings, we show that the pattern we uncover is not one of uniformly lower trust, but rather one of who is trusted along the social distance axis. To demonstrate this, we re-estimate equation 2 using as the outcome a measure of generalized trust: an indicator equal to one if the respondent reports trusting a generic stranger, and zero otherwise. Across countries, districts, and individuals (Table B10), as well as among second-generation migrants (Table B11), we estimate a precise zero for the effect of transhumant pastoralism. Taken together, these results reinforce the idea that transhumant pastoralism shapes

[10]See Figure B4 for a map of transhumant pastoralism among SCCS groups.

a distinctive trust structure characterized by highly localized in-group trust coupled with distrust of socially distant others, rather than lower trust overall.

4.4. Instrumental Variable Approach

So far, we have established a robust positive correlation between historical reliance on transhumant pastoralism and contemporary in-group trust bias, controlling for extensive geographic, climatic, disease, and ethnographic characteristics. We have also provided historical and contemporary validation. Nonetheless, two endogeneity concerns remain. First, there may be omitted variable bias. It could be that a latent variable explains the emergence of transhumant pastoralism and the development of in-group trust norms. Second, there may be reverse causality: only groups with pre-existing norms of strong internal cohesion may have been able to sustain transhumant pastoralism historically, in which case the observed correlation may reflect deeper underlying traits rather than a causal effect. To address these concerns, we adopt an instrumental variable strategy.

Because transhumant pastoralism likely emerges in response to ecological constraints rather than cultural preferences, environmental suitability provides a natural source of quasi-exogenous variation (Stephens et al., 2019). Our instrument captures environmental suitability for transhumant pastoralism relative to agriculture. This approach follows the logic of existing studies that use ecological suitability as a source of exogenous variation in pastoral reliance (e.g., Becker (2024), Araújo et al. (2021), but departs from them in two key ways. First, we construct suitability specifically for transhumant pastoralism, rather than generic pastoralism. Second, we build a new dataset addressing several limitations of the commonly used suitability estimates from Beck and Sieber (2010) discussed in Section B.5. These limitations include limited geographic coverage and contemporary data sources rather than historical. Because of these limitations, we construct a new instrument with global geographical coverage and fully referenced, exogenous environmental inputs. We view this new dataset as a contribution in its own right.

Borrowing from ecological modeling practices, we estimate the geographic suitability for transhumant pastoralism and agriculture using a Maximum Entropy species-distribution model (MaxEnt) (Phillips, Anderson and Schapire, 2006, Phillips and Dudík, 2008, Phillips, Dudík and

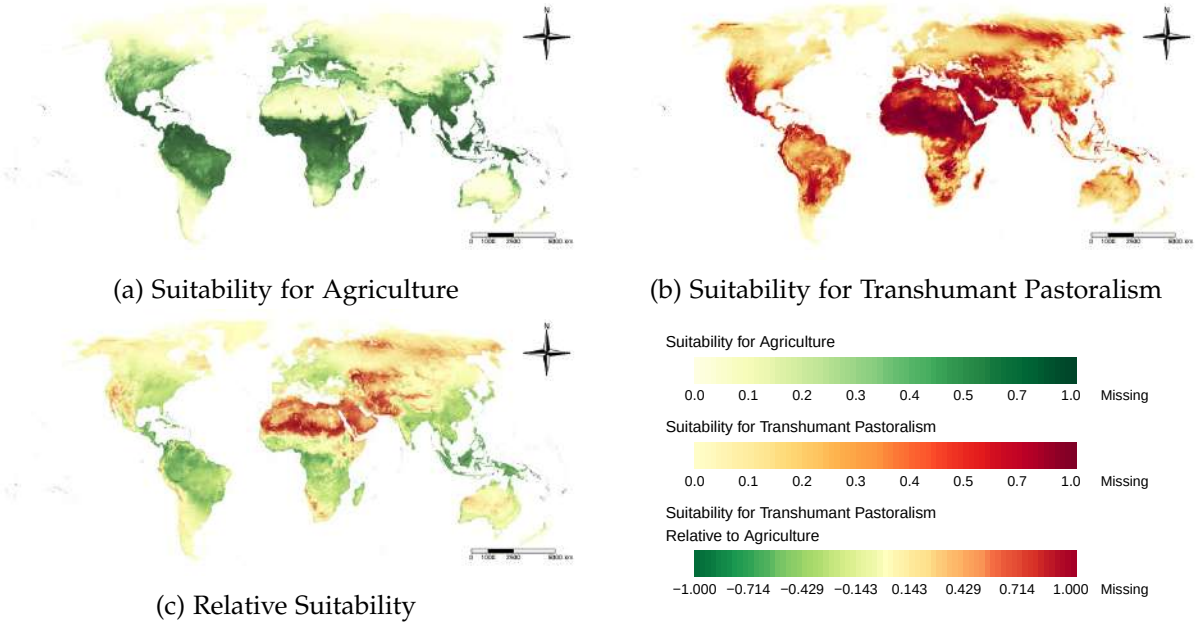
Schapire, 2017). MaxEnt predicts the probability of presence of a "species", here, a livelihood system, based on environmental covariates observed at locations of known presence and at randomly sampled background points.

We use the Ethnographic Atlas to extract latitude-longitude coordinates of ethnic groups historically engaged in transhumant pastoralism (treatment, presence points) and those engaged in pre-industrial agriculture (control, presence points). The environmental data we use consists of elevation from (Fick and Hijmans, 2017), precipitation and temperature in the pre-industrial era (Compo, Whitaker, Sardeshmukh, Matsui, Allan, Yin, Gleason, Vose, Rutledge, Bessemoulin et al., 2011). We use variable monthly convective precipitation accumulation at the surface, and monthly skin temperature from January 1840 to December 1959. For both temperature and precipitation, we use these sources to compute the mean, range, min, max, mean in the driest quarter, mean in the wettest quarter, mean in the hottest quarter, and mean in the coldest quarter. We use clay, sand, and silt content within 5 cm depth from the surface from (Poggio, De Sousa, Batjes, Heuvelink, Kempen, Ribeiro and Rossiter, 2021).

Maximum entropy modeling uses the presence points and background data to estimate the likelihood surface of suitability. We produce two predicted surfaces: suitability for agriculture and suitability for transhumant pastoralism. These are presented in Figure 4. The instrument is defined as the ratio (or difference) of these two predicted suitability scores measured within 100 kilometers from the centroid of each ethnic group's ancestral territory. Section B.5 provides details on the procedure for constructing the instrument and statistics.

This measure provides plausibly exogenous, spatially continuous variation in the relative environmental suitability for transhumant pastoralism, which we use to instrument historical reliance on transhumant mobility. Figure B5 presents a binsreg plot of the relationship between our instrument, land suitability for transhumant pastoralism relative to agriculture, and historical reliance on transhumant pastoralism. The pattern shows a clear and monotonic relationship: historical reliance on transhumant pastoralism remains close to zero in areas where land is relatively unsuitable for pastoral mobility, but rises sharply as environmental conditions become more favorable for transhumant herding. This strong first-stage relationship supports the validity of our instrument.

Table 3 reports instrumental variable estimates of the effect of historical reliance on transhu-



(a) Suitability for Agriculture

(b) Suitability for Transhumant Pastoralism

(c) Relative Suitability

Figure 4: Output from Maxent

Notes: This figure presents global suitability maps generated using maximum entropy model. Panel 4a shows predicted environmental suitability for agriculture, while panel 4b displays suitability for transhumant pastoralism. Suitability values range from 0 (least suitable) to 1 (most suitable). Panel 4c reports relative suitability, computed as the difference between the two predicted surfaces, where red areas indicate conditions relatively more suitable for transhumant pastoralism and green areas indicate conditions more suitable for agriculture. The maxent model was fitted using a set of biophysical and climatic predictors, including mean, minimum, maximum, and range of temperature and precipitation (annual and seasonal averages for cold, warm, dry, and humid quarters) for the period 1840-1849; elevation and elevation squared; and soil characteristics (sand, silt, and clay content).

mant pastoralism on contemporary in-group trust bias. The unit of analysis is an individual respondent in the World Values Survey, whom we link to historical reliance on transhumant pastoralism using the respondent's self-reported ethnic affiliation. Across all specifications, the coefficient on transhumant pastoralism is positive, statistically significant, and substantially larger than the corresponding OLS estimates (Table 2), consistent with attenuation bias stemming from measurement error in the historical transhumant pastoralism variable. The magnitude of the estimates is economically meaningful. Using the standardized version of the transhumant pastoralism index, the results imply that a one-standard-deviation increase in historical dependence on transhumant pastoralism increases the in-group trust bias by approximately 0.11-0.13 units of a standard deviation. Across specifications, the F-statistic on the excluded instrument ranges from 5.88 to 10.01, which is consistent with a moderately strong first stage.

5. Mechanisms

We now investigate mechanisms linking historical reliance on transhumant pastoralism and in-group trust bias. Historical transhumant pastoralism required recurrent seasonal movement along geographically defined routes. Variation in the topography of these routes generated systematic differences in the extent to which pastoral communities encountered other groups and the institutional environments governing these interactions. Routes with low elevation gradients – relatively horizontal pathways – were generally associated with broader mobility across contiguous ecological zones and, as a result, with a greater likelihood of crossing administrative or political boundaries. Movement along such routes often occurred under limited external enforcement, creating incentives for groups to develop norms that favored internal cohesion, mutual protection, and as a result higher in-group trust. By contrast, routes with high elevation gradients – i.e. more vertical pathways – constrained movement to narrower areas and reduced exposure to cross-group interactions. These constraints limited the frequency and scope of encounters requiring cooperation or negotiation with outsiders.

The distinction between these two patterns of mobility yields one testable implication: the relationship between historical transhumant pastoralism and contemporary in-out-group trust should be stronger for groups whose historical routes were flatter. To evaluate this implication,

Table 3: Transhumant Pastoralism and In-Group Trust Bias: Instrumental Variable Estimates

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})					
	(1)	(2)	(3)	(4)	(5)	(6)
Transhumant Pastoralism	0.358***	0.363***	0.347***	0.305***	0.619*	0.378***
	(0.108)	(0.110)	(0.108)	(0.094)	(0.351)	(0.110)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	N	Y	Y	Y	Y
Geographic Controls	N	N	N	Y	Y	Y
Ethnographic Controls	N	N	N	N	Y	Y
Country FEs	Y	Y	Y	Y	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	1.104	1.104	1.104	1.104	1.090	1.090
Beta Coef.	0.126	0.128	0.123	0.108	0.214	0.130
Num. of Observations	61,719	61,719	61,719	61,719	59,800	59,800
Num. of Clusters	124	124	124	124	121	121
F Stat. Excluded Instrument	8.160	8.160	7.740	10.010	5.880	

Notes: The table presents OLS estimates with robust standard errors clustered at the language sub-family level. The unit of observation is a society in the Standard Cross-Cultural Sample (Murdock and White, 1969). The dependent variable in columns (1) to (3) measures in-group favoritism as the difference between the acceptability of violence toward people in the same society, but outside of the local community, and members of the local community. In columns (4) to (6), the dependent variable measures in-group favoritism as the difference between the acceptability of violence toward people in other societies and members of the local community. Every specification controls for the log number of years since an ethnic group was recorded in the SCCS.
* p < 0.1; ** p < 0.05; *** p < 0.01.

we proceed as follows. First, we describe the construction and validation of a transhumance routes' horizontality index. Second, we test whether route horizontality systematically amplifies the core relationship between historical transhumance and in-out-group trust . Third, we document how route characteristics map into differential exposure to cross-group interactions. Fourth, we examine how an exogenous disruption to historical routes affect conflict, providing behavioral evidence consistent with the proposed mechanism.

5.1. Constructing and Validating an Index of Transhumance Routes' Horizontality

We begin by introducing the *Atlas of Historical Transhumance Routes*, which we construct by digitizing maps of transhumant routes across the globe. This dataset covers 2,013 transhumance routes of pastoral populations across Africa, the Middle East, and Eurasia. Figure 5 shows the outcome of our data collection effort.[11] The Atlas, generated from the digitization of over 60 maps, identifies the location of historically used transhumance routes, providing a detailed representation of the paths along which pastoral groups moved during their seasonal movements.

[11] Appendix section A.3 provides information on the data collection methodology and data construction. Table A1 provides summary statistics at the route level. Figure A1 presents the density of maps digitized by geographic region. Figure A2 presents the temporal distribution of digitized maps. Figure A3 and A4 show the type of sources digitized.

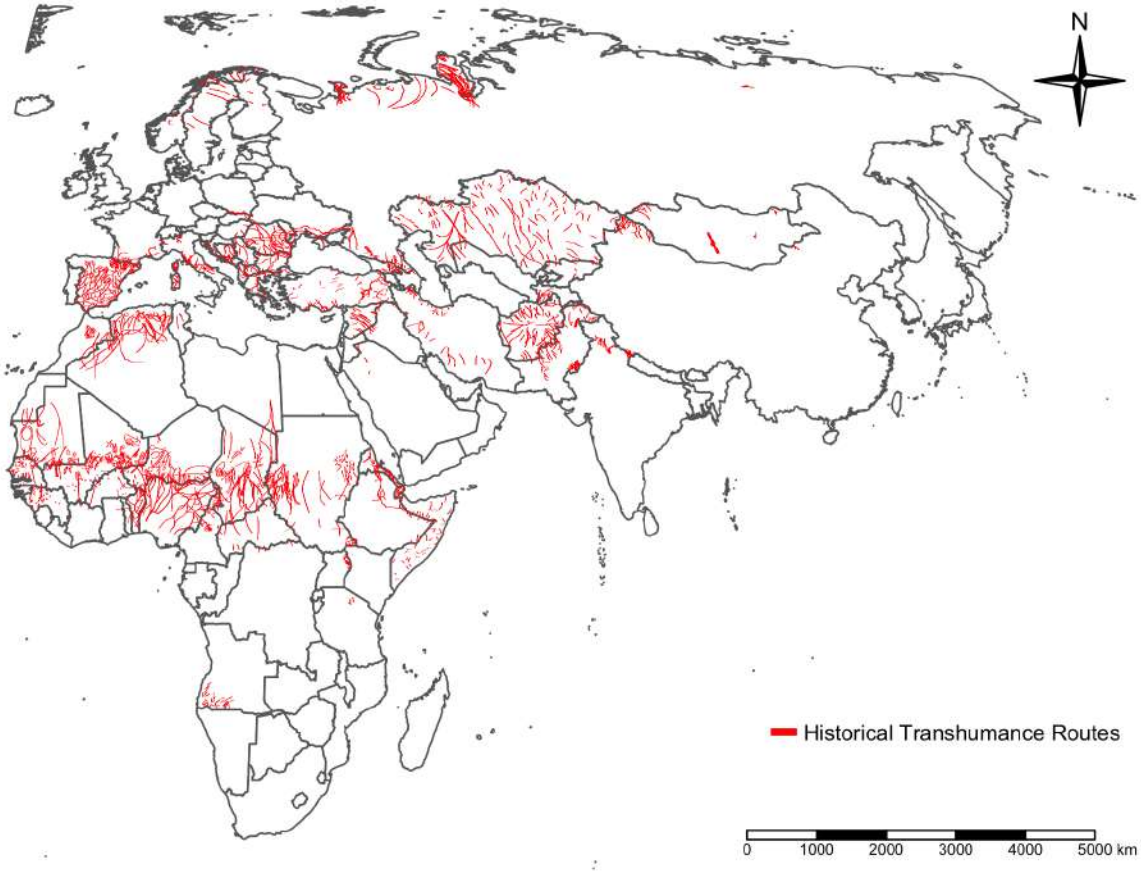


Figure 5: The Atlas of Historical Transhumance Routes

Notes: This map displays 2,013 historical transhumance routes across African and Eurasia. Each road is represented by a red line.

To illustrate variation in route topography, Figure 6 provides graphical illustrations of horizontal and vertical transhumance. The left panel (6a) represents a scatterplot of the relationship between the 10th and the 90th percentile of elevation along each individual route represented by a light blue dot.[12] Red dots represent the median for a given transhumant pastoral group. Dots positioned near the dashed red line represent roads (groups) not gaining any elevation over their transhumance. One example of such group is the Dinka whose routes vary from 700 meters and 800 meters elevation. In contrast, groups like the Dard from Pakistan gain approximately 1000 meters over their transhumance. The right panel (6b) shows the relationship between road length and elevation range between the 90th and 10th percentile of elevation. We see that some routes are extremely long (over 700 kilometers) but remain relatively flat. Others are shorter but gain a lot of elevation. These patterns motivate a measure of route topology that we can link to contemporary outcomes.

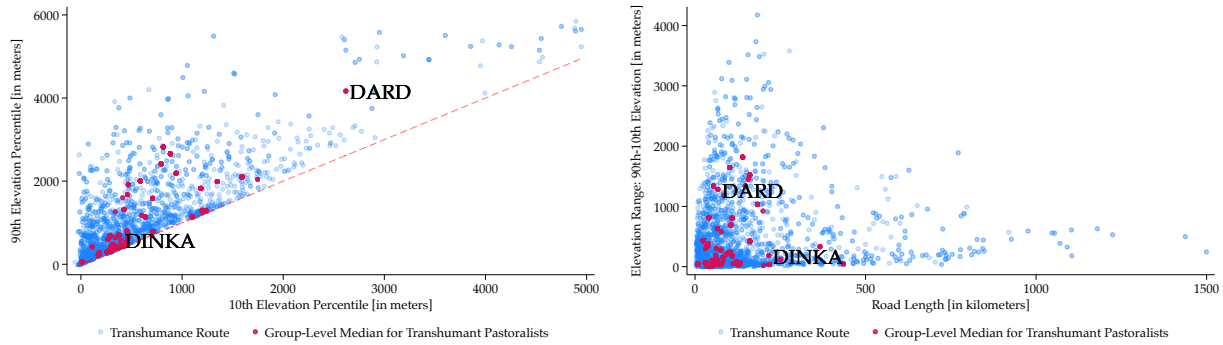
Building on Figure 6, we construct a route horizontality index to capture the extent to which a transhumance route is horizontal rather than vertical:

$$\text{Route Horizontality}_r = -1 \times \frac{P^{\text{elev}}_{90,r} - P^{\text{elev}}_{10,r}}{\text{Length}_r}$$

where $P^{\text{elev}}_{90,r}$ and $P^{\text{elev}}_{10,r}$ denote the 90th and 10th percentile of elevation (in meters) along route r, and Length_r is the total route length (in kilometers). The negative sign ensures that higher values correspond to flatter, more horizontal routes. This measure normalizes elevation gain by route length, allowing comparison across routes of different scales and topographies while minimizing the influence of outlier peaks or valleys. In practice, higher values of the index denote flat transhumance routes, typical of Sahelian or Central Asian transhumance (Dinka people), while lower values correspond to steep routes typical of alpine systems (Dard people).

Each route is linked to the ethnic groups whose ancestral territories intersect either the origin or destination of the route, using Ethnologue's digitized ethnic-boundary polygons. Figure A5 presents an example of the matching for Iran. For each ethnic group, we compute the mean horizontality across all routes intersecting its territory. This procedure assigns route characteristics to groups relying on transhumant pastoralism as well as to groups historically exposed to such mobility.

[12] Elevation data are derived from Yamazaki, Ikeshima, Tawatari, Yamaguchi, O'Loughlin, Neal, Sampson, Kanae and Bates (2017).



(a) Elevation Gain

(b) Routes Verticality Relative to Length

Figure 6: Vertical and Horizontal Dimensions of Transhumance Routes

Notes: Across figures, light blue dots represent all digitized transhumance routes worldwide (N=2,013). Red dots show the median for each transhumant pastoralist group. Panel 6a plots routes by their 10th and 90th elevation percentiles (in meters). Panel 6b shows the elevation range (90th minus 10th percentile) for each individual transhumance route as a function of total route length (in kilometers).

We validate the horizontality measure using an independent dataset from the League of Pastoral Peoples (LPP), which provides information on pastoral systems for organizations related to pastoralism worldwide. From this dataset, we link 83 groups to our Atlas. Because the LPP does not provide polygons for ethnic territories but only latitude-longitude coordinates, we match groups to transhumance routes based on spatial proximity, using a 50 km buffer around each group's location. Appendix Figure B10 plots the distribution of elevation range per 100 km of route for groups classified by the LPP as horizontal or vertical pastoral systems. Groups classified by the LPP as practicing horizontal transhumance exhibit dramatically lower elevation ranges than vertical groups, confirming that the measure captures meaningful variation in mobility structure and validating our index externally.

5.2. *Horizontal and Vertical Transhumance: Evidence from the Atlas*

To test whether the degree of transhumance' horizontality has implications for in-group versus out-group trust, we examine heterogeneity in the effect of transhumant pastoralism along routes' horizontality. We augment our within country specification and estimate the following

specification:

$$\begin{aligned}\Delta(Trust^{In} - Trust^{Out})_{iect} =& \alpha + \beta Transhumant\ Pastoralism_e + \theta Routes'\ Horizontality_e \\ &+ \omega(Transhumant\ Pastoralism_e \times Routes'\ Horizontality_e) \\ &+ \mathbf{X_i'\Phi} + \mathbf{X_e'\Psi} + \mu_{ct} + \varepsilon_{iect}\end{aligned} \tag{3}$$

where $(Trust^{In} - Trust^{Out})_{iect}$ is our outcome variable 'in-out trust' for individual i, of ethnic ancestry e, from country c, surveyed in year t. $Transhumant\ Pastoralism_e$ is our index of historical reliance on transhumant pastoralism for individual i's ethnic group e. $Routes'\ Horizontality_e$ captures the flatness of transhumance routes historically intersecting the territory of group e. This matching procedure assigns route characteristics even to groups that do not practice transhumance but are historically recurrently exposed to it.

The coefficient θ captures the association between routes' horizontality and in-out-group trust for non-transhumant groups, while the interaction coefficient ω captures how the transhumance-trust relationship varies with route flatness. A positive coefficient on the interaction term ω indicates that the effect of transhumant pastoralism on in-group trust bias increases with the degree of route flatness, consistent with the hypothesis that horizontal (low-relief) transhumance amplifies the association between historical pastoral mobility and parochial trust norms.

Table 4 reports the OLS estimates of Equation 3. Across specifications, the coefficient on transhumant pastoralism remains positive and statistically significant, consistent with the baseline finding. The interaction term between transhumant pastoralism and route horizontality is also consistently positive and significant, indicating that the parochial trust associated with transhumant ancestry is stronger in settings where historical routes were flatter.

Figure 7 shows how the estimated effect of ancestral transhumant pastoralism on parochial trust varies with transhumance routes' horizontality. At low horizontality (-2σ), the effect is close to zero and statistically indistinguishable from zero. At mean horizontality, the effect is approximately 0.10 standard deviations. This monotonic increase suggests that historical transhumance translates into stronger parochial norms specifically when groups historically travelled more horizontal routes. The results are robust to alternative measures of route topology. Replacing our preferred horizontality index with either the p95-p5 elevation range (Table B12) yields comparable positive and significant interaction effects.

Table 4: Transhumant Pastoralism and In-Group Trust Bias: Heterogeneity by Routes' Horizontality

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})				
	(1)	(2)	(3)	(4)	(5)
Transhumant Pastoralism [std.]	0.063***	0.060***	0.061***	0.050***	0.035
	(0.015)	(0.013)	(0.011)	(0.013)	(0.030)
Routes' Horizontality [std.]	−0.051**	−0.031*	−0.024	−0.021	−0.060*
	(0.020)	(0.019)	(0.020)	(0.036)	(0.034)
Transhumant Pastoralism [std.]	0.033***	0.037***	0.032***	0.039**	0.046**
× **Routes' Horizontality [std.]**	(0.009)	(0.007)	(0.007)	(0.016)	(0.017)
Respondent Demographics	Y	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y	Y
Disease Controls	N	Y	Y	Y	Y
Climate Controls	N	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y
Country FEs	Y	Y	Y	Y	Y
Mean Dep. Var.	1.174	1.174	1.174	1.174	1.174
Adjusted R2	0.105	0.107	0.107	0.109	0.111
Num. of Observations	27,747	27,747	27,747	27,747	27,747
Num. of Clusters	42	42	42	42	42

Notes: The table reports OLS estimates with robust standard errors clustered at the language sub-family level reported in parentheses. The unit of observation is an individual respondent in the World Values Survey. *Transhumant Pastoralism* is an index ranging from 0 to 1 that measures the historical reliance of the respondent's ethnic group on transhumant pastoralism. *Route's Horizontality* is an index of terrain flatness, calculated as the negative difference between the 90th and 10th percentiles of elevation divided by the route's length ($\times$100). The dependent variable in all columns is the difference between average in-group trust (trust in family, neighbors, and people known personally) and average out-group trust (trust in people met for the first time, people of another religion, and foreigners). *Respondent Demographics* include a respondent's age, age squared, and gender. *Baseline controls* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. All specifications include country-wave fixed effects. * p < 0.1; ** p < 0.05; *** p < 0.01.

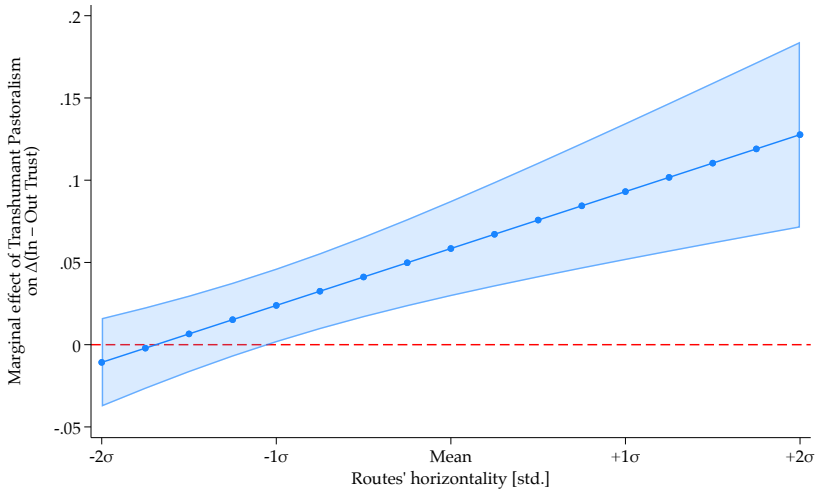


Figure 7: Marginal Effect of Transhumant Pastoralism on Parochial Trust Across Routes' Horizontality

Notes: This figure plots the marginal effect of transhumant pastoralism on the in-out-group trust differential as a function of routes! horizontality. Estimates are based on the specification in Table 4, column 1. The horizontal axis shows standardized horizontality (-2σ to +2σ). The solid line reports the estimated marginal effect; the shaded band shows 95% confidence intervals.

5.3. Route Topology and Exposure to Cross-Group Interactions

The effect of transhumant pastoralism on in-group trust bias is stronger along more horizontal routes. We now investigate what distinguishes these routes. Specifically, we examine whether horizontal transhumance paths are more likely to intersect diverse ethnic boundaries, features that historically shaped the frequency and nature of intergroup contact and coordination. The unit of analysis is a transhumance route. We estimate the following specification:

$$y_{rc} = \alpha + \beta Route\ Horizontality_{rc} + \mu Continent_c + \mathbf{X}_\mathbf{r}'\mathbf{\Lambda} + \varepsilon_{rc} \tag{4}$$

Where, $Route\ Horizontality_{rc}$ captures the flatness of a transhumance route r in continent c. For each historical transhumance route, we calculate the number of ethnic boundaries intersected by overlaying route geometries with Ethnologue's cultural boundary polygons. We control for each route's length, in level in columns (1) and (2), and in log in columns (3) and (4), as well as the year in which the historical route was used, as reported in the original map; these controls are included in $\mathbf{X}_\mathbf{r}'$ in every specification.

Table 5 summarizes the results. Routes' horizontality is consistently associated with crossing ethnic boundaries. The effect is strongest for ethnic boundaries when exploiting global variation

(odd columns). Adding continent fixed effects reduces precision (even columns), reflecting the limited within-continent variation in ethnic-group presence.

5.4. Cross-Group Interactions and In-Group Trust Bias

Having established that horizontal transhumance routes systematically intersect a greater number of ethnic boundaries, we now examine whether the intensity of cross-group encounters along these routes helps explain the relationship between historical transhumance and contemporary parochial trust norms. The proposed mechanism suggests that when pastoral mobility routinely brought groups into contact with outsiders, particularly in contexts lacking centralized enforcement and competition for resources, this generated incentives to strengthen internal cohesion and in-group solidarity. To test this implication, we construct a route-level measure of cross-group exposure. For each historical transhumance route intersecting an ethnic group's ancestral territory, we compute the share of the route's total length that falls outside the group's homeland. This measure captures the extent to which seasonal movements required pastoralists to travel through the territories of other groups, hence the degree of potential cross-group encounters. Using the Ethnographic Atlas to classify groups, we compute this measure separately for (i) any outside group, (ii) other transhumant pastoralist groups, (iii) pastoralist groups, and (iv) agriculturalist groups.[13]

We then estimate a version of equation 3 in which we interact historical reliance on transhumant pastoralism with the share of each group's historical transhumance routes that lay outside that group's ancestral territory. The unit of observation remains an individual from the World Values Survey, matched to ancestral groups.

Table 6 presents the results. Across columns (1) to (6), the findings are consistent and strongly supportive of the proposed mechanism. The coefficient on the interaction term between $Transhumant\ Pastoralism$ and the $Share\ of\ Transhumance\ Route\ Outside\ Ancestral\ Territory$ is positive and statistically significant in all specifications including encounters with transhumant pastoralists or pastoralist neighbors. Substantively, this means that the association between his-

[13]We identify pastoralist groups using the measure proposed by (Becker, 2024). We use variable v5 in the EA to identify agriculturalist groups. We classify a group as being agriculturalist if it historically retrieved more calories from agriculture than pastoralism.

Table 5: Transhumance Route's Horizontality and the Crossing of Ethnic Boundaries

	Dependent Variable: Ethnic Groupes Boundaries Crossed			
	Any [0/1]		#/km	
	(1)	(2)	(3)	(4)
Route's Horizontality	0.070***	0.043*	0.004**	0.003*
	(0.026)	(0.023)	(0.002)	(0.001)
Route Controls	Y	Y	Y	Y
Continent FEs	N	Y	N	Y
Mean Dep. Var.	0.473	0.473	0.010	0.010
Beta Coef.	0.140	0.086	0.196	0.130
Adjusted R2	0.102	0.115	0.064	0.081
Num. of Observations	2,013	2,013	2,013	2,013
Num. of Map Clusters	63	63	63	63
Num. of Country Clusters	66	66	66	66

Notes: The table reports OLS estimates with robust standard errors two-way clustered at the levels of the original source map and the main overlapping country. The unit of observation is a transhumance route. In columns (1)-(2) the dependent variable is a binary indicator equal to one if a transhumance route crosses at least one ethnic border, and zero otherwise. In columns columns (3)-(4), the dependent variable is the number of ethnic borders crossed per kilometer. *Route's Horizontality* is an index of terrain flatness, calculated as the negative difference between the 90th and 10th percentiles of elevation divided by the route's length. Higher values indicate flatter routes. Specifications reported in even columns include continent fixed effects (Africa, Asia, and Europe). All specifications control for the number of years since the route was recorded on the original map and route length. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

torical transhumance and in-group trust bias is stronger for groups whose seasonal movements required them to repeatedly traverse the territories of other (mobile) pastoral communities. In contrast, the main effect of transhumant pastoralism is small and often statistically insignificant in the absence of such cross-group exposure.

These patterns imply that mobility alone does not generate parochial trust norms; rather, such norms emerge specifically in contexts where mobility entailed recurrent intergroup interactions under weak institutional oversight. This is precisely the condition under which internal cohesion and parochial trust are predicted to be most adaptive.

By contrast, encounters with agriculturalist communities were historically less competitive and often symbiotic rather than rivalrous. In many agro-pastoral zones, pastoralists provided meat, milk, and manure, while agriculturalists supplied crop residues, cultivated grains, and access to post-harvest stubble fields. These relationships tended to be based on reciprocity and mutual benefit rather than direct competition for the same ecological resources. Consequently, moving through agriculturalist territory would not have strengthened internal cohesion in the same way as interacting with other pastoral groups, and indeed, in Columns (7) and (8) we find

Table 6: Routes' Horizontality and Ethnic Border Crossing

	Dependent Variable: Ethnic Borders Crossed [0/1]							
	Any Group		Transhumant Pastoralists		Pastoralists		Agriculturalists	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Transhumant Pastoralism [std.]	0.006	−0.002	0.010	−0.001	0.007	0.000	0.021	0.012
	(0.019)	(0.017)	(0.023)	(0.025)	(0.019)	(0.016)	(0.033)	(0.036)
Share of Transhumance Route Outside Ancestral Territory in [...] [std.]	−0.143**	−0.167**	−0.087***	−0.071**	−0.188***	−0.192***	0.074	0.050
	(0.063)	(0.063)	(0.027)	(0.030)	(0.061)	(0.059)	(0.055)	(0.070)
Transhumant Pastoralism [std.] × Share of Transhumance Route Outside Ancestral Territory in [...] [std.]	0.065**	0.070***	0.022**	0.024**	0.060**	0.062***	0.004	0.010
	(0.026)	(0.022)	(0.011)	(0.009)	(0.023)	(0.021)	(0.048)	(0.051)
Respondent Demographics	Y	Y	Y	Y	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y
Disease Controls	Y	Y	Y	Y	Y	Y	Y	Y
Climate Controls	Y	Y	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y	Y	Y
Ethnographic Controls	N	Y	N	Y	N	Y	N	Y
Country FEs	N	Y	N	Y	N	Y	Y	Y
Mean Dep. Var.	1.174	1.174	1.174	1.174	1.174	1.174	1.174	1.174
Adjusted R2	0.110	0.111	0.110	0.110	0.110	0.111	0.109	0.110
Num. of Observations	27,747	27,747	27,747	27,747	27,747	27,747	27,747	27,747
Num. of Clusters	42	42	42	42	42	42	42	42

Notes: The table reports OLS estimates with robust standard errors two-way clustered at the levels of the original source map and the main overlapping country. The unit of observation is a transhumance route. The dependent variable differs across panels: columns (1)-(2) refer to any ethnic borders crossed; columns (3)-(4) refer to agriculturalist ethnic borders crossed; and columns (5)-(6) refer to transhumant pastoralist ethnic borders crossed. In columns Across columns, the dependent variable is a binary indicator equal to one if a transhumance route crosses at least one respective border, and zero otherwise. *Route's Horizontality* is an index of terrain flatness, calculated as the negative difference between the 90th and 10th percentiles of elevation divided by the route's length (×100). Higher values indicate flatter routes. Specifications reported in even columns include continent fixed effects (Africa, Asia, and Europe). All specifications control for the number of years since the route was recorded on the original map. * p < 0.1; ** p < 0.05; *** p < 0.01.

no evidence that such encounters amplify the transhumance-trust association. Importantly, this distinction is consistent with more recent research showing that the historical complementarity between farming and herding has eroded under climate change, which is now pushing pastoralists and agriculturalists into increasingly direct competition for land, water, and growing-season timing (McGuirk and Nunn, 2025). The absence of a historical mechanism in agriculturalist territories in our data therefore reflects the fact that the pastoral-agricultural relationship was not traditionally conflictual, even though contemporary ecological pressures have shifted this balance.

Together, these findings reinforce the central mechanism: it is repeated interaction with other mobile pastoral groups, operating in contexts of resource competition and weak enforcement, that gives rise to persistent in-group trust norms-not simply mobility itself, nor generic exposure to out-groups.

5.5. *Mobility Impediment and Conflict: Evidence from the Partition of Sudan*

The results above show that the relationship between historical transhumant pastoralism and contemporary parochial trust depends critically on the nature of cross-group interactions experienced during seasonal mobility. Encounters with other pastoral or transhumant groups, who competed over grazing corridors, dry-season pastures, and access to water points (Dyson-Hudson and Dyson-Hudson, 1980), were historically marked by both ecological interdependence and strategic rivalry. These interactions took place in settings with limited centralized enforcement, making cooperation fragile and heavily reliant on negotiated arrangements, reciprocal norms, and strong internal cohesion. In contrast, interactions with agriculturalists were historically far more symbiotic, built around exchanges of manure, crop residues, and livestock products, and only recently became more competitive due to climatic pressures.

This distinction provides a clear theoretical implication: the institutions and trust norms that sustained cooperation along pastoral mobility corridors should break down when mobility is suddenly impeded. When movement becomes risky, redirected, or impossible, uncertainty increases, reciprocal grazing arrangements collapse, and identity boundaries harden, precisely the conditions under which conflict is most likely to emerge (Percival and Homer-Dixon, 1996).

The 2011 partition of Sudan creates a natural experiment to test this prediction. South Sudan's independence abruptly transformed several historically open north-south transhumance routes, long governed by customary institutions and negotiated cross-group agreements, into highly militarized international border crossings (Cormack and Young, 2012, Craze, 2013) (see Figure 8). The sudden imposition of checkpoints, security barriers, and political contestation altered the institutional environment under which pastoralists had historically migrated. By comparing conflict patterns along historical transhumance routes before and after the partition, we can directly evaluate whether exogenous restrictions on pastoral mobility generate the predicted rise in conflict, providing behavioral evidence consistent with the mechanism linking historical transhumance, intergroup interactions, and parochial trust norms.

To identify the relevant historical mobility corridors, we digitize eight detailed maps produced between the 1990s and the early 2000s that document the major transhumance routes used by Sudanese pastoralist groups prior to 2011. These maps provide precise information on the trajec-

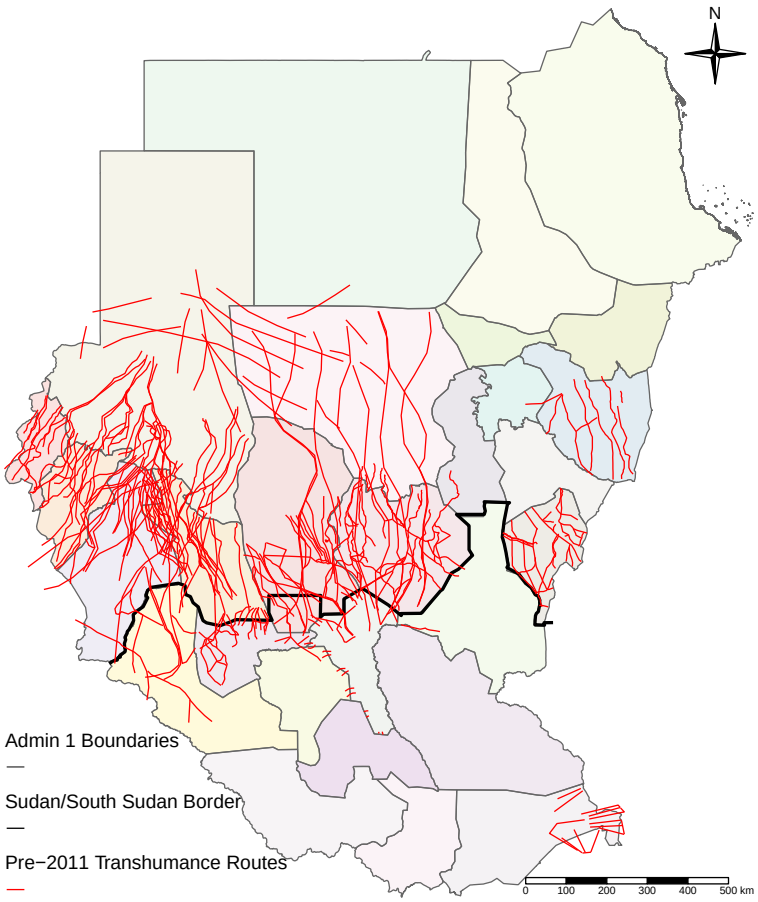


Figure 8: Transhumance Routes in Sudan

Notes: This figure displays major transhumance routes in Sudan before 2011. The background shows first-level administrative boundaries. The black line marks the Sudan-South Sudan international border as established in 2011.

tories several pastoral communities including groups whose seasonal movements brought them into regular contact with groups farther south. We georeference all eight maps and construct a unified dataset of pre-independence transhumance corridors across the Sudan-South Sudan borderlands.

Using this dataset, we estimate a difference-in-differences specification of the form:

$$Conflict_{it} = \alpha_i + \lambda_t + \beta(Transhumance\ Route_i \times Post\,2011_t) + \varepsilon_{it} \tag{5}$$

Where $Conflict_{it}$ is a dummy variable equal to one if at least one conflict took place in a 10 by 10 kilometers grid cell i at time t. α_i and λ_t are respectively matrices of cell and year fixed effects absorbing time-invariant spatial differences in conflict risk and common shocks. The interaction term $Transhumance\ Route \times Post\,2011_t$ identifies whether conflict rose disproportionately along historical transhumance corridors after 2011. The coefficient β is therefore a difference-in-differences estimate of the effect of the mobility constraint generated by the new border. Finally, ε_{it} is the error term.

Table 7 reports estimates of the effect of the 2011 border on conflict incidence along pre-2011 transhumance routes. Standard errors are two-way clustered by grid cell and by province-by-year to account for serial correlation within locations over time and for spatial correlation across neighboring cells sharing common administrative and political shocks. Across all specifications, we find a large and statistically significant increase in conflict along the historical transhumance routes after the 2011 partition. In the baseline specification, cells intersected by pre-independence routes become 0.97 percentage points more likely to experience conflict after 2011, relative to a pre-2011 mean of 0.28%. This represents a threefold increase in conflict incidence-substantively large given the sparsely populated nature of much of the study region.

Columns (2) to (5) disaggregate the outcome by subtype. The sharpest increases occur for land-related conflict, battles, and non-state violence, consistent with the mechanism that mobility disruptions destabilize negotiated grazing arrangements and intensify competition over shared dry-season pastures. In contrast, we observe only a small and marginally significant increase in riots, which are typically urban and not directly tied to pastoral mobility. This pattern reinforces the idea that the effects we document operate specifically through changes to pastoral institutions

and are not driven by broader political unrest.

Figure 9 reports event-study estimates. The pre-2011 coefficients are flat and statistically indistinguishable from zero, indicating parallel trends between treated and untreated cells prior to independence. Immediately after 2011, conflict along historical routes rises sharply. The elevated conflict levels persist in subsequent years, suggesting a structural and enduring breakdown of cross-border cooperation rather than a temporary shock.

Taken together, these results provide compelling behavioral evidence for the mechanism proposed. Historically, mobility facilitated structured intergroup interactions, reciprocal access to grazing resources, and the maintenance of cooperative institutions along pastoral corridors. When these routes were suddenly blocked and subjected to militarized control, the foundations of cooperation were undermined: uncertainty increased, reciprocal grazing arrangements collapsed, and identity boundaries hardened, generating the form of conflict predicted by the mechanism. The fact that the estimated effects emerge exactly along the routes documented in the eight digitized pre-2011 maps underscores that the results reflect disruptions to long-standing mobility practices rather than generic border or post-secession dynamics.

6. Economic and Social Implications

We now study the economic and social implications of greater in-group trust bias. Using reduced from estimates, we start by showing that greater historical reliance on transhumant pastoralism correlates with ownership structure and firm size. We then study the social consequences of greater parochial trust.

6.1. Economic Implications: Firm Ownership Structure and Size Outcomes

We now examine whether the cultural legacies of transhumant pastoralism translate into observable differences in how firms are owned, managed, and scaled. As shown in Figure 2, countries with stronger in-group trust bias tend to have smaller firms, as measured by the number of employees. One interpretation is that higher in-group bias constrains firm growth by limiting entrepreneurs' ability to rely on non-kin partners for managerial delegation, supervision, and the coordination of additional production units. When trust is concentrated within a narrow circle of

Table 7: Effect of the Partition of Sudan on Conflict Along Transhumance Routes

	Dependent Variable: ACLED Conflict Event [0/1]					
	Any	Land	Battles	Non-State	State	Riots
	(1)	(2)	(3)	(4)	(5)	(6)
Cell with Transhumance Route × Post 2011	0.0097***	0.0052***	0.0026***	0.0067***	0.0054***	0.0005*
	(0.0018)	(0.0010)	(0.0010)	(0.0014)	(0.0012)	(0.0003)
Cell FEs	Y	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y	Y
Mean Dep. Var. (Pre-2011)	0.0028	0.0003	0.0015	0.0020	0.0015	0.0002
Adjusted R2	0.268	0.147	0.202	0.252	0.234	0.237
Num. of Observations	501,056	501,056	501,056	501,056	501,056	501,056
Num. of Cell Clusters	31,316	31,316	31,316	31,316	31,316	31,316
Num. of Adm1 × Year Clusters	448	448	448	448	448	448

Notes: The table presents OLS estimates with two-way standard errors clustered at the cell level and at the first-administrative-unit × year level. *Cell with Transhumance Routes × Post 2011* is an indicator for whether a cell intersects a transhumance route within a 5-km buffer post-2011. Each column corresponds to a different conflict type: (1) any conflict event, (2) land-related events, (3) battles, (4) non-state conflict, (5) state-based conflict, (6) riots, and (7) demonstrations. * p < 0.1; ** p < 0.05; *** p < 0.01.

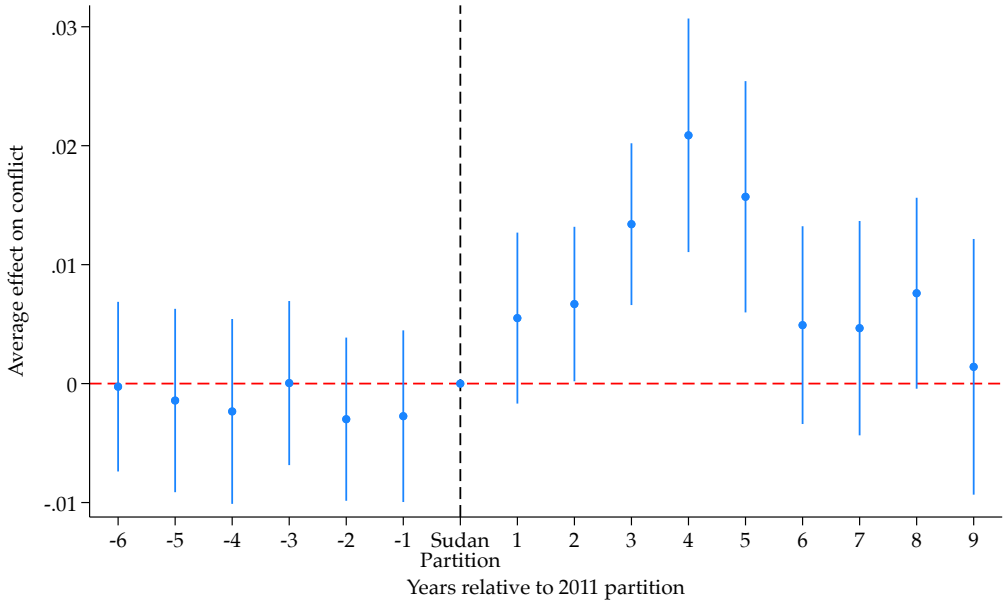


Figure 9: Event-Study Estimates of the Effect of the 2011 Sudan Partition on Local Conflict along Transhumance Routes

Notes: The figure presents an event-study decomposition of the effect of the 2011 Sudan partition on conflict in grid cells intersected by historical transhumance routes. Each point represents the estimated difference in conflict probability between treated and untreated cells in a given year relative to the year of partition (t = 0). The vertical dashed line marks 2011, when the partition took place.

close partners, expanding beyond that circle becomes socially costlier. As a consequence, firms may remain small in settings where in-group trust bias is more deeply rooted.

To explore this channel, we relate the historical degree of reliance on transhumant pastoralism to a set of ownership and size outcomes from the World Bank Enterprise Surveys. These outcomes capture the extent to which firms are individually owned, owner-managed, and concentrated in ownership, as well as their employment level and number of establishments.

We estimate the relationship between historical reliance on transhumant pastoralism and contemporary firm outcomes using the following specification:

$$Y_{isect} = \alpha + \beta\, Transhumant\ Pastoralism_e + X_{isect} + \mu_{ct} + \theta_s + \epsilon_{isect}, \tag{6}$$

where Y_{isect} denotes a given outcome for firm i operating in sector s, located in ethnologue group e, in country c at time t. Our main predictor, $Transhumant\ Pastoralism_e$, captures the historical degree of reliance on transhumant pastoralism of the ethnic group associated with ethnologue area e. The vector X_{isect} includes a rich set of geographic controls, and ϵ_{isect} is the error term. All regressions include country-year fixed effects (μ_{ct}), and sector fixed effects (θ_s). Standard errors, reported in parentheses, are clustered at the language sub-family level.

Table 8 presents the results. We find that firms located in areas historically shaped by transhumant pastoralism are more likely to be sole proprietorships, exhibit more concentrated ownership structures, and are more often managed directly by their owners. Ac a consequence, these firms tend to be smaller, employing fewer workers and operating fewer establishments. Taken together, these results suggest that the cultural and legacies associated with transhumant pastoralism are reflected in more personalized, less scalable forms of firm organization.

6.2. Social Implications: How Transhumant Pastoralists are Viewed

We document that transhumant pastoralist groups are less trusting of outsiders. A natural question that arises is: how are individuals originating from transhumant pastoralist groups perceived in their interactions with others? A straightforward hypothesis stemming from our previous results is that individuals from transhumant pastoralist groups may be perceived less favorably.

Table 8: Transhumant Pastoralism and Firms Management

	Dependent Variable:				
	Sole	Top Manager	Share Owned	ln(Number of)	
	Proprietorship	is Owner	by Largest Owner	Employees	Establishments
	(1)	(2)	(3)	(4)	(5)
Transhumant Pastoralism	0.139***	0.105**	0.049**	−0.299***	−0.115*
	(0.040)	(0.045)	(0.023)	(0.088)	(0.067)
Respondent Demographics	Y	Y	Y	Y	Y
Endogenous Controls	Y	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y
Ethnographic Controls	Y	Y	Y	Y	Y
Country FEs	Y	Y	Y	Y	Y
Mean Dep. Var.	0.375	0.694	0.872	117.737	18.547
Beta Coef.	0.057	0.045	0.043	-0.046	-0.021
Adjusted R2	0.284	0.082	0.193	0.102	0.359
Num. of Observations	78,750	59,222	50,184	78,418	13,997
Num. of Clusters	50	44	47	50	42

Notes: The table presents OLS estimates with robust standard errors clustered at the language sub-family level. The unit of observation is a firm the World Bank Enterprise Survey. *Transhumant Pastoralism* is an index ranging from 0 to 1 that measures the historical reliance of the respondent's ethnic group on transhumant pastoralism. * p < 0.1; ** p < 0.05; *** p < 0.01.

The Afrobarometer presents a quasi-experimental setting in which to ask how those from transhumant pastoralist groups are viewed. In all rounds of Afrobarometer, interviewers are asked to answer a few exit questions about the respondent they interviewed at the end of every interview. These questions aim to assess how the respondent appeared during the interview. Specifically, the interviewer answers questions in the following format: "What was the respondent's attitude towards you during the interview? Was he or she friendly, in between, or hostile?"

The Afrobarometer setting presents a close to ideal setting to ask this question. An individual i, the interviewer, is asked to interact with an individual j, the respondent, to complete a task, the survey. Individual j, may or may not originate from a group that historically relied on transhumant pastoralism. Individual i is asked to repeat the task N times and at the end of each iteration, individual i is asked to assess the respondent's attitude during the task.

On average, interviewers in the Afrobarometer surveys assess the perceived attitudes of 35 respondents. We take advantage of this setting to test our hypothesis that individuals from groups that historically relied on transhumant pastoralism are perceived less favorably. This is because the interviewer is most likely an out-group member and hence less likely to be trusted.

We estimate the following specification where the unit of observation is an interview conducted by an interviewer i with a respondent j.

$$PerceivedAttitude_{ijc} = \alpha + \beta TranshumantPastoralism_j + \mathbf{X_j'\Gamma_1} + \mathbf{Z_j'\Gamma_2} + \mathbf{Z_i'\Gamma_3} + \mu_c + \theta_t + \epsilon_{ijc} \tag{7}$$

where $\mathbf{X_j}$ is the set of geographic, disease, climate and ethnographic variables correlated with transhumant pastoralism; $\mathbf{Z_i'}$, and $\mathbf{Z_j'}$ are interviewer and respondent socio-demographic controls (age, age squared, gender, education, urban status); μ_c represents country fixed-effects; θ_t time fixed-effects; and ϵ is the error term. $TranshumantPastoralism_j$ is our variable of interest. As before, it measures to what extent the ethnic group of a respondent j historically relied on transhumant pastoralism.

Given that how attitudes are perceived may vary across interviewers, we exploit the fact that interviewer i conducts surveys with multiple respondents j. These respondents vary in their ethnic identity, and thus in their historical reliance on transhumant pastoralism. Hence, our preferred specification includes interviewer fixed effects, ρ_i:

$$PerceivedAttitude_{ij} = \alpha + \beta TranshumantPastoralism_j + \mathbf{X_j'\Gamma_1} + \mathbf{Z_j'\Gamma_2} + \rho_i + \epsilon_{ijc} \tag{8}$$

We examine four outcome variables: the extent to which the respondent's attitude during the interview was perceived as friendly, cooperative, honest, and at ease.

Table B16 presents the results. Odd numbered columns display the coefficient estimates of $Transhumant\ Pastoralism$ from equation 7. Individuals from groups that historically relied on transhumant pastoralism are perceived in negative terms by interviewers: they are seen as less friendly, less cooperative, less honest, and less at ease. As before, the coefficients we report are standardized into z-scores. Even numbered columns report the coefficient estimates of $TranshumantPastoralism$ from equation 8, which includes interviewer fixed effects. In these columns, identification comes from within interviewer variation in $TranshumantPastoralism$ of the respondents interviewed. The estimates follow the same pattern as in odd columns and gain in statistical significance. These estimates are in line with our hypothesis and suggest that individuals originating from transhumant pastoral groups are perceived as less prosocial.[14]

[14]We are not the first to tabulate these questions. Michalopoulos et al. (2019) examine how livelihoods are associated with perceptions in the Afrobarometer. In their analysis, the reference group is individuals whose ancestors practice pastoralism. The authors find that pastoralists are seen as more hostile, bored, uncooperative, impatient, suspicious and dishonest. We go one step further in showing that this effect is mainly associated with transhumant pastoralism and not pastoralism (see table B17.)

7. Conclusion

This paper investigates the origin of variation in the scope of trust. Across countries, between districts within countries, between individuals from different ethnic groups within countries, and among second-generation immigrants, we find that societies whose ancestors relied more on transhumant pastoralism exhibit stronger trust in in-group members relative to out-group members. These results are robust across three data sources, consistent with historical ethnography, and supported by an instrumental-variable strategy based on a new instrument: the environmental suitability for transhumance pastoralism relative to agriculture. They also persist in contemporary contexts, as shown by evidence from Kyrgyzstan linking present-day participation in transhumant pastoralism to greater parochial trust.

We investigate the mechanisms. To do so we build a new atlas that describes the routes taken by transhumant groups by digitizing over 60 historical maps of routes. We explore heterogeneity by the elevation change in routes. Horizontal transhumance routes – flatter routes that exposed groups to recurrent cross-group encounters in settings with weak external enforcement – were systematically associated with greater interdependence within the group, more fragile cooperation with outsiders, and a higher likelihood of developing strong in-group solidarity. These routes intersected more ethnic boundaries, creating repeated interactions that were both economically necessary and potentially conflictual. Encounters with other pastoralists, in particular, involving competition over scarce and mobile resources, reinforced cohesive in-group norms while encouraging caution towards outsiders.

We leverage the natural experiment created by South Sudan's 2011 independence to present a final behavioral validation: when long-standing mobility corridors were suddenly disrupted, cooperative arrangements collapsed and conflict increased precisely along the historical pathways used by pastoralist groups.

Finally, we show that a narrower scope of trust constrains organizational hierarchies: firms operating in regions with a stronger historical presence of transhumant pastoralism are systematically smaller, more likely to be run by owner-managers, less likely to be incorporated, and less likely to have dispersed ownership structures. These patterns are consistent with the idea that a historically inherited, more parochial scope of trust limits the formation of impersonal

managerial relationships, restricts delegation beyond kin and close associates, and ultimately hinders the scaling of productive organizations. Together, these findings highlight the long imprint of culture, its roots, and economic consequences.

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Web Appendix for

In-Group – Out-Group Trust: Origins and Consequences

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Appendix A. Data Sources and Variable Definitions

A.1. Data Sources

Ethnographic Atlas: As noted in Fenske (2013), the ethnographic atlas contains two duplicate observations (the Chilcotin and Tokelau), these are removed in the dataset provided by (Giuliano and Nunn, 2021). For two groups Aryans and Hebrews, the year of observation is -800 BC, and for Babylonians the year of observation is -2000. Following Enke (2019) and Fenske (2013) we remove these groups from the sample. As noted in Fenske (2013) the latitude and longitude data contains discrepancies. For example, the longitude of Easter Island is -190°, which falls outside the [-180°, 180°] range. To correct these discrepancies we rely on D-Place for societies' latitudes and longitudes pairs (Kirby, Gray, Greenhill, Jordan, Gomes-Ng, Bibiko, Blasi, Botero, Bowern, Ember et al., 2016). This revision affects 171 ethnic groups

Standard Cross-Cultural Sample:

World Values Survey:

Afrobarometer:

Life in Kyrgyzstan: The LiK Study is a longitudinal, multi-topic survey of around 3,000 households and approximately 8,000 individuals across all seven regions, called *oblasts* of Kyrgyzstan, as well as the cities of Bishkek and Osh. The survey has been conducted five times between 2010 and 2019 (Life in Kyrgyzstan Study, 2013).

Armed Conflict Location & Event Data: ACLED is a global, geo-referenced database that records individual events of political violence and social unrest, including battles, violence against civilians, riots, and protests. Each event is coded with precise dates, locations, actors, and event types using a consistent methodology. We use ACLED to measure conflict in Sudan, and we identify land-related conflict by extracting relevant information from the event notes, following the approach of Eberle et al. (2025). This allows us to capture both general violence and specific disputes over land.

World Bank Enterprise Survey: The World Bank Enterprise Surveys, www.enterprisesurveys.org provide firm-level data for a representative sample of private-sector establishments (with more than five employees and over 1% private ownership). Launched in 2005, with GPS coordinates available since 2010, the initiative has conducted over 180,000 interviews in 154 economies.

Using a uniform, stratified sampling design (by firm size, sector, and location), the surveys yield comparable data across countries and years. The unit of analysis is the establishment, defined as a business at a specific location with its own financial statements; multi-establishment firms are included only if separate financials exist. From this dataset, we extract measures of ownership structure and firm size. We use the standardized dataset *New_Comprehensive_October_6_2025*.

A.2. Variables from the Ethnographic Atlas

Transhumant Pastoralism: is based on variables v4 $\in$ [0;100] in 10 percent intervals (animal husbandry), v40 (predominant type of animal husbandry), and v30 (settlement pattern) from the EA. From variable v4, we create one dummy variable *herding animals* that equals one if the predominant type of animal raised is a herding animal such as cattle, sheep, or camelids. From variable v30, we create one dummy variable *impermanent settlement* that equals one if a society's settlement pattern is either "nomadic or fully migratory", "seminomadic", "semisedentary", or "compact but impermanent settlements", and zero otherwise. We measure transhumant pastoralism by multiplying variable v40 by variables *herding animals* and *impermanent settlement*.

Pastoralism: is based on variables v4 (animal husbandry) $\in$ [0;100] in 10 percent intervals and v40 (predominant type of animal husbandry). From variable v4, we create one dummy variable *herding animals* that equals one if the predominant type of animal raised is a herding animal such as cattle, sheep, or camelids. We measure pastoralism by multiplying variable v40 by variables *herding animals*. This measure is similar to Becker (2024).

Transhumant: is based on variable v30 (settlement pattern). We create one dummy variable *impermanent settlement* that equals one if a society's settlement pattern is either "nomadic or fully migratory", "seminomadic", "semisedentary", "compact but impermanent settlements", or "neighborhoods of dispersed family homes", and zero otherwise.

Mean Size Communities: is based on variable v31 (average population of local communities) a categorical variable ranging from 1 less than 50 inhabitants, to 8 more than 50,000 inhabitants. In the study we employ the variable as coded in the EA.

Political Complexity: is based on variable variable v33 (jurisdictional hierarchy beyond local communities) a categorical variable ranging from zero *acephalous societies* to three *three levels*. We

make use of this variable as coded in the EA.

Elevation: from WorldClim version 2.1. This elevation data is available at the 2.5-minute of longitude and latitude degree resolution – approximately 4.5 kilometers at the equator – was derived from the Shuttle Radar Topography Mission.

Skin Surface Temperature: from NOAA. Surface temperature in tens of Kelvin degrees. Available on a monthly basis from 1836 to 2015. We use data 1840-1859.

Precipitation: from NOAA. Convective precipitation accumulation in kilogram of water per meter square per month. Available on a monthly basis from 1836 to 2015. We use data 1840-1859.

(EVS, 2022)

(Haerpfer et al., 2022)

(Compo et al., 2011)

(Poggio et al., 2021)

Ethnologue: Languages of the world. 16th Edition. (Gordon Jr, 2009)

(Murdock and White, 1969)

(Afrobarometer, 2023)

A.3. The Atlas of Historical Transhumance Routes

To construct a global atlas of transhumant pastoralism, we searched for maps in scientific publications from the fields of history, ethnography, anthropology, and geography. Our inclusion criteria required that maps either (i) were published prior to 1950, or (ii) if published later, explicitly depicted routes historically used before 1950. In cases where no historical maps were available, we digitized contemporary maps only if the accompanying text provided clear reference to traditional or historical transhumance routes.

A road is defined here as an arrow on a map indicating the displacement of a pastoral group between seasonal pastures, typically from lowland winter areas to highland summer grazing grounds. Arrows vary widely in their cartographic precision and interpretation (see Figure A3).[15] Figure A2 presents the number of publications and the number of digitized roads by publication year. Although many sources are from recent decades, they frequently reconstruct or describe historical movements. Figure A3 and Figure A4 display additional cartographic sources from Europe and West Africa, respectively. In total, we digitized 1,987 transhumance roads from 62 unique maps. The average map date is [insert year], and the average road date is [insert year]. Figure A1 shows spatial coverage by pixel, and Table A1 provides descriptive statistics at the road level.

Linking Roads to Ethnic Groups: To connect historical roads to cultural groups, we identified the geographic coordinates of each road's start and end points. For roads with branches, we used the most spatially distant endpoints to define the trajectory. We followed (Giuliano and Nunn, 2021) in linking the Ethnographic Atlas to Ethnologue data on a country's ethnic group basis. Because Ethnologue polygons represent country-specific fragments of ethnic groups, we dissolved all country-level polygons into a single shape for each ethnic group to better approximate ancestral territories. Each road was then linked to an ethnic group if its start or end point intersected that group's territory. We note that some roads may cross or terminate in regions historically occupied by groups that were not themselves transhumant. This reflects the reality that transhumance is often destination-based, involving seasonal movement across or into the territories of other

[15] In some cases, arrows may indicate general directional movement rather than specific start and end points. Others may reflect idealized or aggregated movements based on multiple years or groups. We retain such arrows when they clearly represent seasonal displacement patterns.

groups.

Transhumance routes are represented in maps as lines or arrows. Arrows occasionally suggest directionality, but often, it is impossible to determine a unique start or end point. Pastoralists may enter a given road at multiple points or use only segments of a route depending on climate, water availability, or sociopolitical conditions.

Normalization and Measurement

Due to variation in the representation of routes, some as arrows with inferred direction, others as undirected lines, and uncertainty about where along a road a group enters or exits, we adopt a standard normalization approach. All road-based statistics are calculated **per 100 kilometers of road length**, ensuring comparability across routes and regions regardless of the granularity of the original map.

To account for this variability, we normalize all route-based statistics per 100 kilometers of road length. This allows for consistent comparison across regions and maps of differing scale and route detail.

Table A1: Summary Stats

	Summary Statistics: Final Sample							
	N	*Mean*	*SD*	*Q1*	*Median*	*Q3*	*Min*	*Max*
Length [km]	2019	140.40	172.59	40	84	162	3	1523
Elevation Minimum [10th Percentile]	2019	546.06	632.59	188	329	700	-58	4948
Elevation Maximum [90th Percentile]	2019	982.34	970.96	315	619	1333	-13	5850
Elevation Range [90th - 10th Percentile]	2019	436.28	592.08	46	176	609	0	4177
Elevation Std. Dev.	2013	183.23	228.75	20	84	278	1	1488
Any Ethnic Borders Crossed [0,1]	2013	0.47	0.50	0	0	1	0	1
Number of Ethnic Borders Crossed	2013	0.84	1.57	0	0	1	0	24

Notes: Descriptive Statistics of transhumance roads. Within 10 kilometers on both sides of each road.

A.4. Map Data Sources

- West Africa
    1. Higazi, Abubakar Ali et al. (2018)

2. Okediji (1973)
3. Stenning (1994)
4. Scheper, Bohlouli, Brügemann, Weimann, Vanvanhossou, König and Dossa (2020)

- North Africa
  1. Wilson (1978)
  2. Raswan (1930)

- Eastern Africa
  1. Mburu (2003)
  2. Chidlaw-Roberts, Stuttaford and Huq (1920)
  3. World Health Organization (2007)
  4. Århem (1987)
  5. Moritz, Larisa Catherine, Drent, Kari, Mouhaman and Scholte (2013)
  6. Xiao, Cai, Moritz, Garabed and Pomeroy (2015)

- Central Africa
  1. Group (2014)

- Europe
  1. Renes, Kruse and Potthoff (2023)
  2. Micle (2013)
  3. Mertens and Huband (2004)
  4. Braudel (2023)
  5. Muller, Verlag and geographische mitteilungen (Périodique) (1939)
  6. *LES PRATIQUES ET SAVOIR-FAIRE DE LA TRANSHUMANCE EN FRANCE* (2020)

- Central Asia
  1. Gillin (2021)
  2. Steimann and Humangeographie (2011)
  3. Ibadildin (2024)

- Asia
  1. Malik, Ali et al. (2017)
  2. Rashid, Rahim, Nafees, Rehman, Khurshid and Shi (2019)

3. Muhammad (2024)
4. sahjveevan centre for pastoralism (2022)
5. Choudhary and Garkoti (2024)

- Eastern Asia (Himalaya, China, Mongolia, Siberia)
  1. Srichandan, Pasupuleti and Mishra (2021)
  2. Dong (2016)
  3. Pandey, Pradhan, Chaudhari and Ghate (2017)
  4. Humphrey and Sneath (1999)
  5. Fernández-Giménez (1999)
  6. Takakura (2004)
  7. Amstislavski, Zubov, Chen, Ceccato, Pekel and Weedon (2013)
  8. Gunya, Gairabekov, Karaev, Lysenko, Elmurzaev and Janibekova (2019)
  9. Degteva and Nellemann (2013)
  10. Laptander, Horstkotte, Habeck, Rasmus, Komu, Matthes, Tømmervik, Istomin, Eronen and Forbes (2024)

- Middle East
  1. Ocak (2016)
  2. Thevenin (2011)
  3. Ehlers (2011)
  4. Pandey et al. (2017)
  5. Gratien (2014)
  6. Cassanelli (2016)

- Sudan, Pre-2011 Transhumance Routes
  1. Abdul-Jalil and Unruh (2013)
  2. El Hassan and Birch (2008)
  3. Milner (2012)
  4. Milner (2012)
  5. Sulieman and Ahmed (2013)
  6. Young, Satti and Radday (2020)
  7. Touré, Ickowicz, Wane, Garba and Gerber (2012)
  8. Crisis, Mapping, (CRMA) and (UNDP) (2010)
  9. Ocak (2016)

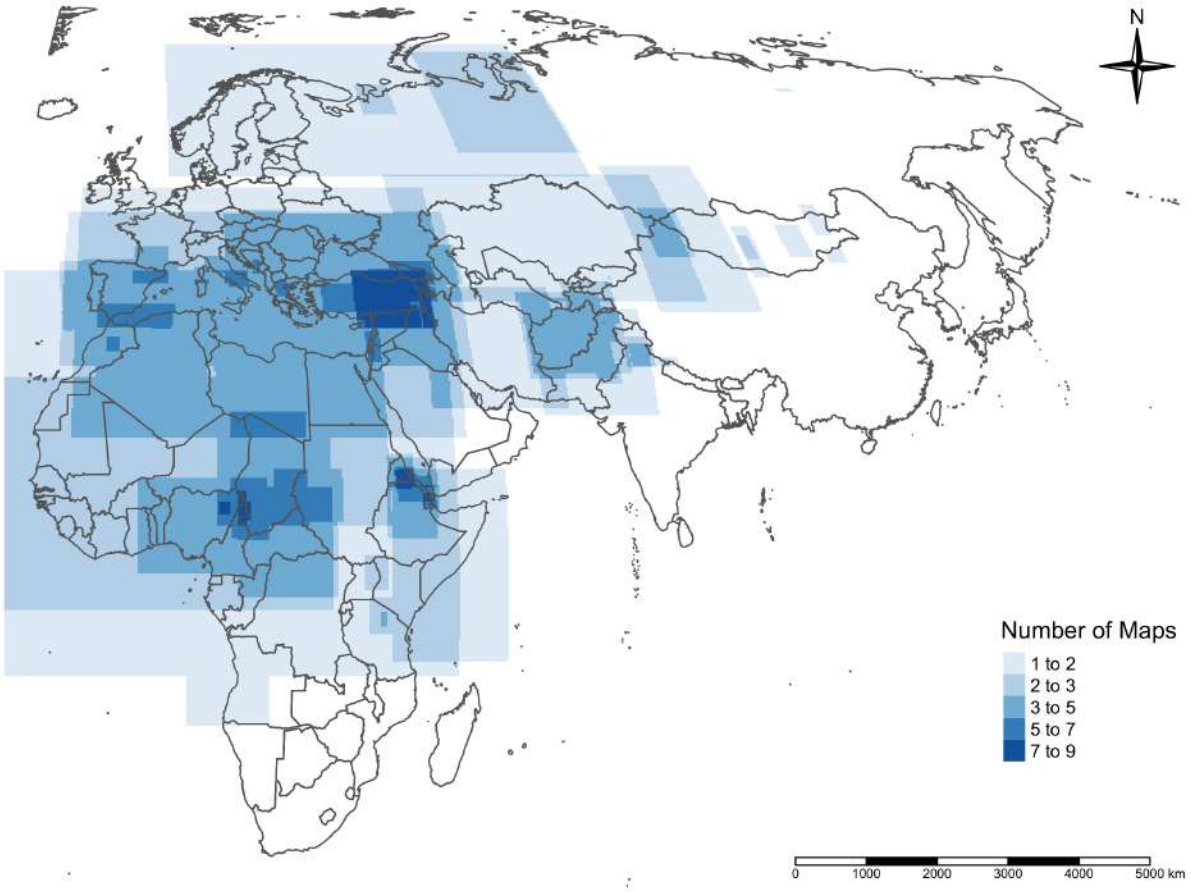


Figure A1: Spatial Coverage of Digitized Map Sources

Notes: The map shows the number of georeferenced map sources overlapping each 5×5 km grid cell. Darker shades of blue indicate greater map density.

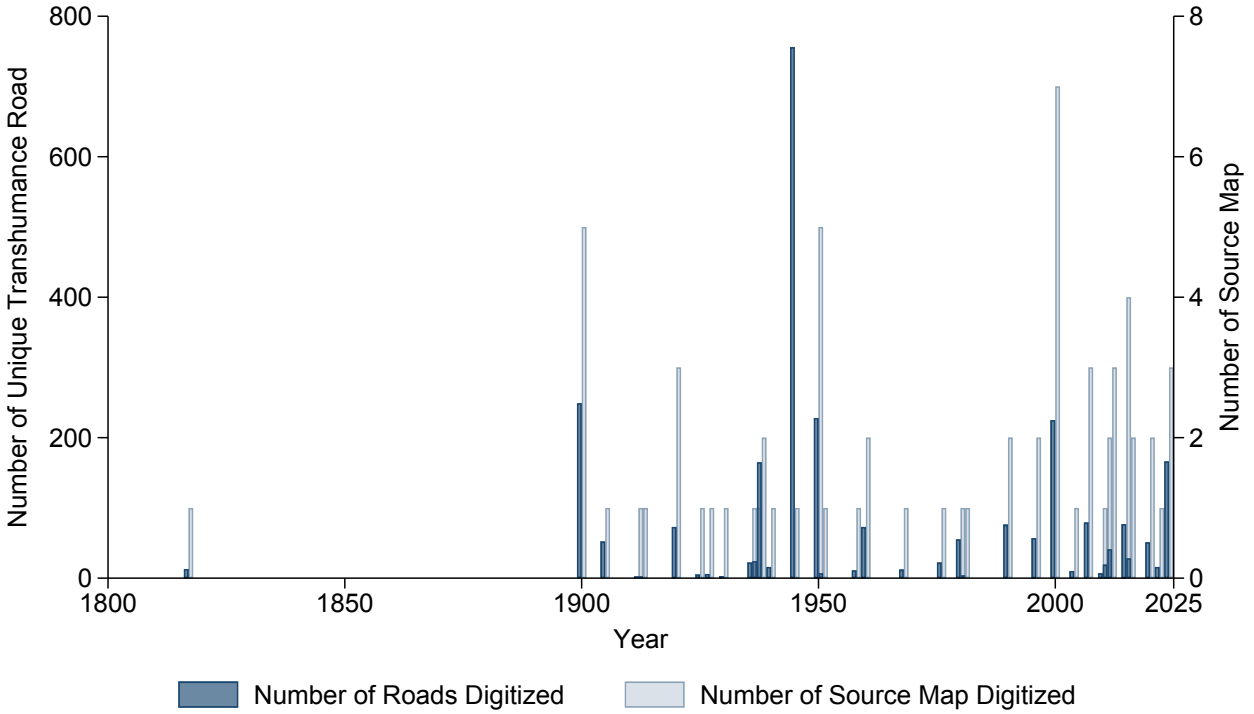


Figure A2: Number of Digitized Transhumance Roads by Reported Year of Use, and Number of Source Maps digitized by Publication Year.

Notes: The figure displays the number of maps digitized by year of publication (dark navy bars) and the number of transhumance routes digitized by reported year of use (light navy bars). Years correspond to temporal information provided in the original cartographic sources, which varies in precision across documents.



Figure A3: Transhumance Routes in the Mediterranean Region

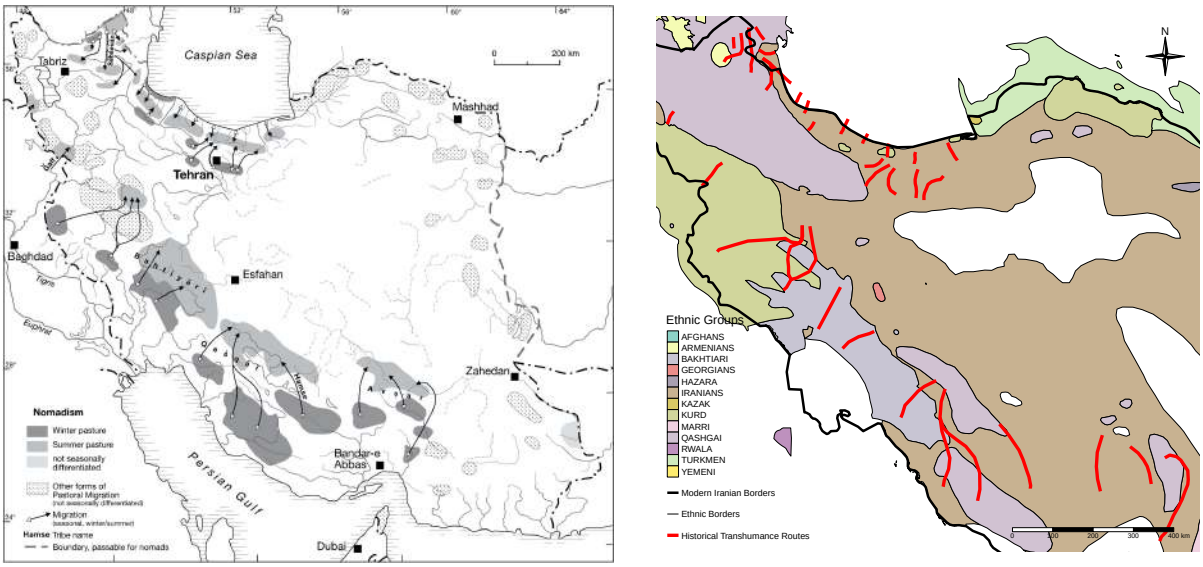
Notes: This map shows transhumance routes in the Mediterranean circa 1938. Source: (Müller, 1938).



Figure A4: Transhumance Routes in West Africa (1940s)

Notes: This map shows various transhumance paths in West Africa taken by transhumant pastoralists in the 1940s. Specifically, the map shows path towards wintering pastures, path towards dry-season pastures, routes to the annual salt-supplement site. Source: (de la Recherche Scientifique Coloniale, 1945)

A.5. Matching to Ethnic Groups



(a) Original Map (b) Digitized Version with Ethnic Groups

Figure A5: Connecting Transhumance Routes to Ethnic Groups

Notes: Panel A5a presents historical transhumance routes in Iran (Tapper, 1985). Panel A5b shows digitized routes (red) over ethnic polygons. We assign routes to ethnic groups via point-in-polygon using start/end nodes.

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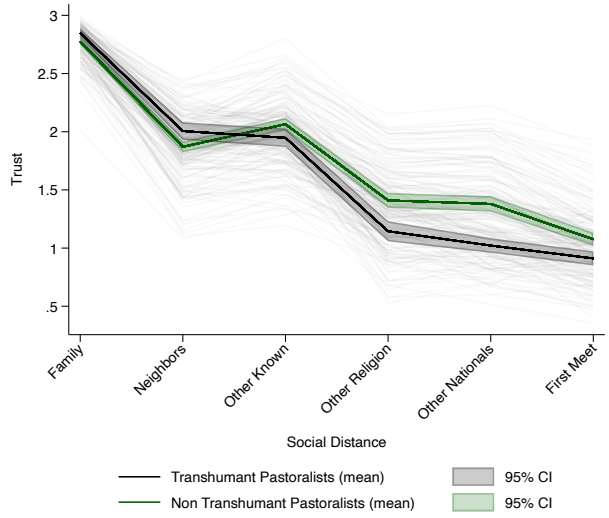
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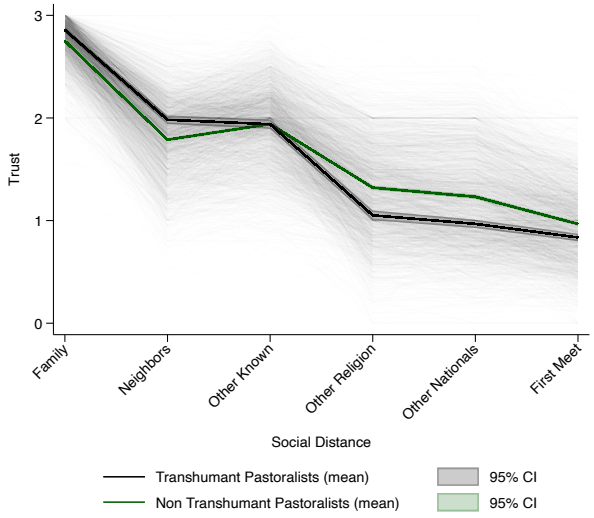
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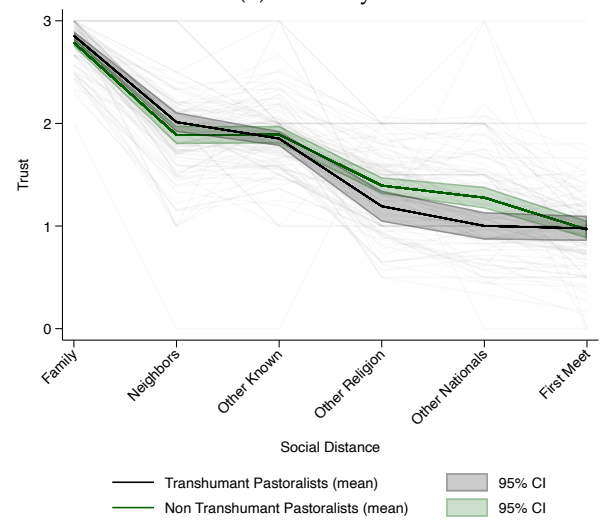
Appendix B. Additional Tables and Figures



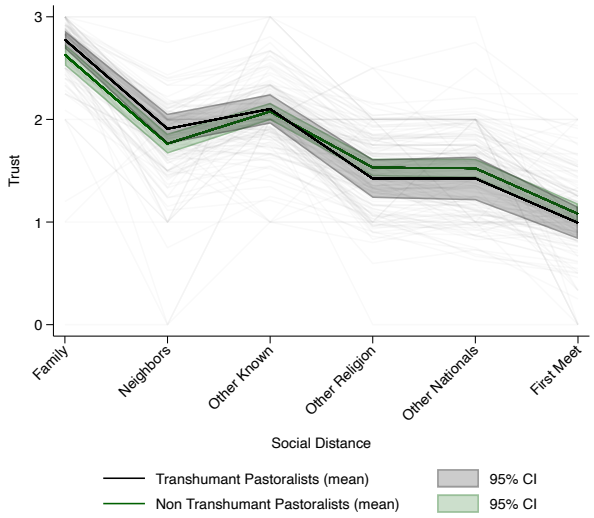
(a) Country



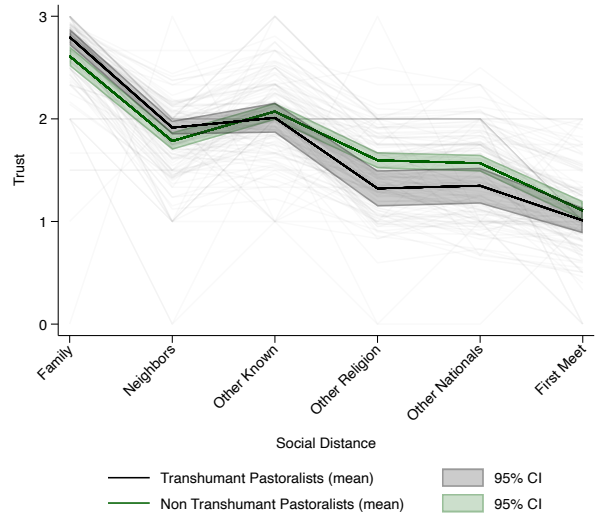
(b) District



(c) Ethnic



(d) Father's Country of Origin



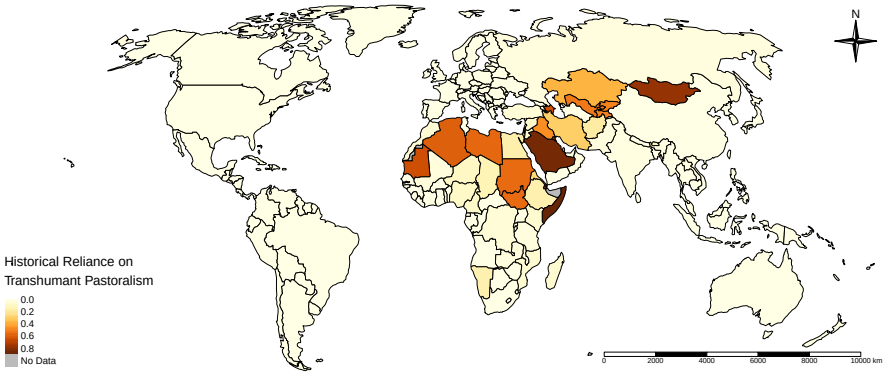
(e) Mother's Country of Origin

Notes: The black curve shows the average and 95% confidence intervals for countries (panel B1a), districts (panel B1b), ethnic groups (panel B1c), father's origin country (panel B1d) and mother's origin country (panel B1e) for whom population historically relied on transhumant pastoralism for at least 10% of calories intake. The green curve shows the distribution when transhumant pastoralism played no role in historical calories intake.

Figure B1: Graphical Visualization of the Scope of Trust in the Raw Data

B.1. Additional Cross-Country Estimates

Figure B2: Distribution of Historical Reliance on Transhumant Pastoralism Across Countries



Notes: This map displays the distribution of our population-weighted index of *Transhumant Pastoralism* across countries. Authors' own computation based on Giuliano and Nunn (2021). Data comes from the Ethnographic Atlas and Ethnologue.

Table B1: Robustness to Cross-Country Estimates: Transhumant Pastoralism and In-Group Trust Bias

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Transhumant Pastoralism	0.339**	0.318**	0.309**	0.254*	0.216	0.262	0.352**	0.261*	0.306*	0.057	0.316**	0.314**	0.139
	(0.155)	(0.153)	(0.150)	(0.142)	(0.157)	(0.176)	(0.161)	(0.144)	(0.155)	(0.141)	(0.153)	(0.152)	(0.153)
ln(Country Size in sq.km)	Y	N	N	N	N	N	N	N	N	N	N	N	Y
Population in 1500	N	Y	N	N	N	N	N	N	N	N	N	N	Y
Population in 2000	N	N	Y	N	N	N	N	N	N	N	N	N	Y
ln(GDP) in Current 2015$	N	N	N	Y	N	N	N	N	N	N	N	N	Y
Legal Origin	N	N	N	N	Y	N	N	N	N	N	N	N	Y
Polity V	N	N	N	N	N	Y	N	N	N	N	N	N	Y
Ethnic Fractionalization	N	N	N	N	N	N	Y	N	N	N	N	N	Y
Religious Fractionalization	N	N	N	N	N	N	N	Y	N	N	N	N	Y
Linguistic Fractionalization	N	N	N	N	N	N	N	N	Y	N	N	N	Y
Share Top 5 Religions	N	N	N	N	N	N	N	N	N	Y	N	N	Y
Number of Inter-State Wars 1950-2000	N	N	N	N	N	N	N	N	N	N	Y	N	Y
Number of Extra-State Wars 1950-2000	N	N	N	N	N	N	N	N	N	N	N	Y	Y
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Disease Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Climate Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ethnographic Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Continent FEs	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mean Dep. Var.	1.017	1.016	1.016	1.016	1.018	1.018	1.011	1.013	1.017	1.015	1.015	1.015	1.021
Adjusted R2	0.548	0.561	0.543	0.572	0.605	0.503	0.483	0.549	0.504	0.574	0.497	0.497	0.728
Beta Coef.	0.206	0.197	0.188	0.155	0.133	0.163	0.220	0.161	0.192	0.035	0.192	0.191	0.090
Num. of Observations	202	194	206	205	195	199	200	202	199	209	209	209	186
Num. of Clusters	100	96	102	101	97	96	96	98	96	103	103	103	89

Notes: The table presents OLS estimates with standard errors clustered at the country level in parentheses. The unit of observation is a country and data is from the IVS. $Transhumant\ Pastoralism$ is an index [0/1] measuring a country's population historical reliance on transhumant pastoralism. The dependent variable in every column is the difference between average in-group trust (family, neighbors, people known) and average out-group trust (people first met, people of another religion, foreigners). Baseline controls include the log number of years since a country's ethnic groups were observed in the Ethnographic Atlas. Geographic controls are ancestry-adjusted and include: latitude, suitability for agriculture, caloric suitability, share of land in arid climate, elevation, ruggedness and tsetse fly suitability. Ethnographic controls are ancestry-adjusted and include: political complexity, domestic organization around nuclear family, and past irrigation. Survey-round fixed effects included in every column. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table B2: Cross-Country Estimates: Transhumant Pastoralism, Other Livelihoods and In-Group Trust Bias

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})					
	(1)	(2)	(3)	(4)	(5)	(6)
Transhumant Pastoralism	0.988***	0.975***	0.674***	0.523**	0.251	0.353
	(0.231)	(0.228)	(0.237)	(0.237)	(0.218)	(0.225)
Animal Husbandry	−0.462	−0.447	−0.258	−0.219	0.022	−0.164
	(0.306)	(0.314)	(0.359)	(0.368)	(0.338)	(0.292)
Gathering	−0.715	−0.724	−0.585	−0.014	0.808	−0.735
	(0.488)	(0.489)	(0.408)	(0.590)	(0.724)	(0.463)
Hunting	−1.481***	−1.794***	−1.191	−1.279	−2.235***	−1.564**
	(0.560)	(0.665)	(0.872)	(0.863)	(0.809)	(0.626)
Fishing	−0.168	−0.181	−0.491	−0.583	−0.506	−0.502
	(0.346)	(0.352)	(0.441)	(0.427)	(0.391)	(0.356)
Baseline Controls	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Disease Controls	N	N	Y	Y	Y	Y
Climate Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Continent FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	1.015	1.015	1.015	1.015	1.015	1.015
Adjusted R2	0.267	0.262	0.375	0.455	0.510	.
Beta Coef.	0.543	0.536	0.370	0.288	0.138	0.194
Num. of Observations	210	210	210	210	210	210
Num. of Clusters	104	104	104	104	104	104

Notes: The table presents OLS estimates with standard errors clustered at the country level in parentheses. The unit of observation is a country and data is from the IVS. $Transhumant\ Pastoralism$ is an index [0/1] measuring a country's population historical reliance on transhumant pastoralism. The dependent variable in every column is the difference between average in-group trust (family, neighbors, people known) and average out-group trust (people first met, people of another religion, foreigners). Baseline controls include the log number of years since a country's ethnic groups were observed in the Ethnographic Atlas. Geographic controls are ancestry-adjusted and include: latitude, suitability for agriculture, caloric suitability, share of land in arid climate, elevation, ruggedness and tsetse fly suitability. Ethnographic controls are ancestry-adjusted and include: political complexity, domestic organization around nuclear family, and past irrigation. Survey-round fixed effects included in every column. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table B3: Early Adoption of Subsistence Strategies and Contemporary In-Group Trust Bias

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})			
	(1)	(2)	(3)	(4)
Ln(Centuries since Adoption of Transhumant Pastoralism)	0.016*	0.018**	0.019*	0.021**
	(0.008)	(0.008)	(0.010)	(0.009)
Ln(Centuries since Adoption of Hunting Gathering)		−0.010*	−0.010*	−0.011**
		(0.005)	(0.005)	(0.006)
Ln(Centuries since Adoption of Intensive Agriculture)			−0.002	−0.005
			(0.007)	(0.007)
Ln(Centuries since Adoption of Extensive Agriculture)				0.008
				(0.006)
Baseline Controls	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y
Disease Controls	Y	Y	Y	Y
Climate Controls	Y	Y	Y	Y
Ethnographic Controls	Y	Y	Y	Y
Continent FEs	Y	Y	Y	Y
Mean Dep. Var.	1.015	1.015	1.015	1.015
Adjusted R2	0.474	0.485	0.482	0.491
Num. of Observations	210	210	210	210
Num. of Clusters	104	104	104	104

Notes: The table presents OLS estimates with robust standard errors clustered at the country level in parentheses. The unit of observation is a country and data is from the IVS. The key regressors measure the log number of centuries since a country first adopted transhumant pastoralism, hunting and gathering, intensive agriculture, or extensive agriculture. Data is sources from Stephens et al. (2019). The dependent variable in every column is the difference between average in-group trust (family, neighbors, people known) and average out-group trust (people first met, people of another religion, foreigners). Baseline controls include the log number of years since a country's ethnic groups were observed in the Ethnographic Atlas. Geographic controls are ancestry-adjusted and include: latitude, suitability for agriculture, caloric suitability, share of land in arid climate, elevation, ruggedness and tsetse fly suitability. Ethnographic controls are ancestry-adjusted and include: political complexity, domestic organization around nuclear family, and past irrigation. Survey-round fixed effects included in every column. * p < 0.1; ** p < 0.05; *** p < 0.01.

B.2. Additional Within-Country Estimates

Table B4: Transhumant Pastoralism and In-Group Trust Bias: Controlling for Endogenous Controls

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})				
	(1)	(2)	(3)	(4)	(5)
Transhumant Pastoralism	0.226***	0.226***	0.210***	0.160*	0.156
	(0.081)	(0.081)	(0.080)	(0.091)	(0.125)
Respondent Demographics	Y	Y	Y	Y	Y
Endogenous Controls	Y	Y	Y	Y	Y
Baseline Controls	N	N	Y	Y	Y
Geographic Controls	N	N	N	Y	Y
Ethnographic Controls	N	N	N	N	Y
Country FEs	Y	Y	Y	Y	Y
Mean Dep. Var.	1.106	1.107	1.115	1.115	1.112
Adjusted R2	0.109	0.108	0.103	0.104	0.105
Beta Coef.	0.079	0.079	0.074	0.056	0.056
Num. of Observations	56,611	56,342	55,364	55,319	54,016
Num. of Clusters	118	118	115	114	109

Notes: The table reports OLS estimates with robust standard errors clustered at the language sub-family level reported in parentheses. The unit of observation is an individual respondent in the World Values Survey. $Transhumant\ Pastoralism$ is an index [0/1] measuring the historical reliance on transhumant pastoralism of the respondent's ethnic group. The dependent variable in all columns is the difference between average in-group trust (trust in family, neighbors, and people known personally) and average out-group trust (trust in people met for the first time, people of another religion, and foreigners). Respondent Demographics include a respondent's age, age squared, and gender. Endogenous controls include education, marital status, whether the respondent has children and employment status. Baseline control includes the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. Geographic controls include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. Disease controls include historical tsetse fly suitability and malaria ecology. Climate controls include mean temperature and mean precipitation between 1840 and 1859. Ethnographic controls include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. All specifications include country-wave fixed effects. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table B5: District-Level Estimates: Transhumant Pastoralism and In-Group Trust Bias

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})					
	(1)	(2)	(3)	(4)	(5)	(6)
Transhumant Pastoralism	0.504***	0.115**	0.117**	0.136**	0.168**	0.332***
	(0.040)	(0.055)	(0.056)	(0.063)	(0.084)	(0.071)
Baseline Controls	N	N	Y	Y	Y	Y
Geographic Controls	N	N	N	Y	Y	Y
Disease Controls	N	N	N	Y	Y	Y
Climate Controls	N	N	N	Y	Y	Y
Ethnographic Controls	N	N	N	N	Y	Y
Country-Wave FEs	N	Y	Y	Y	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	1.029	1.030	1.030	1.030	1.030	1.029
Adjusted R2	0.078	0.558	0.558	0.560	0.559	.
Beta Coef.	0.279	0.064	0.065	0.076	0.093	0.184
Num. of Observations	2,697	2,693	2,693	2,693	2,693	2,697
Num. of Clusters	1,726	1,724	1,724	1,724	1,724	1,726

Notes: The table reports OLS estimates with robust standard errors clustered at the district level reported in parentheses. The unit of observation is a district and data is from the Integrated Values Surveys. *Transhumant Pastoralism* is an index [0/1] measuring a district's population historical reliance on transhumant pastoralism. The dependent variable in every column is the district-level difference between average in-group trust (trust in family, neighbors, and people known personally) and average out-group trust (trust in people met for the first time, people of another religion, and foreigners). *Baseline controls* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. All specifications include country-wave fixed effects. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table B6: Transhumant Pastoralism and In-Group Trust Bias: Evidence from Africa

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})					
	(1)	(2)	(3)	(4)	(5)	(6)
Transhumant Pastoralism	0.217**	0.215**	0.212**	0.130	0.104	0.214**
	(0.095)	(0.094)	(0.094)	(0.090)	(0.089)	(0.100)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	N	Y	Y	Y	Y
Geographic Controls	N	N	N	Y	Y	Y
Ethnographic Controls	N	N	N	N	Y	Y
Country FEs	Y	Y	Y	Y	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.282	0.282	0.282	0.282	0.281	0.281
Adjusted R2	0.063	0.063	0.063	0.066	0.069	.
Beta Coef.	0.038	0.038	0.037	0.023	0.018	0.037
Num. of Observations	32,343	32,329	32,329	32,329	30,918	30,918
Num. of Clusters	213	213	213	213	203	203

Notes: Notes: The table reports OLS estimates with robust standard errors clustered at the language sub-family level reported in parentheses. The unit of observation is an individual respondent in the Afrobarometer surveys round 9. Transhumant Pastoralism is an index ranging from 0 to 1 that measures the historical reliance of the respondent's ethnic group on transhumant pastoralism. The dependent variable in all columns is the difference between average in-group trust (trust in relatives, neighbors, and people known personally) and average out-group trust (other citizens of country, and other ethnic groups). Respondent Demographics include a respondent's age, age squared, and gender. Baseline controls include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. Geographic controls include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. Disease controls include historical tsetse fly suitability and malaria ecology. Climate controls include mean temperature and mean precipitation between 1840 and 1859. Ethnographic controls include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. All specifications include country-wave fixed effects. *p<0.1; **p<0.05; ***p<0.01.

Table B7: Second Generation Migrants: Transhumant Pastoralism and In-Out-Group Trust

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})					
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Estimates for Father's Country of Birth					
Transhumant Pastoralism	0.152**	0.170***	0.131*	0.151**	0.215***	0.185***
	(0.063)	(0.064)	(0.068)	(0.073)	(0.066)	(0.056)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Disease Controls	N	N	Y	Y	Y	Y
Climate Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Country of Residence FEs	Y	Y	Y	Y	Y	Y
Father's Continent of Birth FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.801	0.800	0.800	0.800	0.800	0.800
Adjusted R2	0.125	0.126	0.128	0.128	0.128	.
Beta Coef.	0.026	0.029	0.023	0.026	0.037	0.032
Num. of Observations	8,700	8,600	8,600	8,600	8,600	8,607
Num. of Clusters	144	144	144	144	144	144
	Panel B: Estimates for Mother's Country of Birth					
Transhumant Pastoralism	0.152*	0.168*	0.119	0.137	0.178**	0.179**
	(0.086)	(0.086)	(0.088)	(0.091)	(0.084)	(0.072)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Disease Controls	N	N	Y	Y	Y	Y
Climate Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Country of Residence FEs	Y	Y	Y	Y	Y	Y
Mother's Continent of Birth FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.799	0.798	0.798	0.798	0.798	0.798
Adjusted R2	0.125	0.126	0.128	0.128	0.128	.
Beta Coef.	0.026	0.029	0.020	0.023	0.030	0.030
Num. of Observations	8,721	8,621	8,621	8,621	8,621	8,628
Num. of Clusters	148	148	148	148	148	148
	Panel C: Estimates for Same Country of Birth					
Transhumant Pastoralism	0.192*	0.211**	0.170*	0.194**	0.248***	0.231***
	(0.098)	(0.097)	(0.098)	(0.096)	(0.088)	(0.086)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Disease Controls	N	N	Y	Y	Y	Y
Climate Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Country of Residence FEs	Y	Y	Y	Y	Y	Y
Parents' Continent of Birth FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.810	0.809	0.809	0.809	0.809	0.809
Adjusted R2	0.122	0.123	0.124	0.124	0.124	.
Beta Coef.	0.032	0.036	0.029	0.033	0.042	0.039
Num. of Observations	7,831	7,733	7,733	7,733	7,733	7,740
Num. of Clusters	137	137	137	137	137	137

Notes: The table presents OLS estimates with standard errors clustered at the country of origin level in parentheses. The unit of observation is an individual respondent who is a second generation immigrant in the Integrated Values Surveys. *Transhumant Pastoralism* is an index [0/1] measuring the historical reliance on transhumant pastoralism of the respondent's parents' country of origin. The dependent variable in all columns is the difference between average in-group trust (trust in family, neighbors, and people known personally) and average out-group trust (trust in people met for the first time, people of another religion, and foreigners). *Respondent Demographics* include a respondent's age, age squared, and gender. *Baseline control* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. All specifications include country-wave fixed effects. * p < 0.1; ** p < 0.05; *** p < 0.01.

We show that historical reliance on transhumant pastoralism is associated with higher levels of in-group trust bias today. In view of these results, a natural question arises: are people who continue to practice transhumant pastoralism also more in-group biased than people in other segments of the population? To address this question, we make use of data from Kyrgyzstan (Life in Kyrgyzstan Study, 2013).

The Kyrgyz people have historically engaged in transhumant pastoralism to live in the country's extremely mountainous terrain, which allows for grazing at different altitudes throughout the year. In the past, Kyrgyz people would spend winters in valleys and lower areas with no snow cover, called *kyshtoo*, before moving with their herds to spring pastures at medium altitudes, known as *jazdoo*, and finally to the summer pastures, *jailoo*. In autumn, they would return to their encampments via the fall pastures, *kyzdoo*. Yurts were the most common form of housing. According to the Ethnographic Atlas, the Kyrgyz people historically derived 80% of their caloric intake from transhumant pastoralism.

This traditional system was disrupted during the Soviet period, when the Kyrgyz were forced to settle, and livestock was nationalized under collective and state farm structures. Following the de-collectivization of the 1990s, some people returned to transhumant pastoralism. In the year 2000, the livestock-dependent population of Kyrgyzstan was estimated at 256,000, which represented 5.4% of the total population and 20% of the agricultural population (FAOStats; Thornton et al., 2002).

To explore whether people currently involved in transhumant pastoralism exhibit greater in-group bias, we use data from the Life in Kyrgyzstan Study (LiK) (Life in Kyrgyzstan Study, 2013). The 2016 wave contain specific questions that allow us to investigate the relationship between contemporary reliance on transhumant pastoralism and in-group trust bias. The survey includes a question asking whether household members spent time in a *jailoo* (summer pasture) in the preceding growing season: "Have any of the household members spent time in a *jailoo* (summer pasture) during the past 12 months?" This information enables us to classify households as *jailoo* participants or non-participants.

Additionally, we use data on the level of trust in various categories of people from the survey question: "On a scale from 1 to 4, how much do you generally trust the following?" The categories include family members, neighbors, people you do not know, and people from other

ethnic or linguistic groups. While the raw data includes other categories, these four categories best match the survey questions from the World Values Survey and European Values Study. For example, the Life in Kyrgyzstan survey includes a category for "people in your surrounding village/city," which has no direct equivalent in the other surveys.

From the 2,525 individuals tracked for trust data since 2010, 40 households reported sending at least one member to a *jailoo* in 2016.

We estimate the following specification:

$$\Delta(Trust^{In} - Trust^{Out})_{iho} = \alpha + \beta \textit{Jailoo Participation}_h + \mathbf{X}'\mathbf{\Gamma}_{ih} + \mu_o + \epsilon_{iho} \tag{A1}$$

where $\Delta(Trust^{In} - Trust^{Out})_{ih}$ is our measure of in-group trust bias at the individual level, and $\textit{Jailoo Participation}_h$ takes the value of one if the household reports participation in summer migration to *jailoo*.

Table B8 presents the OLS estimates. We present the results in two steps. First, we compare households with evidence of *jailoo* participation to the rest of the population. Our findings indicate that households participating in *jailoo* migration exhibit higher levels of in-group trust bias compared to those that do not. Second, we compare our population of interest to other agro-pastoral households and again find a positive association between transhumant pastoralism, as measured by summer migration to *jailoo*, and in-group trust bias.[16]

[16]We define agro-pastoral households using information about the sector in which members are involved.

Table B8: Transhumant Pastoralism and In-Group Trust Bias: Evidence from Kyrgyzstan

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})					
Sample:	Entire Population			Agro-Pastoral Households		
	(1)	(2)	(3)	(4)	(5)	(6)
***Jailoo* Participation**	0.159**	0.159**	0.176**	0.132	0.131	0.157*
	(0.078)	(0.078)	(0.076)	(0.082)	(0.082)	(0.083)
Baseline Controls	N	Y	Y	N	Y	Y
Extended Controls	N	N	Y	N	N	Y
Oblast FEs	Y	Y	Y	Y	Y	Y
Mean Dep. Var.	1.277	1.277	1.277	1.304	1.304	1.304
Adjusted R2	0.205	0.205	0.230	0.240	0.239	0.285
Beta Coef.	0.025	0.025	0.028	0.030	0.029	0.035
Num. of Observations	6,851	6,851	6,851	3,093	3,093	3,093
Num. of Clusters	2,303	2,303	2,303	956	956	956

Notes: The table presents OLS estimates with robust standard errors clustered at the household level, shown in parentheses. The unit of observation is a respondent from the Life in Kyrgyzstan Study (Life in Kyrgyzstan Study, 2013). The dependent variable in all columns is the difference between in-group trust and out-group trust. In-group trust is the average trust in family members and neighbors, while out-group trust is the average trust in people not known by the respondent and people of a different ethnic group. *Jailoo Participation* takes the value of one if a household sent at least one member to the summer pasture (*Jailoo*) in the preceding season. In columns (1) to (3), the sample includes all respondents while in columns (4) to (6), the sample includes only respondents from agro-pastoral households. Each column includes *oblast* fixed effects. Control variables in columns (2) and (3), as well as (5) and (6), include age, age squared, and gender. Additional control variables in columns (3) and (6) include ethnicity fixed effects, marital status, religiosity, and an urban-rural dummy. * p < 0.1; ** p < 0.05; *** p < 0.01.

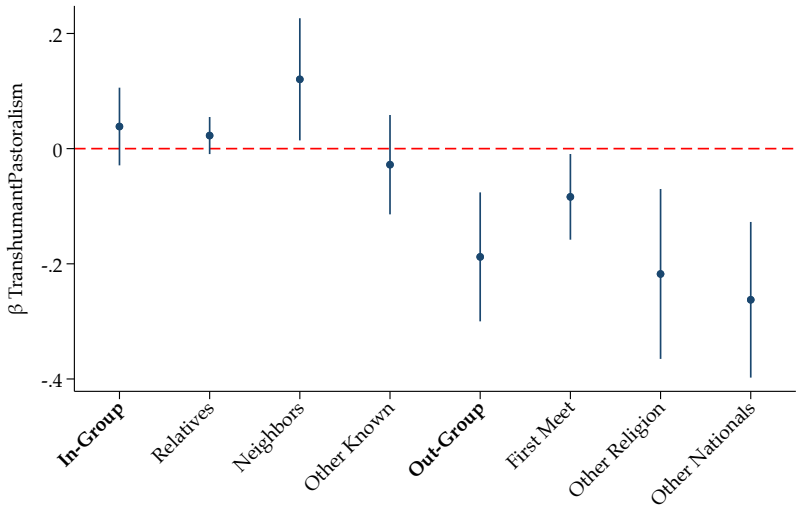


Figure B3: Transhumant Pastoralism and the Components of In-Group and Out-Group Trust

Notes: This figure presents the effect of Transhumant Pastoralism on each component of the Δ (Trust^{In} - Trust^{Out}) index. The unit of observation is a respondent in the World Values Survey (N $\approx$ 45,000).

B.3. Transhumant Pastoralism and In-Group Bias, Evidence from the Standard Cross Cultural Sample

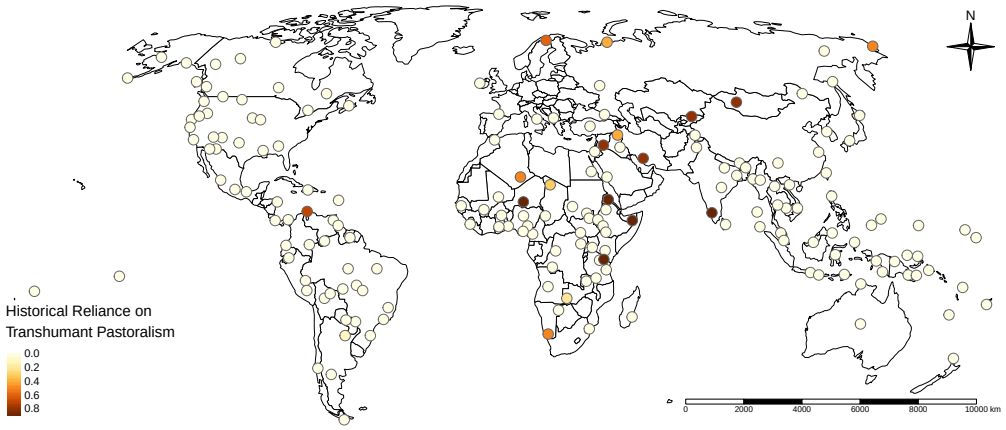


Figure B4: Distribution of Transhumant Pastoral Groups in the Standard Cross-Cultural Sample

Notes: This map displays the distribution of transhumant pastoralist groups in the Standard Cross-Cultural Sample (Murdock and White, 1969). Transhumant Pastoralism ϵ [0;100], is based on variable v4 (animal husbandry), variable v40 (predominant type of animal husbandry), and v30 (impermanent settlement).

Table B9: Standard Cross-Cultural Sample

	Dependent Variable: Δ (Violence^{In} - Violence^{Out})					
In-group:	Local Community			Local Community		
	–			–		
Out-group:	Same Society			Other Society		
	(1)	(2)	(3)	(4)	(5)	(6)
Transhumant Pastoralism	-1.102^{***}	-1.319^{***}	-1.150^{***}	-0.608^{**}	-0.543	-0.401
	(0.277)	(0.332)	(0.343)	(0.274)	(0.444)	(0.458)
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	N	Y	Y	N	Y	Y
Disease Controls	N	Y	Y	N	Y	Y
Climate Controls	N	Y	Y	N	Y	Y
Ethnographic Controls	N	Y	Y	N	Y	Y
Continent FEs	N	N	Y	N	N	Y
Mean Dep. Var.	-0.922	-0.922	-0.922	-0.934	-0.934	-0.934
Adjusted R2	0.058	0.179	0.142	0.079	0.244	0.304
Beta Coef.	-0.272	-0.326	-0.284	-0.148	-0.132	-0.097
Num. of Observations	77	77	77	63	63	63
Num. of Clusters	31	31	31	29	29	29

Notes: The table presents OLS estimates with robust standard errors clustered at the language sub-family level. The unit of observation is a society in the Standard Cross-Cultural Sample (Murdock and White, 1969). The dependent variable in columns (1) to (3) measures in-group favoritism as the difference between the acceptability of violence toward people in the same society, but outside of the local community, and members of the local community. In columns (4) to (6), the dependent variable measures in-group favoritism as the difference between the acceptability of violence toward people in other societies and members of the local community. Every specification controls for the log number of years since an ethnic group was recorded in the SCCS.
* p < 0.1; ** p < 0.05; *** p < 0.01.

B.4. Generalized Trust Question

Table B10: Transhumant Pastoralism and Trust in a Generic Stranger

	Dependent Variable: Trust in a Generic Stranger					
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Cross-Country Estimates					
Transhumant Pastoralism	−0.044	−0.067	−0.036	−0.067	−0.055	−0.121
	(0.052)	(0.056)	(0.101)	(0.110)	(0.132)	(0.075)
Baseline Controls	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Continent FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.255	0.255	0.255	0.255	0.255	0.255
Adjusted R2	0.054	0.060	0.344	0.348	0.465	.
Beta Coef.	-0.039	-0.059	-0.032	-0.059	-0.049	-0.108
Num. of Observations	208	208	208	208	208	208
Num. of Clusters	103	103	103	103	103	103
	Panel B: Cross-District Estimates					
Transhumant Pastoralism	−0.100***	0.021	0.022	0.038	0.062**	−0.039
	(0.019)	(0.023)	(0.023)	(0.028)	(0.030)	(0.024)
Baseline Controls	N	N	Y	Y	Y	Y
Geographic Controls	N	N	N	Y	Y	Y
Ethnographic Controls	N	N	N	N	Y	Y
Country FEs	N	Y	Y	Y	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.246	0.246	0.246	0.246	0.246	0.246
Adjusted R2	0.113	0.574	0.574	0.577	0.577	.
Beta Coef.	-0.094	0.020	0.021	0.035	0.059	-0.036
Num. of Observations	2,690	2,688	2,688	2,688	2,688	2,690
Num. of Clusters	1,726	1,724	1,724	1,724	1,724	1,726
	Panel C: Within Country Estimates					
Transhumant Pastoralism	0.004	0.004	0.006	−0.016	−0.009	−0.008
	(0.024)	(0.024)	(0.024)	(0.030)	(0.031)	(0.025)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	N	Y	Y	Y	Y
Geographic Controls	N	N	N	Y	Y	Y
Ethnographic Controls	N	N	N	N	Y	Y
Country FEs	Y	Y	Y	Y	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.265	0.264	0.259	0.259	0.261	0.261
Adjusted R2	0.145	0.146	0.136	0.138	0.139	.
Beta Coef.	0.002	0.002	0.003	-0.008	-0.005	-0.004
Num. of Observations	58,912	58,509	57,549	57,509	56,235	56,235
Num. of Clusters	122	122	119	118	113	113

Notes: The table reports OLS estimates with robust standard errors clustered at the relevant geographic level-countries in Panel A, district-level units in Panel B, and language sub-family in Panel C (all reported in parentheses). The unit of observation differs by panel: Panel A uses country-level aggregates from the Integrated Value Survey, Panel B uses district-level aggregates, and Panel C uses individual respondents. *Transhumant Pastoralism* is an index [0/1] measuring the historical reliance on transhumant pastoralism of a country's (Panel A), district's (Panel B), or respondent's ethnic group's (Panel C) ancestors. The dependent variable in all columns is trust in a generic stranger, defined as a dummy variable equal to one if respondents report that "most people can be trusted," and zero if they report that "you can never be too careful in dealing with others." *Respondent Demographics* (Panel C only) include a respondent's age, age squared, and gender. *Baseline control* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. Panel A controls additionally include continent fixed effects, Panel B and Panel C include country-wave fixed effects.* p < 0.1; ** p < 0.05; *** p < 0.01.

Table B11: Second Generation Migrants: Transhumant Pastoralism and Trust in a Generic Stranger

	Dependent Variable: Trust in a Generic Stranger					
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Estimates for Father's Country of Birth					
Transhumant Pastoralism	−0.024	−0.038	0.109	0.071	−0.004	0.144**
	(0.045)	(0.050)	(0.090)	(0.081)	(0.089)	(0.069)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Country of Residence FEs	Y	Y	Y	Y	Y	Y
Father's Continent of Birth FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.359	0.358	0.358	0.358	0.358	0.358
Adjusted R2	0.093	0.095	0.107	0.107	0.110	.
Beta Coef.	-0.005	-0.008	0.023	0.015	-0.001	0.031
Num. of Observations	8,592	8,496	8,496	8,496	8,496	8,504
Num. of Clusters	144	144	144	144	144	144
	Panel B: Estimates for Mother's Country of Birth					
Transhumant Pastoralism	−0.056	−0.082*	0.085	0.040	−0.070	0.056
	(0.042)	(0.048)	(0.074)	(0.068)	(0.093)	(0.072)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Country of Residence FEs	Y	Y	Y	Y	Y	Y
Mother's Continent of Birth FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.359	0.358	0.357	0.357	0.357	0.357
Adjusted R2	0.092	0.095	0.106	0.108	0.110	.
Beta Coef.	-0.012	-0.017	0.018	0.008	-0.015	0.012
Num. of Observations	8,611	8,515	8,409	8,409	8,409	8,417
Num. of Clusters	148	148	147	147	147	147
	Panel C: Estimates for Same Country of Birth					
Transhumant Pastoralism	−0.059	−0.080	0.096	0.054	−0.042	0.059
	(0.043)	(0.049)	(0.091)	(0.085)	(0.096)	(0.077)
Respondent Demographics	N	Y	Y	Y	Y	Y
Baseline Controls	N	Y	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y	Y
Country of Residence FEs	Y	Y	Y	Y	Y	Y
Parents' Continent of Birth FEs	N	N	N	N	Y	Y
Lasso-Selected Controls	N	N	N	N	N	Y
Mean Dep. Var.	0.356	0.355	0.355	0.355	0.355	0.355
Adjusted R2	0.091	0.093	0.106	0.107	0.111	.
Beta Coef.	-0.012	-0.017	0.020	0.011	-0.009	0.012
Num. of Observations	7,730	7,636	7,636	7,636	7,636	7,644
Num. of Clusters	137	137	137	137	137	137

Notes: The table presents OLS estimates with standard errors clustered at the country of origin level in parentheses. The unit of observation is an individual respondent who is a second generation immigrant in the Integrated Values Surveys. *Transhumant Pastoralism* is an index [0/1] measuring the historical reliance on transhumant pastoralism of the respondent's parents' country of origin. The dependent variable in all columns is trust in a generic stranger: a dummy variable equals to one if a respondent reports that most people can be trusted, and zero if the respondent answers you never be too careful in dealing with others. *Respondent Demographics* include a respondent's age, age squared, and gender. *Baseline control* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. All specifications include country-wave fixed effects. * p < 0.1; ** p < 0.05; *** p < 0.01.

B.5. Instrumental Variable Construction

Data from Beck and Sieber (2010), while extremely useful and widely used in this literature, suffer from three shortcomings. First, Beck and Sieber (2010)'s suitability estimates cover only the Old World and Australia, omitting North, Central, and South America. This excludes about 30% of groups in the Ethnographic Atlas and 9 groups historically reliant on transhumance. Second, information on locations of livelihoods rely on compiled lists whose sources, spatial resolution, and temporal coverage are not documented clearly, reducing replicability and raising concerns about measurement error. Third, suitability is estimated using climate and soil data that are contemporary and potentially endogenous. Climate data used cover 1961-1990 and are partially shaped by human activity. Soil classifications include categories explicitly reflecting anthropogenic alteration (Anthrosols, Technosols). These two types of soils capture, respectively "soils that have been modified profoundly through human activities" and "soils whose properties and pedogenesis are dominated by their technical origin. They contain a significant amount of artefacts (something in the soil recognizably made or strongly altered by humans or extracted from greater depths), or are sealed by technic hard material (hard material created by humans, having properties unlike natural rock) or contain a geomembrane." Together, they may introduce endogeneity.

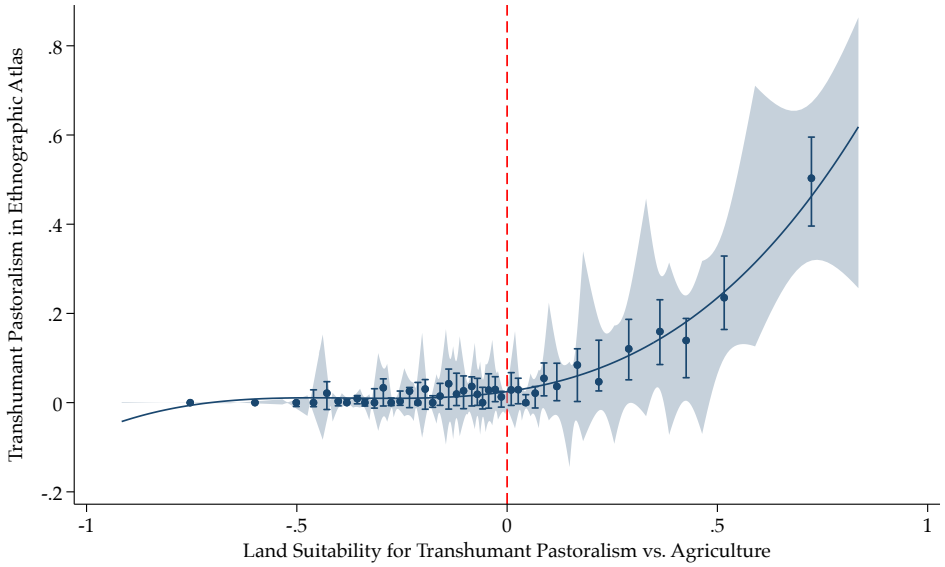
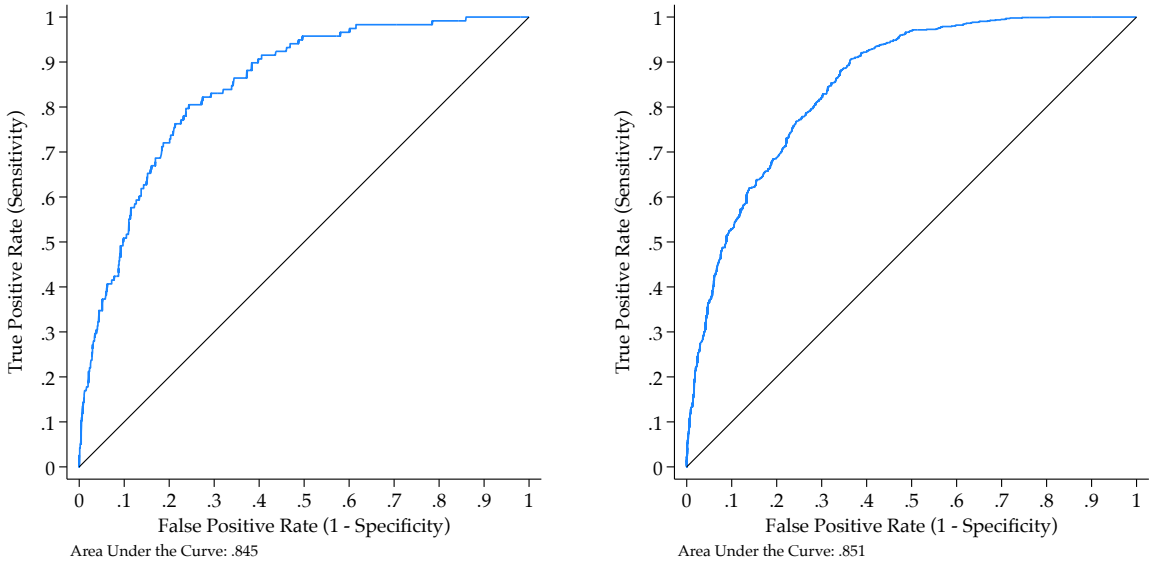


Figure B5: Transhumant Pastoralism and Land Suitability for Transhumant Pastoralism relative to Agriculture

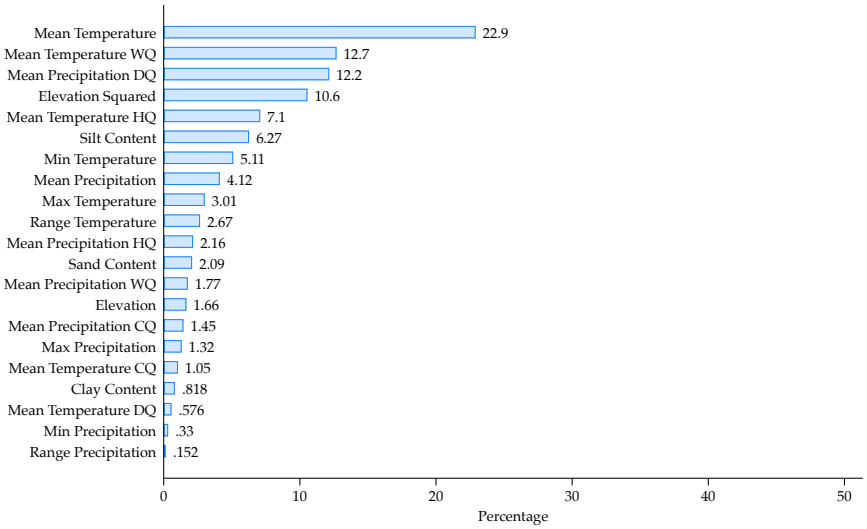
Notes: This Figure presents a binsreg plot of the relationship between reliance on transhumant pastoralism in the Ethnographic Atlas and land suitability for transhumant pastoralism relative to agriculture (Cattaneo, Crump, Farrell and Feng, 2025).



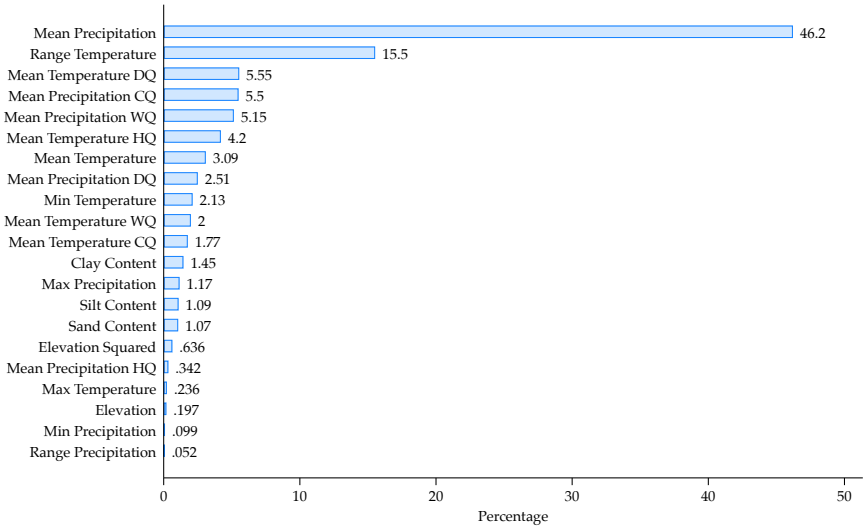
(a) Transhumant Pastoralism (b) Agriculture

Figure B6: Receiver Operating Characteristic Curves

Notes: This figure presents the receiver operating characteristic curves (ROC) evaluating the predictive performance of the Maxent models for transhumant pastoralism (panel B7a) and agriculture (panel B7b). The ROC curve plots the true positive rate (sensitivity) against the false positive rate ($1 -$ specificity) across different classification thresholds.



(a) Transhumant Pastoralism



(b) Agriculture

Figure B7: Variables Contribution to Model Accuracy

Notes: This figure reports the relative contribution of each environmental and climatic variable to the predictive performance of the Maxent models for transhumant pastoralism (panel B7a) and agriculture (panel B7b). The contributions are expressed as percentages, indicating the extent to which each variable improves model accuracy when included in the estimation.

Figure B8: Rasters used in the Construction of the Instrument (Part 1/2)



(a) Elevation



(b) Elevation Squared



(c) Sand Content



(d) Silt Content



(e) Clay Content



(f) Mean Temperature



(g) Range Temperature



(i) Max Temperature



(k) Mean Temperature HQ



(h) Min Temperature

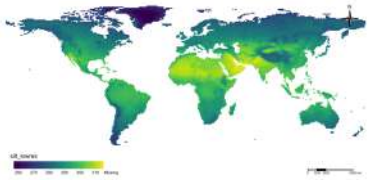


(j) Mean Temperature CQ



(l) Mean Temperature DQ

Figure B9: Rasters used in the Construction of the Instrument (Part 2/2)



(a) Mean Temperature WQ



(c) Mean Precipitation HQ



(e) Mean Precipitation WQ



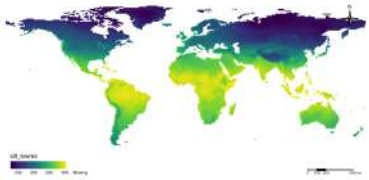
(b) Mean Precipitation CQ



(d) Mean Precipitation DQ



(f) Max Temperature



(g) Min Temperature



(i) Mean Temperature



(h) Range Temperature



(j) Mean Temperature CQ

Notes: These figures display the set of environmental and climatic rasters used in the construction of the instrumental variable derived from the Maxent (Maximum Entropy) model. The variables capture fixed and long-run geographic and biophysical conditions that influence agricultural and pastoral suitability. The topographic variables include elevation, elevation squared, and soil texture indicators (sand, silt, and clay content). The climatic variables include mean, minimum, maximum, and range of temperature and precipitation, as well as seasonal means for the cold, warm, dry, and humid quarters (CQ, WQ, DQ, HQ). Temperature and precipitation data correspond to the historical period 1820-1840, reflecting preindustrial climate conditions.

B.6. Mechanisms

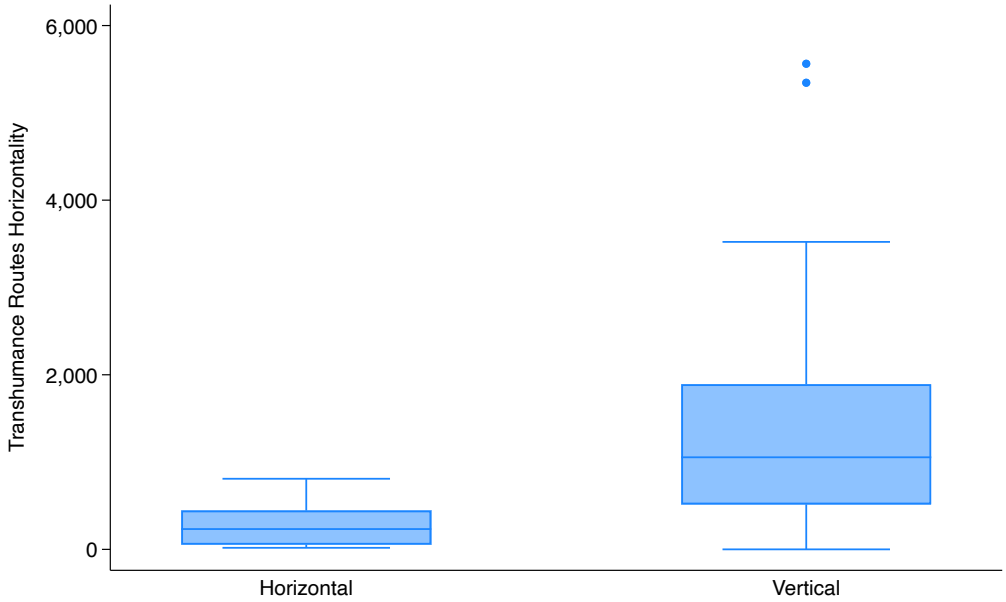


Figure B10: Validation of Horizontality Using the LPP Classification of Pastoral Mobility Systems

Notes: This figure plots the distribution of elevation range (p10-p90) per 100 km of transhumance route for 83 groups classified by the League of Pastoral Peoples. Groups from the LPP database are matched to the nearest transhumance route using a 50 km proximity buffer around each group's latitude-longitude coordinates. Elevation range is computed as the difference between the 90th and 10th percentile elevations along each matched route, normalized per 100 km. The classification of mobility type (horizontal vs. vertical) is taken directly from LPP descriptions.

Table B12: Transhumant Pastoralism and In-Group Trust Bias: Heterogeneity by Routes' Horizontality 95th-5th Percentile

	Dependent Variable: Δ (Trust^{In} - Trust^{Out})				
	(1)	(2)	(3)	(4)	(5)
Transhumant Pastoralism [std.]	0.063***	0.060***	0.060***	0.050***	0.035
	(0.016)	(0.014)	(0.012)	(0.014)	(0.031)
Routes' Horizontality [std.]	−0.042*	−0.023	−0.016	−0.010	−0.054
	(0.023)	(0.021)	(0.022)	(0.040)	(0.036)
Transhumant Pastoralism [std.]	0.030***	0.035***	0.031***	0.036**	0.045**
× **Routes' Horizontality [std.]**	(0.010)	(0.008)	(0.008)	(0.016)	(0.018)
Respondent Demographics	Y	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y	Y
Disease Controls	N	Y	Y	Y	Y
Climate Controls	N	Y	Y	Y	Y
Geographic Controls	N	N	Y	Y	Y
Ethnographic Controls	N	N	N	Y	Y
Country FEs	Y	Y	Y	Y	Y
Mean Dep. Var.	1.174	1.174	1.174	1.174	1.174
Adjusted R2	0.105	0.107	0.107	0.109	0.110
Num. of Observations	27,747	27,747	27,747	27,747	27,747
Num. of Clusters	42	42	42	42	42

Notes: The table reports OLS estimates with robust standard errors clustered at the language sub-family level reported in parentheses. The unit of observation is an individual respondent in the World Values Survey. *Transhumant Pastoralism* is an index ranging from 0 to 1 that measures the historical reliance of the respondent's ethnic group on transhumant pastoralism. *Route's Horizontality* is an index of terrain flatness, calculated as the negative difference between the 90th and 10th percentiles of elevation divided by the route's length (×100). The dependent variable in all columns is the difference between average in-group trust (trust in family, neighbors, and people known personally) and average out-group trust (trust in people met for the first time, people of another religion, and foreigners). *Respondent Demographics* include a respondent's age, age squared, and gender. *Baseline controls* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. All specifications include country-wave fixed effects. * p < 0.1; ** p < 0.05; *** p < 0.01.

Table B13: Routes' Horizontality and Ethnic Border Crossing

	Dependent Variable: Ethnic Borders Crossed [Cont.]					
	Any		Agriculture		Transhumant Pastoralist	
	(1)	(2)	(3)	(4)	(5)	(6)
Routes' Horizontality	0.017***	0.012**	0.011**	0.009**	0.001**	0.000
	(0.006)	(0.005)	(0.005)	(0.004)	(0.001)	(0.000)
Year of Map Control	Y	Y	Y	Y	Y	Y
Continent FEs	N	Y	N	Y	N	Y
Mean Dep. Var.	0.840	0.840	0.488	0.488	0.069	0.069
Beta Coef.	0.145	0.098	0.103	0.085	0.061	0.008
Adjusted R2	0.021	0.040	0.010	0.027	0.003	0.018
Num. of Observations	2,013	2,013	2,013	2,013	2,013	2,013
Num. of Map Clusters	63	63	63	63	63	63
Num. of Country Clusters	66	66	66	66	66	66

Notes: The table reports OLS estimates with robust standard errors two-way clustered at the levels of the original source map and the main overlapping country. The unit of observation is a transhumance route. The dependent variable differs across panels: columns (1)-(2) refer to any ethnic borders crossed; columns (3)-(4) refer to agriculturalist ethnic borders crossed; and columns (5)-(6) refer to transhumant pastoralist ethnic borders crossed. In columns Across columns, the dependent variable is a binary indicator equal to one if a transhumance route crosses at least one respective border, and zero otherwise. *Route's Horizontality* is an index of terrain flatness, calculated as the negative difference between the 90th and 10th percentiles of elevation divided by the route's length ($\times 100$). Higher values indicate flatter routes. Specifications reported in even columns include continent fixed effects (Africa, Asia, and Europe). All specifications control for the number of years since the route was recorded on the original map. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B14: Routes' Horizontality and Ethnic Border Crossing

	Dependent Variable: Ethnic Borders Crossed [ln(1+Cont.)]					
	Any		Agriculture		Transhumant Pastoralist	
	(1)	(2)	(3)	(4)	(5)	(6)
Routes' Horizontality	0.008***	0.006***	0.005***	0.004**	0.001**	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)
Year of Map Control	Y	Y	Y	Y	Y	Y
Continent FEs	N	Y	N	Y	N	Y
Mean Dep. Var.	0.438	0.438	0.248	0.248	0.045	0.045
Beta Coef.	0.194	0.146	0.131	0.125	0.064	0.008
Adjusted R2	0.046	0.066	0.021	0.051	0.004	0.020
Num. of Observations	2,013	2,013	2,013	2,013	2,013	2,013
Num. of Map Clusters	63	63	63	63	63	63
Num. of Country Clusters	66	66	66	66	66	66

Notes: The table reports OLS estimates with robust standard errors two-way clustered at the levels of the original source map and the main overlapping country. The unit of observation is a transhumance route. The dependent variable differs across panels: columns (1)-(2) refer to any ethnic borders crossed; columns (3)-(4) refer to agriculturalist ethnic borders crossed; and columns (5)-(6) refer to transhumant pastoralist ethnic borders crossed. In columns Across columns, the dependent variable is a binary indicator equal to one if a transhumance route crosses at least one respective border, and zero otherwise. *Route's Horizontality* is an index of terrain flatness, calculated as the negative difference between the 90th and 10th percentiles of elevation divided by the route's length ($\times$100). Higher values indicate flatter routes. Specifications reported in even columns include continent fixed effects (Africa, Asia, and Europe). All specifications control for the number of years since the route was recorded on the original map. * p < 0.1; ** p < 0.05; *** p < 0.01.

B.7. In-Group Trust Bias and Firm Size

Table B15: Parochial Trust and Average Establishment Size

	Dependent Variable: ln(Average Establishment Size), Country Level					
	(1)	(2)	(3)	(4)	(5)	(6)
In-Out Trust	-0.587^{***}	-0.671^{***}	-0.572^{**}	-0.552^{**}	-0.431^{**}	-0.425^{**}
	(0.186)	(0.221)	(0.237)	(0.216)	(0.184)	(0.210)
Generalized Trust	0.814^{***}	0.607^{*}	0.490	-0.039	0.345	0.360
	(0.287)	(0.336)	(0.332)	(0.368)	(0.403)	(0.400)
Ln(GDP 2000)	N	Y	Y	Y	Y	Y
Ln(Population 2000)	N	N	Y	Y	Y	Y
Ln(Country Size 2000)	N	N	N	Y	Y	Y
Legal Origin FEs	N	N	N	N	Y	Y
Government Effectiveness	N	N	N	N	N	Y
Rule of Law	N	N	N	N	N	Y
Continent FEs	N	Y	Y	Y	Y	Y
Mean Dep. Var.	1.630	1.630	1.622	1.626	1.626	1.626
Adjusted R2	0.599	0.646	0.647	0.701	0.742	0.741
Num. of Observations	471	471	459	447	447	447
Num. of Clusters	81	81	79	77	77	77

Notes: The table presents OLS estimates with standard errors clustered at the country level in parentheses. The unit of observation is a country-sector pair, and the dependent variable is measured using establishment-size data from Bento and Restuccia (2021). *In-Out Trust* is the difference between average in-group trust (family, neighbors, people known) and average out-group trust (people first met, people of another religion, foreigners). *Baseline controls* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. Columns progressively add controls for economic development (log GDP per capita), country population, geographic country size, legal-origin fixed effects, measures of institutional quality (Rule of Law and Government Effectiveness), and continent fixed effects. * p < 0.1; ** p < 0.05; *** p < 0.01.

B.8. Social Consequences of Transhumant Pastoralism: Evidence from Afrobarometer's Exit Questions

Table B16: Social Consequences: Perceived Attitudes, Evidence from Exit Questions Afrobarometer

	Dependent Variable: The Respondent Is [...]							
	Friendly		Cooperative		Honest		At Ease	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Transhumant Pastoralism	-0.054^{***}	-0.042^{***}	-0.038^{**}	-0.043^{***}	-0.070^{***}	-0.059^{***}	-0.056^{**}	-0.080^{***}
	(0.015)	(0.013)	(0.015)	(0.014)	(0.027)	(0.019)	(0.025)	(0.020)
Respondent Demographics	Y	Y	Y	Y	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y
Geographic Controls	N	Y	N	Y	N	Y	N	Y
Ethnographic Controls	N	Y	N	Y	N	Y	N	Y
Country FEs	Y	N	Y	N	Y	N	Y	N
Interviewer FEs	N	Y	N	Y	N	Y	N	Y
Mean Dep. Var.	0.898	0.898	0.898	0.898	0.898	0.898	0.898	0.898
Beta Coef.	-0.016	-0.013	-0.011	-0.013	-0.021	-0.018	-0.017	-0.024
Adjusted R2	0.019	0.181	0.025	0.168	0.043	0.237	0.034	0.201
Num. of Observations	196,507	196,417	196,562	196,472	196,787	196,697	196,815	196,724
Num. of Clusters	238	238	238	238	238	238	238	238

Notes: The table presents OLS estimates with robust standard errors clustered at the language sub-family level. The unit of observation is a survey in the Afrobarometer surveys rounds 3 to 9. *Transhumant Pastoralism* is an index ranging from 0 to 1 that measures the historical reliance of the respondent's ethnic group on transhumant pastoralism. Across specifications the dependent variables are exit questions from the Afrobarometer surveys and measure to what extent a respondent appeared friendly, cooperative, honest, or at ease an enumerator. The dependent variables are -1 to 1 categorical variables. For the outcome considered in columns (1) and (2), -1 stands for hostile, 0 for in between, and 1 for friendly. Each specification controls for the respondent's age, age squared, gender, urban status, and education. Specifications in columns (1), (3), (5), and (7) control for the symmetric characteristics of the interviewer. *Respondent Demographics* include a respondent's age, age squared, and gender. *Baseline controls* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table B17: Social Consequences: Perceived Attitudes, Evidence from Exit Questions Afrobarometer, Controlling for Pastoralism

	Dependent Variable: The Respondent Is [...]							
	Friendly		Cooperative		Honest		At Ease	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Transhumant Pastoralism	−0.055***	−0.062***	−0.037*	−0.055***	−0.068**	−0.064***	−0.058*	−0.102***
	(0.019)	(0.016)	(0.019)	(0.016)	(0.032)	(0.021)	(0.033)	(0.025)
Pastoralism	0.003	0.044***	−0.001	0.027	−0.006	0.010	0.007	0.049*
	(0.029)	(0.016)	(0.031)	(0.017)	(0.045)	(0.022)	(0.053)	(0.025)
Respondent Demographics	Y	Y	Y	Y	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y
Geographic Controls	N	Y	N	Y	N	Y	N	Y
Ethnographic Controls	N	Y	N	Y	N	Y	N	Y
Country FEs	Y	N	Y	N	Y	N	Y	N
Interviewer FEs	N	Y	N	Y	N	Y	N	Y
Mean Dep. Var.	0.898	0.898	0.898	0.898	0.898	0.898	0.898	0.898
Adjusted R2	0.019	0.181	0.025	0.168	0.043	0.237	0.034	0.201
Num. of Observations	196,507	196,417	196,562	196,472	196,787	196,697	196,815	196,724
Num. of Clusters	238	238	238	238	238	238	238	238

Notes: The table presents OLS estimates with robust standard errors clustered at the language sub-family level. The unit of observation is a survey in the Afrobarometer surveys rounds 3 to 9. *Transhumant Pastoralism* is an index ranging from 0 to 1 that measures the historical reliance of the respondent's ethnic group on transhumant pastoralism. Across specifications the dependent variables are exit questions from the Afrobarometer surveys and measure to what extent a respondent appeared friendly, cooperative, honest, or at ease an enumerator. The dependent variables are -1 to 1 categorical variables. For the outcome considered in columns (1) and (2), -1 stands for hostile, 0 for in between, and 1 for friendly. Each specification controls for the respondent's age, age squared, gender, urban status, and education. Specifications in columns (1), (3), (5), and (7) control for the symmetric characteristics of the interviewer. *Respondent Demographics* include a respondent's age, age squared, and gender. *Baseline controls* include the log number of years since a given ethnic group was first observed in the Ethnographic Atlas. *Geographic controls* include absolute latitude, land suitability for agriculture, caloric suitability, elevation and its square, terrain ruggedness, and distance to the coast. *Disease controls* include historical tsetse fly suitability and malaria ecology. *Climate controls* include mean temperature and mean precipitation between 1840 and 1859. *Ethnographic controls* include political complexity, community size, presence of irrigation, and whether domestic organization was based on the nuclear family. * p < 0.1; ** p < 0.05; *** p < 0.01.