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UNDERSTANDING CULTURAL PERSISTENCE AND CHANGE

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ABSTRACT

When does culture persist and when does it change? We examine a determinant that has been put forth in the anthropology literature: the variability of the environment from one generation to the next. A prediction, which emerges from a class of existing models from evolutionary anthropology, is that following the customs of the previous generation is relatively more beneficial in stable environments where the culture that has evolved up to the previous generation is more likely to be relevant for the subsequent generation. We test this hypothesis by measuring the variability of average temperature across 20-year generations from 500–1900. Looking across countries, ethnic groups, and the descendants of immigrants, we find that populations with ancestors who lived in environments with more stability from one generation to the next place a greater importance in maintaining tradition today. These populations also exhibit more persistence in their traditions over time.

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1. Introduction

Increasingly, we are coming to understand the role of culture and its importance for economic development (e.g., Nunn, 2012, Spolaore and Wacziarg, 2013). A number of studies have documented the persistence of cultural traits over very long periods (e.g., Voigtlaender and Voth, 2012). Strong cultural persistence that lasts for generations has been documented among migrants and their descendants (e.g., Fischer, 1989, Fernandez, 2007, Giuliano, 2007, Fernandez and Fogli, 2009, Algan and Cahuc, 2010). We also have accumulating evidence that vertically transmitted traits, such as culture or a common history, are important determinants of comparative development today (Spolaore and Wacziarg, 2009, Comin, Easterly and Gong, 2010, Chanda and Putterman, 2014). Along similar lines, numerous studies show how deep historical factors can shape persistent cultural traits (Giuliano and Nunn, 2013, Alesina, Giuliano and Nunn, 2013, Talhelm, Zhang, Oishi, Shimin, Duan, Lan and Kitayama, 2014, Becker, Boeckh, Hainz and Woessmann, 2016, Buggle and Durante, 2016, Guiso, Sapienza and Zingales, 2016).

On the other hand, there are also numerous examples of a lack of cultural persistence; namely, episodes of significant cultural change. A well-studied episode of cultural change is the Protestant Reformation in Europe (e.g., Becker and Woessmann, 2008, 2009, Cantoni, 2012, 2014). Another example, though on a smaller scale, is the Puritan colony established on Providence Island, off of the coast of Nicaragua, in the early seventeenth century (Kupperman, 1995). Unlike the Puritan colony established in Massachusetts, this colony experienced a significant cultural change. Abandoning their traditional values, the Puritans began large-scale use of slaves and engaged in privateering. Margaret Mead's (1956) ethnography of the Manus documents how, in a single generation, this society completely changed its culture, abandoning the previous practices of living in stilt houses on the sea to living on land, wearing European clothes, and adopting European institutional structures in the villages. Firth (1959) documents similar dramatic cultural changes that occurred within one generation among the Polynesian community of Tikopia.[1]

Given that we have numerous examples of cultural persistence and numerous examples of cultural change, a question naturally arises: when does culture change and when does it persist? In particular, what determines a society's willingness to adopt new customs and beliefs rather than hold on to traditions? We consider this question here. Specifically, we test for the importance

[1] Also related are studies that find evidence of a lack of economic persistence and even reversals (see for example Acemoglu, Johnson and Robinson, 2002, Olsson and Paik, 2012).

of the instability of a society's environment across generations, a determinant that is central in the theoretical evolutionary anthropology literature (e.g., Boyd and Richerson, 1985, Aoki and Feldman, 1987, Rogers, 1988, Feldman, Aoki and Kumm, 1996, Boyd and Richerson, 2005).

To see how the instability of the environment from one generation to the next can be an important determinant of cultural change, first consider a population living in a very stable environment. In this setting, the customs and beliefs of one's ancestors are particularly helpful in deciding what actions are best in the current setting. Given that those customs and beliefs had evolved and survived up until the prior generation, they likely contain valuable information that is relevant to the current generation. That is, there are potential benefits to a belief in the importance of following and maintaining the traditions of the previous generation.[2] The more similar the environment is across generations, the more likely it is that the traditions of the previous generation are useful for the current generation. Thus, for societies that live in environments that do not vary across generations, there are significant benefits to valuing tradition and placing importance on the continuity of cultural practices across generations.

Next, consider a population living in a very unstable environment, where the setting of each generation changes so much that the customs and beliefs of the previous generation are unlikely to be relevant for the current generation.[3] In this setting, the traditions of one's ancestors are less informative of the best actions for the current generation. Thus, a culture that strongly values tradition is less beneficial, and we therefore expect such a society to place less importance on maintaining tradition and to be more willing to adopt new practices and beliefs.

We take this hypothesis to the data and test whether societies that historically lived in environments with more environmental instability from one generation to the next value tradition less, are more likely to adopt new cultural values, and exhibit less cultural persistence over time. To measure the environmental instability across generations, we use paleoclimatic data from Mann, Zhang, Rutherford, Bradley, Hughes, Shindell, Ammann, Faluvegi and Ni (2009a) that measures the average annual temperature of 0.5-degree-by-0.5-degree grid-cells globally beginning in 500AD. For each grid-cell, we calculate the variability (i.e., standard deviation) of the average temperature across 20-year generations between 500 and 1900AD.

[2]See Henrich (2016) for evidence of these benefits.

[3]For example, it is well known that cooling during the Little Ice Age resulted in social unrest, increased conflict, and slower economic growth (e.g., Baten, 2002, Oster, 2004, Dalgaard, Hansen and Kaarsen, 2015, Waldinger, 2015, Iyigun, Nunn and Qian, 2017). There is also evidence that greater seasonal variability resulted in the Neolithic transition, one of the most important social changes in human history (Matranga, 2016).

Our empirical analysis uses four strategies to test the hypothesis of interest. The first is to examine self-reported views of the importance of tradition from the *World Values Surveys* (WVS). Looking either across countries or across ethnic groups within countries, we find that having ancestors that experienced more climatic instability across generations is associated with a weaker belief in the importance of maintaining traditions and customs today.

Our second strategy measures the importance a group places on maintaining tradition by the persistence of its cultural traits. We examine three cultural practices for which we have been able to locate data for a large number of societies and over long periods: gender role norms (measured by female labor-force participation), polygamy, and consanguineous marriage (commonly referred to as cousin marriage). Our analysis first documents the persistence of each practice over time. Countries that traditionally engaged in more female work, more polygamy, and more consanguineous marriage are more likely to do so today. We find that, consistent with the prediction from models of cultural evolution, we observe weaker persistence for countries with ancestors that experienced greater instability of their climate from one generation to the next. According to the magnitude of the point estimates, while most countries experience statistically significant persistence, those with the most unstable climates exhibit no persistence at all.

Our third strategy examines the stability of a group's customs and traditions when faced with a large shock that causes these traditions to change. Specifically, we study the descendants of immigrants who have moved to the United States. Immigrants bring their traditional customs with them, but live in a new environment with a new set of practices and values. There is, therefore, a natural weakening of traditional practices. Our analysis examines the extent to which the descendants of immigrants from different societies hold on to their traditional cultures and whether individuals from societies with ancestors who lived in unstable environments are less likely to hold on to their traditional practices. Specifically, we examine whether children of immigrants marry someone from the same ancestral group and whether they speak a language other than English at home. We find that children of immigrants from countries with a more historically unstable environment are less likely to marry someone from their own ancestral group and are more likely to speak English at home. In other words, we find that a history of environmental instability is associated with less persistence of traditional cultural practices.

One concern with the analysis involving immigrants is that they are not necessarily a representative sample of the origin population. Further, the nature of selection may differ systematically in a manner that is correlated with the cross-generational climatic instability of the origin country. Given these concerns, our fourth strategy examines non-immigrant populations that are faced with pressure to change their traditions and customs: Indigenous populations of the United States and Canada. Like immigrants, Indigenous populations are minority groups whose cultural traditions differ from those of the majority population. However, unlike immigrants, they are not a small subset of a larger population that has been selected by the immigration process. Our analysis examines the relationship between the cross-generational climatic instability of the land historically inhabited by Indigenous groups and the extent to which they are able to speak their traditional language today. We find that, as with the descendants of immigrants, Indigenous populations with a history of greater environmental instability are less likely to speak their traditional language. They appear to have been more likely to abandon this cultural tradition and to adopt English as the language spoken at home.

Overall, each of our four strategies yields the same conclusion: tradition is less important and culture less persistent among populations with ancestors who lived in environments that changed more from generation to generation.

Our results contribute to a deeper understanding of cultural persistence and change. Two previous studies use lab-based methods to test the prediction of the relationship between the stability of the environment and cultural persistence that arises from models of cultural evolution (McElreath, Lubell, Richerson, Waring, Baum, Edstein, Efferson and Paciotti, 2005, Toelch, van Delft, Bruce, Donders, Meeus and Reader, 2009).[4] McElreath et al. (2005) examine the behavior of 30–40 student participants (depending on the experiment), who played the role of farmers, choosing which of two crops to plant over twenty consecutive planting seasons. In one of the modules of the experiment, students could choose to learn the planting choices of participants from the previous season before making their decision. The authors found that reliance on social learning (or tradition) is lower when there is less stability in the payoffs to planting each crop. A subsequent experiment implemented by Toelch et al. (2009) with 62 undergraduate students yielded the same finding. In that experiment, participants attempted to find a reward within a virtual maze. There were three treatment groups that varied in the probability that the location of the reward would change after each of 100 rounds. The authors found that more social learning

[4]Prior to these studies, Galef and Whiskin (2004) had used rats to test for a relationship between the stability of the environment and social learning. Consistent with the models, they found that social learning was stronger when the environment was more stable.

occurred (i.e., behavior was more influenced by the actions and payoffs of others) when the environment was less variable.

A number of studies in economics provide important insights into the process of cultural change. Fouka (2015) studies the effects of language restrictions against German schools in the United States in the early twentieth century. She finds that these restrictions actually strengthened the value placed on German culture and identity, and strengthened its transmission over generations. Specifically, she finds that the restrictions increased the rate of within-group marriage and the choice of distinctively German names for children. Along similar lines, Abramitzky, Boustan and Eriksson (2016) examine the naming practices of immigrants who arrived in the United States at the end of the Age of Mass Migration. The authors use the foreignness of child names to trace out the extent of immigrants' cultural assimilation over time. They find that parents tend to choose less-foreign names the longer they are in the United States. They also find that the speed of assimilation varies significantly across origin-countries. Our study can be seen as testing one hypothesis that explains this variation in cultural assimilation.

Giavazzi, Petkov and Schiantarelli (2014) study the complementary question of which types of cultural traits tend to persist and which types tend not to. The authors examine the children of immigrants to Europe and the United States and document that certain cultural traits exhibit strong persistence – namely, religious values and political orientation – while others – such as, attitudes towards cooperation, independence, and women's work – do not. Voigtlaender and Voth (2012) show that the persistence of anti-Semitic attitudes in Germany over a 600-year period was weaker in towns that were more economically dynamic or were more open to external trade. Our findings are consistent with this prior evidence. One can interpret German towns with faster economic growth and greater openness to external trade as being inherently less stable and therefore we expect cultural persistence to be weaker.

On the theoretical front, Greif and Tadelis (2010) examine the persistence of cultural values in a setting with an authority, such as a state or church, that is attempting to change the population's cultural values. The authors allow for the population to engage in actions that differ from their true values and to pass on values to their children that differ from those reflected by their actions. They model how the persistence of cultural values differs depending on the extent to which the authority can detect and punish hidden beliefs. They also consider the possibility of direct socialization by the state; for example, through centralized state schooling. Iyigun and Rubin

(2017) consider the related question of when societies adopt new institutions and when they hold on to traditional institutions, even if those are less efficient. In their setting, uncertainty associated with the new institutions causes people to place a higher value on traditional practices, which decreases the likelihood of institutional innovation. Doepke and Zilibotti (2017) study the specific strategies – permissive, authoritarian, and authoritative – that parents use to induce the desired outcomes for their children. In their model, the strategy chosen by parents has implications for the persistence of behavior across generations.

Our findings also provide empirical validation of a class of models from evolutionary anthropology that provide a foundation for the assumptions made in the models used in cultural economics (e.g., Bisin and Verdier, 2000, 2001, Hauk and Saez-Marti, 2002, Francois and Zabojnik, 2005, Tabellini, 2008, Greif and Tadelis, 2010, Bisin and Verdier, 2017, Doepke and Zilibotti, 2017). Within this class of evolutionary models, under general circumstances, some proportion of the population finds it optimal to rely on social learning – that is, culture – when making decisions. This result provides a justification for the assumption in models of cultural evolution that parents choose to – and are able to – influence the preferences of their children.

The next section of the paper describes the hypothesis and its mechanisms using a simple model. The model shows, in the simplest possible terms, how a stable environment tends to favor a cultural belief in the importance of tradition and therefore generates cultural persistence. In Section 3, we describe the data used in the analysis. In Sections 4–7, we describe our empirical tests and report the results. Section 8 concludes.

2. The model

We now present a simple model that highlights the intuition of how variability of the environment between generations can affect the extent to which individuals value the importance of tradition. The insight that emerges from the model is that it is relatively less beneficial to value (and follow) the traditions of the previous generation when the environment is less stable. Intuitively, this is because the traditions and actions that have evolved up to the previous generation are less likely to be suitable for the environment of the current generation. This insight emerges from a wide range of models of cultural evolution in the evolutionary anthropology literature e.g., Boyd and Richerson (1985, chpt. 4), Rogers (1988), and Boyd and Richerson (1988). The model that we present here reproduces the basic logic of the model from Rogers (1988).

Players

The players of the game consist of a continuum of members of a society. Each period, a new generation is born and the previous generation dies.

Actions

In each period (generation), individuals choose one of two possible actions, which we denote 0 and 1. Which of the two actions yields a higher payoff depends on the state of the world, which can be either 0 or 1. The payoffs to each action in each state is given below, where $\pi > 0$ and $b > 0$. When the state is 0, action 0 yields a higher payoff and when the state is 1, action 1 yields a higher payoff.

		Environment	
		0	1
Action	0	$\pi + b$	$\pi - b$
	1	$\pi - b$	$\pi + b$

In each period, there is some probability $\Delta \in [0,1]$ of a shock. When a shock is experienced, there is a new draw and it is equally likely that the draw results in the new environment being state 0 or state 1. The state of the world is unknown to the players. However, as we explain below, it is possible to engage in learning (at a cost) to determine the state of the world.

Player Types

There are two possible types of players, each with a different method of choosing an action.[5] We describe the two types below.

1. **Traditionalists (T)** value tradition and place strong importance on the actions (culture) of the previous generation. They choose their action by following the action of a randomly chosen person from the previous generation.

2. **Non-Traditionalists (NT)** do not value tradition and ignore the actions (culture) of the previous generation. Instead, they invest an amount 0 to learn with certainty the optimal

[5]Rogers' (1988) original interpretation was that a player's type was hardwired, being biologically determined, and therefore subject to evolutionary forces.

action for the current period. It is assumed that the cost of learning, though positive, is modest and satisfies: $c \in (0, b)$.[6]

Let $p \in [0,1]$ denote the proportion of traditionalists in the population. Thus, p is a measure of the overall strength of tradition in the society: the proportion of the population that values tradition and follows the actions of the previous generation, rather than ignoring tradition and acting based on one's belief about what action is best.

Payoffs

First, consider the expected payoff of a non-traditionalist. In each generation, they learn and choose the optimal action and receive $\pi + b$. However, they also bear the cost of learning, which is equal to c. Thus, the payoff to a non-traditionalist is:

$$\Pi^{NT} = \pi + b - c$$

To calculate the expected payoff of a traditionalist, we first consider the following set of possible scenarios:

1. A traditionalist copies a non-traditionalist from the previous generation; and the environment did not experience a shock between the last and current generation. Since the non-traditionalist from the previous generation chose the action that was optimal in her environment and since a shock did not occur, then this action will also be optimal in the current environment and the traditionalist chooses the optimal action and receives $\pi + b$. This scenario occurs with probability $(1 - p)(1 - \Delta)$.

2. A traditionalist copies a traditionalist from the previous generation, who had copied a non-traditionalist from the previous generation. No shocks occurred during this time. In this scenario, the traditionalist receives $\pi + b$. This occurs with probability $p(1 - p)(1 - \Delta)^2$.

3. A traditionalist copies a traditionalist, who copied a traditionalist, who copied a non-traditionalist. No shocks occurred during this time. In this scenario, the traditionalist receives $\pi + b$. This occurs with probability $p^2(1 - p)(1 - \Delta)^3$.

[6] If $c > b$, then the cost of learning is prohibitively high and there will never be non-traditionalists in the society. We focus our attention here on the empirically-relevant scenario that results in the presence of both types in the population.

4. Copies a traditionalist, who copied a traditionalist, who copied a traditionalist, who copied a non-traditionalist. No shocks occurred during this time. In this scenario, the traditionalist receives $\pi + b$. This occurs with probability $p^3(1-p)(1-\Delta)^4$.

5. Etc, etc.

One can continue this sequence until infinity. Summing the infinite sequence of probabilities gives: $\sum_{t=1}^{\infty} p^{t-1}(1-p)(1-\Delta)^t$.

Conversely, with probability $1 - \sum_{t=1}^{\infty} p^{t-1}(1-p)(1-\Delta)^t$, a traditionalist does not obtain the correct action with certainty. In these cases, at least one shock to the environment has occurred. Recall that after a shock there is an equal probability of being in either state. Thus, a traditionalist still has a 50% chance of choosing the correct action for the state and receiving $\pi + b$ and a 50% chance of choosing the wrong action and receiving $\pi - b$, and the expected payoff in these cases is π.

Putting this all together, the expected payoff to a traditionalist is given by:

$$\begin{aligned}
\Pi^T &= [\sum_{t=1}^{\infty} p^{t-1}(1-p)(1-\Delta)^t](\pi+b) + [1 - \sum_{t=1}^{\infty} p^{t-1}(1-p)(1-\Delta)^t][\frac{1}{2}(\pi+b) + \frac{1}{2}(\pi-b)] \\
&= \pi + b(1-p)(1-\Delta)\sum_{t=1}^{\infty} p^{t-1}(1-\Delta)^{t-1} \\
&= \pi + \frac{b(1-p)(1-\Delta)}{1-p(1-\Delta)}
\end{aligned}$$

The payoffs to both traditionalists and non-traditionalists over all potential values of $p \in [0,1]$ (the proportion of traditionalists in the society) are shown in Figure 1a. As shown, the expected payoff of a traditionalist, Π^T, is decreasing in p, the proportion of traditionalists in the society. Intuitively, this is because as the fraction of traditionalists increases, it is less likely that a traditionalist will copy a non-traditionalist who is more likely to have chosen the correct action. At the extreme, where everyone in the population is a traditionalist ($p = 1$), each traditionalist copies another traditionalist and the expected payoff is π. With 50% probability, one receives $\pi + b$ and with 50% probability, one receives $\pi - b$.

At the other extreme, where everyone is a non-traditionalist ($p = 0$), a (mutant) traditionalist would copy the correct action from someone in the previous generation as long as there was not a shock to the environment between the two generations. Thus, with probability $1 - \Delta$, a traditionalist's payoff is $\pi + b$. If, on the other hand, the environment did change, which occurs with probability $\varDelta$, then there is an equal probability that the environment is in either state and the expected payoff is π. Therefore, the expected payoff to a traditionalist when $p = 0$ is: $\varDelta\pi + (1 - \varDelta)(\pi + b) = \pi + b(1 - \varDelta)$.

Figure 1b illustrates how the payoffs of traditionalists and non-traditionalists change as the environment becomes less stable; that is, as $\varDelta$ increases. More instability causes the payoffs to the traditionalists to decline and the payoff curve rotates downwards. By contrast, the payoffs to the non-traditionalists are unaffected. Therefore, an increase in cross-generational environmental instability results in a decline in the equilibrium proportion of traditionalists in the society.

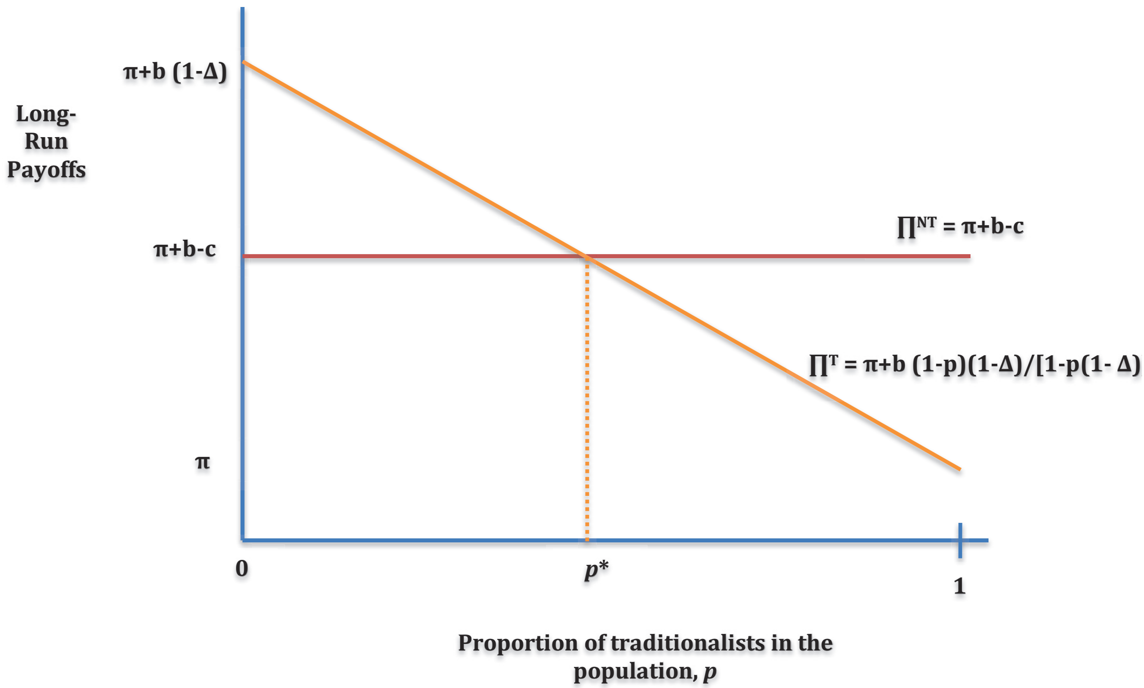
Equilibrium and comparative statics

From Figures 1a and 1b, it is clear that under fairly general conditions ($\varDelta < c/b$), the equilibrium has both traditionalists and non-traditionalists present in the society. It is only when instability, $\varDelta$, is sufficiently great (such that $\varDelta > c/b$), that the society has no traditionalists ($p = 0$).

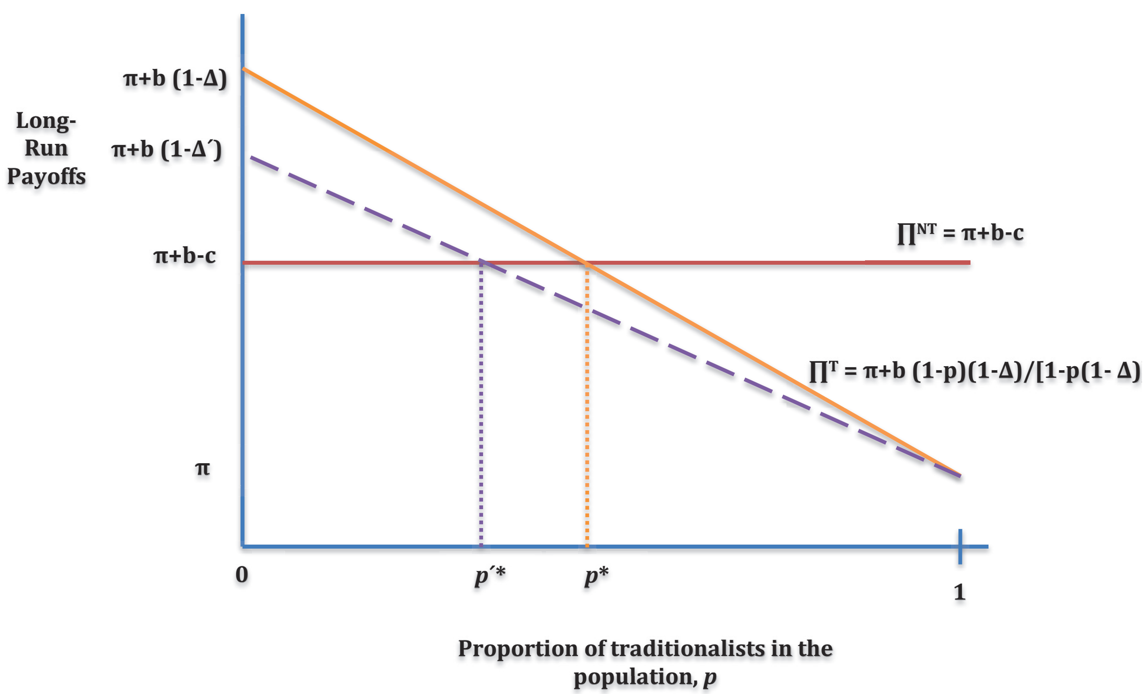
Thus, the model predicts that under fairly general conditions, we should observe the existence of traditionalists (and of cultural transmission). This is due to the value of relying on tradition, which allows for a quick and easy decision-making heuristic: simply rely on the traditional practices of the previous generation. The evidence suggests that this is the empirically relevant scenario. There are many real-world examples of functional traits evolving and being followed despite the population not knowing their benefits. One of the best known is alkali processing of maize, which is the traditional method of preparing maize in Latin America. During the process, dried maize is boiled in a mixture of water and either limestone or ash, before being mashed into a dough called 'masa'. Although it was unknown at the time, putting limestone or ash in the water before boiling prevents pellagra, a disease resulting from niacin deficiency, which occurs in diets that consist primarily of maize. This is because the alkaline solution that results from the inclusion of limestone or ash increases the body's absorption of niacin (Katz, Hediger and Valleroy, 1974).[7]

In equilibria with both types present, their payoffs must be equal. Using this condition, and solving for the equilibrium proportion of traditionalists in the economy, gives: $p^* = \frac{c - \varDelta b}{c(1-\varDelta)}$. The

[7]For other examples and additional evidence along these lines, see Henrich (2015).



(a) Payoffs to traditionalists and non-traditionalists as a function of the proportion of traditionalists in the society.



(b) Effects of an increase in the instability of the environment.

Figure 1: The equilibrium proportion of traditionalists (T) and non-traditionalists (NT) in the model.

full characterization of the equilibrium proportion of traditionalists p^* is given by:

$$p^* = \begin{cases} \frac{c-\Delta b}{c(1-\Delta)} & \text{if } \Delta \in [0,c/b] \\ 0 & \text{if } \Delta \in [c/b,1] \end{cases}$$

From this it is clear that as the economy becomes less stable – that is, as $\Delta \to 1$ – then the proportion of traditionalists in the population decreases. If instability increases to the threshold c/b, then the proportion of traditionalists in the economy goes to zero. The change in the equilibrium proportion of traditionalists as a function of cross-generational environmental instability is given by:

$$\frac{\partial p^*}{\partial \Delta} = \begin{cases} \frac{c-b}{b(1-\Delta)^2} < 0 & \text{if } \Delta \in [0,c/b] \\ 0 & \text{if } \Delta \in [c/b,1] \end{cases}$$

Since $c < b$, then $\frac{\partial p^*}{\partial \Delta} < 0$. Thus, greater instability from one generation to the next decreases the proportion of traditionalists in equilibrium.[8] Thus, the model generates the following two predictions. First, if the environment is only moderately unstable ($\Delta < c/b$), then both traditionalists and non-traditionalists are present. In such equilibria, as instability increases, the proportion of traditionalists p decreases. That is, more cross-generational instability results in less tradition. Second, if the environment is sufficiently unstable, such that $\Delta > c/b$, then the proportion of traditionalists in the economy is zero. These two predictions result in the following testable hypothesis, which we bring to the data:

Hypothesis. *The greater the instability of the environment from one generation to the next, the smaller the proportion of traditionalists in the society, and the less the importance placed on maintaining tradition.*

We now turn to our empirical analysis, which tests for this predicted relationship between the instability of the environment across generations and the importance placed on tradition.

[8]If $c > b$, then for all values of Δ the population is made up of traditionalists only ($p^* = 1$). Here, we assume the empirically relevant scenario in which there is the potential for both types in the society (Henrich, 2015).

3. Data: Sources and their construction

A. *Motivating the measure of environmental instability*

When bringing the model and its predictions to the data, the primary decision is how to measure the variability of the environment, Δ. While there are many aspects of a society's environment that one could measure, we focus on a measure that is exogenous (that is, unaffected by human actions) and is likely to affect the optimal decisions of daily life.

The measure of the environment that we use is temperature. As we explain in more detail below, we measure the historical variability of temperature across 20-year generations from 500 to 1900AD. During this time, temperature was exogenous since it was not affected in any significant manner by human actions. There is also mounting evidence that weather and climate have important effects on societies. For example, a number of studies now show that cooling during the Little Ice Age resulted in worse health outcomes, social unrest, increased conflict, decreased productivity, and slower economic growth (e.g., Baten, 2002, Oster, 2004, Waldinger, 2015, Dalgaard et al., 2015, Iyigun et al., 2017). There is evidence that increased seasonal variability in certain locations resulted in the Neolithic transition, one of the most important social changes in human history (Matranga, 2016). Durante (2010) and Buggle and Durante (2016) find that, within Europe, greater year-to-year variability in temperature and precipitation during the growing season is associated with greater trust. Also related are recent findings that rarely occurring environmental shocks can affect cultural beliefs, such as religiosity (Chaney, 2013, Bentzen, 2015, Belloc, Drago and Galbiati, 2016). There is growing evidence from contemporary data that changes in temperature have important effects, including effects on civil conflict (Burke, Miguel, Satyanath, Dykema and Lobell, 2009), violent crime (Hsiang, Burke and Miguel, 2013), economic output (Burke, Hsiang and Miguel, 2015, Dell, Jones and Olken, 2012), economic growth (Dell et al., 2012), agricultural output (Dell et al., 2012), and political instability (Dell et al., 2012).

Although we cannot observe the relationship between the environment and the optimal action (or the payoffs to different actions), we have mounting evidence that changes in the environment affect important equilibrium outcomes like conflict, cooperation, trust, trade, and economic prosperity. This provides evidence that the environment is an important determinant of the optimal actions for a society at a given time. The evidence suggests that temperature has important effects on the returns to cooperation, to trade, and to conflict. Thus, it plausibly affects the optimal level of cooperation, entrepreneurship, conflict, and so on. In addition, it directly and more mechanically affects the optimal decisions in agriculture, the optimal intensity of agriculture, what crops should be planted and when, and what agricultural implements to use. Thus, our constructed variable then measures how average temperature – and therefore the optimal actions in a society – change from one generation to the next.

An alternative strategy would be to look at changes in more proximate variables, like income, population density, or innovation.[9] While such an exercise would be informative, these determinants are potentially endogenous. In addition, to the extent that cross-generational climatic instability has an effect on these more proximate factors, the reduced-form relationship between climatic instability and the importance of tradition already captures effects working through these mechanisms.

B. ***Measuring the instability of the environment across previous generations***

We use data collected by Mann et al. (2009a) covering the entire world. The original dataset includes gridded average temperatures (0.5-degree-by-0.5-degree grid-cells) annually from 500 to 1900. Mann et al. use a climate field reconstruction approach to reconstruct global patterns of surface temperature for a long historical period. The construction uses proxy data with global coverage that comprises 1,036 tree ring series, 32 ice core series, 15 marine coral series, 19 documentary series, 14 speleothem series, 19 lacustrine sediment series, and 3 marine sediment series (Mann, Zhang, Rutherford, Bradley, Hughes, Shindell, Ammann, Faluvegi and Ni, 2009b).

Let x_g be the average temperature during a given generation g. Generations are 20 years in length and, thus, there are 70 generations from 500–1900. Our measure of interest is the standard deviation of the average temperature across generations: $\left[\frac{1}{N^g}\sum\limits_{g=1}^{70}\left(x_g-\overline{x}\right)^2\right]^{1/2}$.

The average variability by grid-cell is shown in Figure 2, where yellow (a lighter shade) indicates less variability and brown (a darker shade) greater variability. Although there is variation between nearby cells, there are also some broad patterns. For example, cells that are further from the equator tend to have greater variability.

Our analysis examines the relationship between measures of the importance of tradition in the contemporary period and the instability of the climate of an individual's ancestors. Thus, an

[9] Voigtlaender and Voth (2012), for example, show that the persistence of anti-Semitic attitudes in Germany over a 600-year period was weaker in towns that were more economically dynamic or more open to external trade.

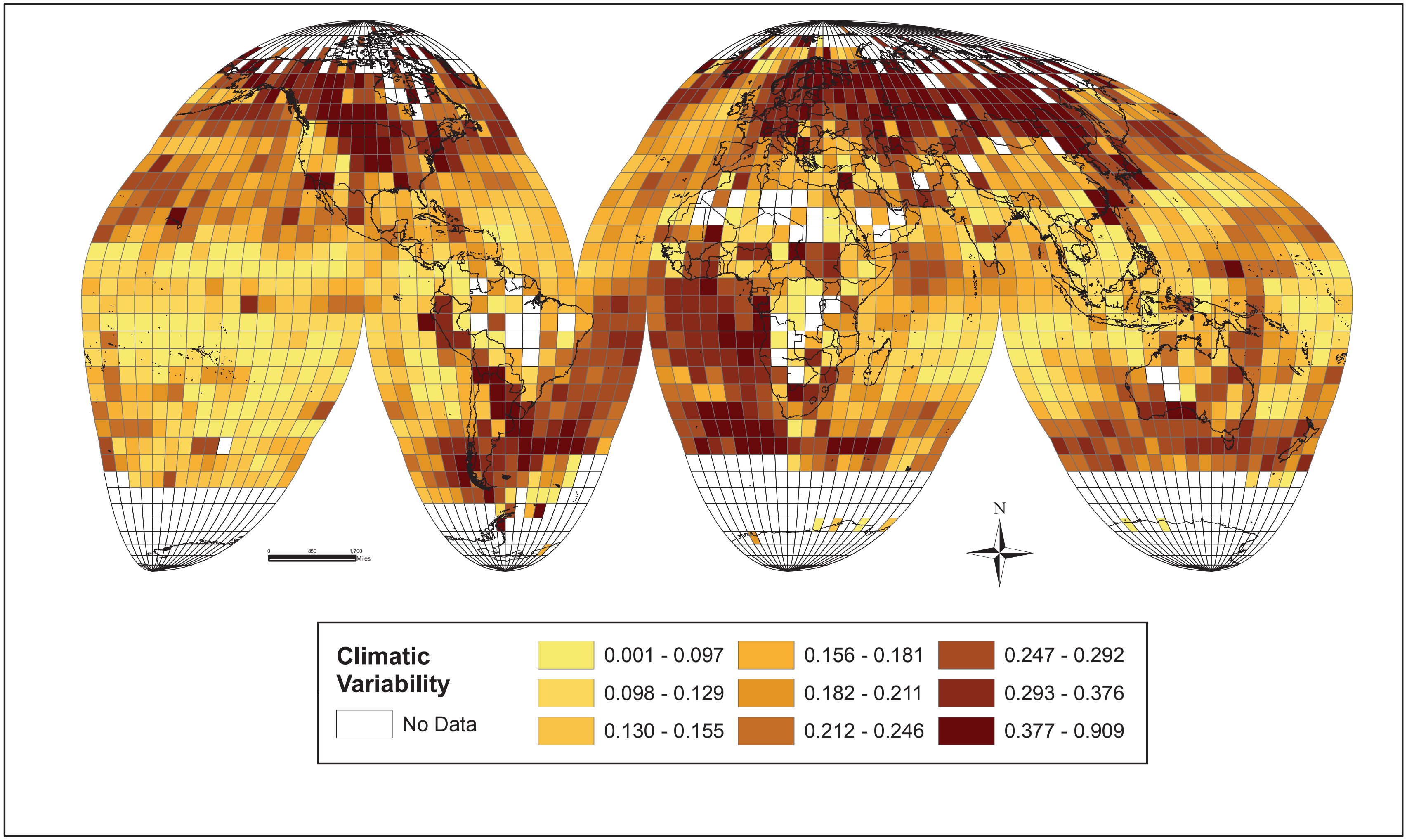


Figure 2: Grid-cell-level historical temperature variability across generations from 500–1900.

important part of the analysis is to correctly identify the historical locations of an individual's ancestors. One method that we use is to rely on the self-reported ethnicity of a respondent. To identify an ethnic group's historical location, we use Murdock's (1967) *Ethnographic Atlas*, which reports the latitude and longitude of the centroid of the traditional location of 1,265 ethnic groups across the world.

To extend the precision and coverage of the *Ethnographic Atlas*, we also use two ethnographic samples that were published in the journal *Ethnology* in 2004 and 2005. *Peoples of Easternmost Europe* was constructed by Bondarenko, Kazankov, Khaltourina and Korotayev (2005) and includes seventeen ethnic groups from Eastern Europe that are not in the *Ethnographic Atlas*. *Peoples of Siberia* was constructed by Korotayev, Kazankov, Borinskaya and Khaltourina (2004) and includes ten additional Siberian ethnic groups. We use this extended sample of 1,292 ethnic groups as a second ethnographic sample for our analysis.

We also use a third (and even larger) sample. In 1957, prior to the construction of the *Ethnographic Atlas*, George Peter Murdock constructed the *World Ethnographic Sample*, which was published in *Ethnology* (see Murdock, 1957). Most of the ethnic groups from the *World Ethnographic Sample* later appeared in the *Ethnographic Atlas*, but seventeen ethnic groups did not. Those were ethnic groups for which information was more limited; if they had been included in the *Ethnographic Atlas*, they would have had a number of variables with missing values. In our analysis, we also use a third extended sample of 1,309 ethnic groups, which also includes the *World Ethnographic Sample*. As we will show, our estimates are very similar irrespective of which ethnographic sample we use.

For each of the 1,309 ethnic groups in our samples, we know the coordinates of the centroid of its historical location. These are shown in Figure 3. By identifying the climatic grid-cell for each location, we have an estimate of the climatic instability across generations that was faced by each group.

For much of our analysis, we are able to identify the climatic instability faced by an individual's ancestors using ethnicity. In these cases, we simply need to match the ethnicities reported in our dataset with the 1,309 ethnic groups from our ethnographic data, which we do manually.

In other parts of our analysis, we use a person's country to obtain an estimate of the historical climatic instability across generations. This requires a measure of the average cross-generational instability faced by the ancestors of those living in each country today. We construct this using

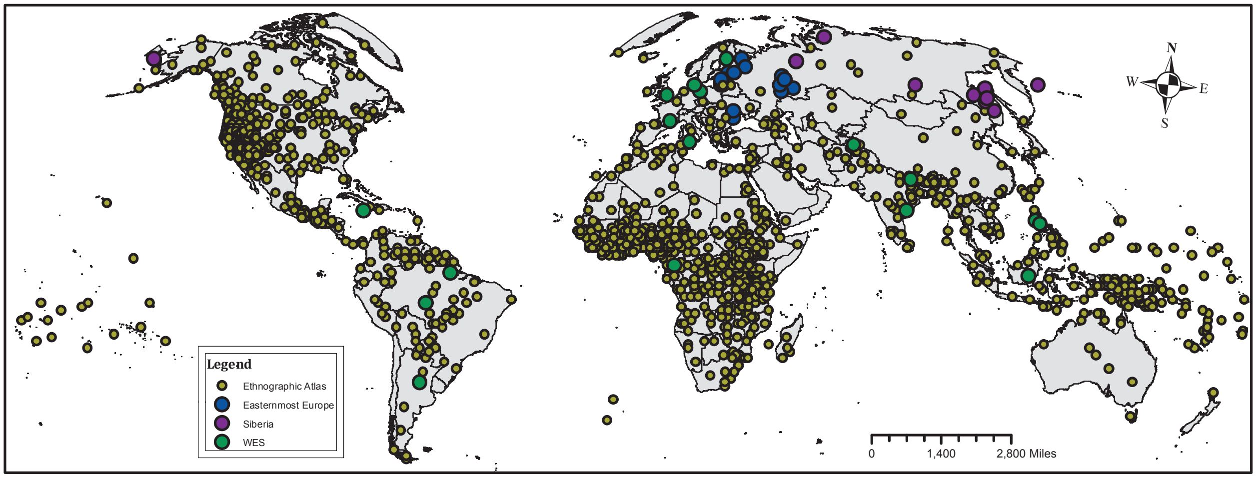


Figure 3: Locations of the centroids of ethnic groups in the *Ethnographic Atlas*, *Peoples of Easternmost Europe*, *Peoples of Siberia*, and *World Ethnographic Sample (WES)*.

a procedure similar to that used in Alesina et al. (2013). First, we match each of the 1,309 ethnic groups in our ethnographic samples to one of the 7,000+ languages and dialects in the world today, as categorized and mapped by the *Ethnologue 16*. This, combined with 1km by 1km gridded population data from Landscan, provides us with an estimate of the identity of the ancestors of all populations in the world at a 1km resolution.[10] Through this match of languages to ethnicities, we create a measure of the estimated instability of the climate between generations of the ancestors of all individuals living across the globe at a 1 kilometer resolution.[11]

With the gridded information, we construct average cross-generational climatic instability measures across all individuals in a country. We use these for those parts of our analysis for which countries are the unit of observation. The country-level measures are shown in Figure 4. As with the grid-level variation, places further from the equator tend to show more variability. In addition, some of the richer countries also appear to have greater variability. Given that these factors could independently affect our outcomes of interest, in our empirical analysis, we control for distance from the equator as well as average per-capita income.

Although our empirical strategy accounts for the large migrations that have occurred since 1500, following the Columbian Exchange, there remains the issue of the extent to which ancestral locations in the ethnographic data are accurate for the period of interest, 500–1900. Other than the

[10] Alesina et al. (2013) used *Ethnologue 15* in their matching procedure, which was the most current version at the time.

[11] For the finer details on the construction of the data, see Giuliano and Nunn (2016). For another application of the same data construction procedure, see Giuliano and Nunn (2013).

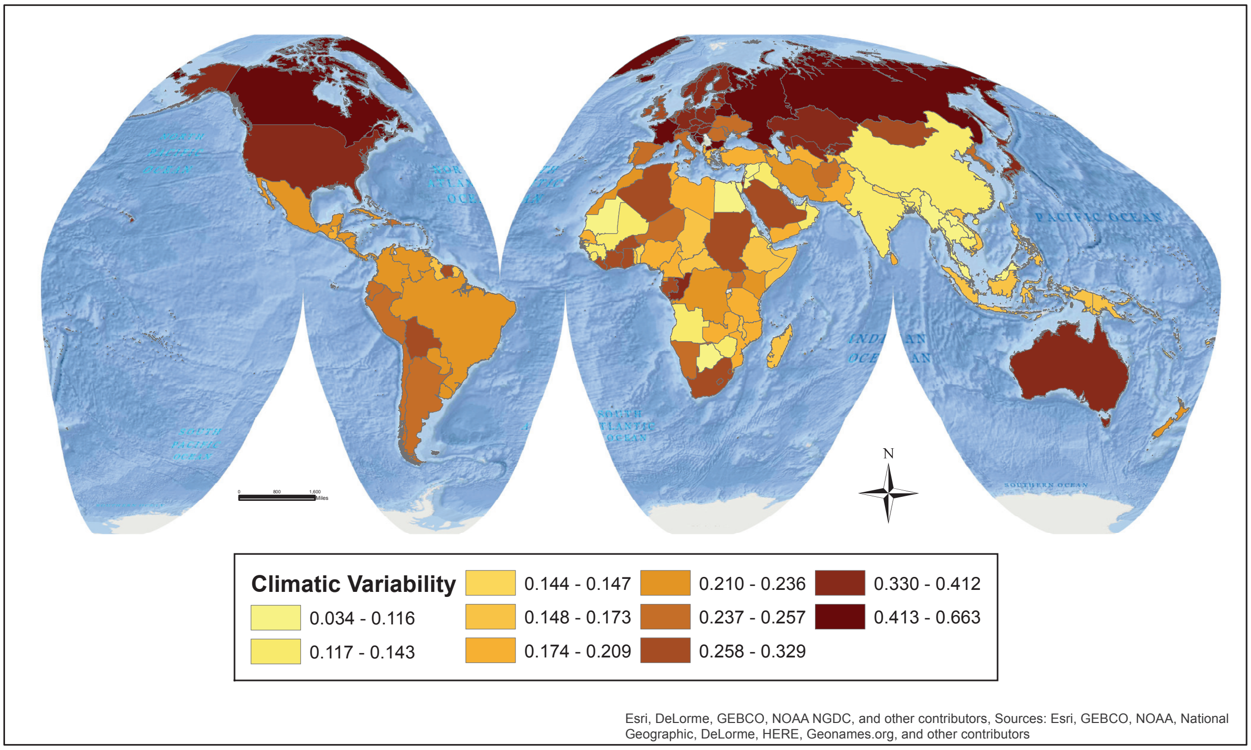


Figure 4: Country-level average historical temperature variability across generations from 500–1900.

Columbian Exchange, the other large migrations in human history predate our study. The Bantu migration within Africa occurred from 1000BCE–500AD. The migrations of Austronesian ancestors from the Mainland of Southern China was complete by 6000BC. An implicit presumption in our empirical analysis is, therefore, that our 1400-year period was sufficiently important in determining the value placed on tradition to allow us to detect effects in the data.[12]

C. *Measuring the importance of tradition today*

We undertake a number of strategies to measure the importance of tradition today. Our first strategy is to test directly for a relationship between climate variability and the self-reported importance of tradition today. Our second strategy examines the persistence of cultural characteristics over long periods. In particular, we consider three important and measurable cultural traits: female gender attitudes (measured by female labor-force participation), the practice of consanguineous marriage, and the practice of polygamy. Our third strategy is to measure the extent to which traditional customs persist amongst second-generation immigrants to the United

[12]We will return to the issue of migration in section 4.A, where we show that our results are robust to omitting countries that experienced significant migration during the period of our analysis.

States. Specifically, we examine whether the children of immigrant parents marry someone from their same origin-group and whether they speak their origin language at home. We interpret both as revealed measures about the strength of the value placed on maintaining the traditions and customs of the origin country. Our fourth strategy is to measure the extent to which Indigenous populations in the United States and Canada continue to speak their native languages.

4. Climatic instability and the importance of tradition: Evidence from self-reports from the WVS

We begin by examining a measure of tradition taken from the *World Values Survey* (WVS).[13] Respondents are given the description of a person: "Tradition is important to this person; to follow the family customs handed down by one's religion or family." Respondents then choose the response that best describes how similar this person is to them: very much like me; like me; somewhat like me; a little like me; not like me; and not at all like me. We code the responses to create a variable with integer values from 1–6, increasing with the value placed on tradition.

Using the tradition variable, we first examine the country-level relationship between the average self-reported measure on the importance of tradition and the average climatic instability across generations of a country's ancestors. Table 1 reports estimates of the relationship, using each of our three variants of average ancestral climatic instability. In the odd-numbered columns, we report the raw bivariate relationship between the average importance of tradition and average climatic instability across generations for the 75 countries for which both measures are available. We find a negative and significant relationship: greater cross-generational climatic instability in the past is associated with less importance placed on tradition today. The relationship is shown visually (for the specification from column 3) in Figure 5; it appears to be very general and not driven by a small number of influential outliers.

In the even-numbered columns, we examine the same relationship conditioning on a host of covariates. Specifically, we estimate:

$$Tradition_c = \beta\, Climatic\, Instability_c + \mathbf{X}_c^H \boldsymbol{\Phi} + \mathbf{X}_c^C \boldsymbol{\Pi} + \varepsilon_c \tag{1}$$

where c denotes a country, $Tradition_c$ is the country-level average of the self-reported importance of tradition, and $Climatic\, Instability_c$ is our measure of historical temperature variability for coun-

[13] There have been six waves of the survey: 1981-1984, 1989-1993, 1994-1998, 1999-2004, 2005-2009 and 2010-2014. Since our variable of interest has been added to the questionnaire only recently, we use only the last two waves.

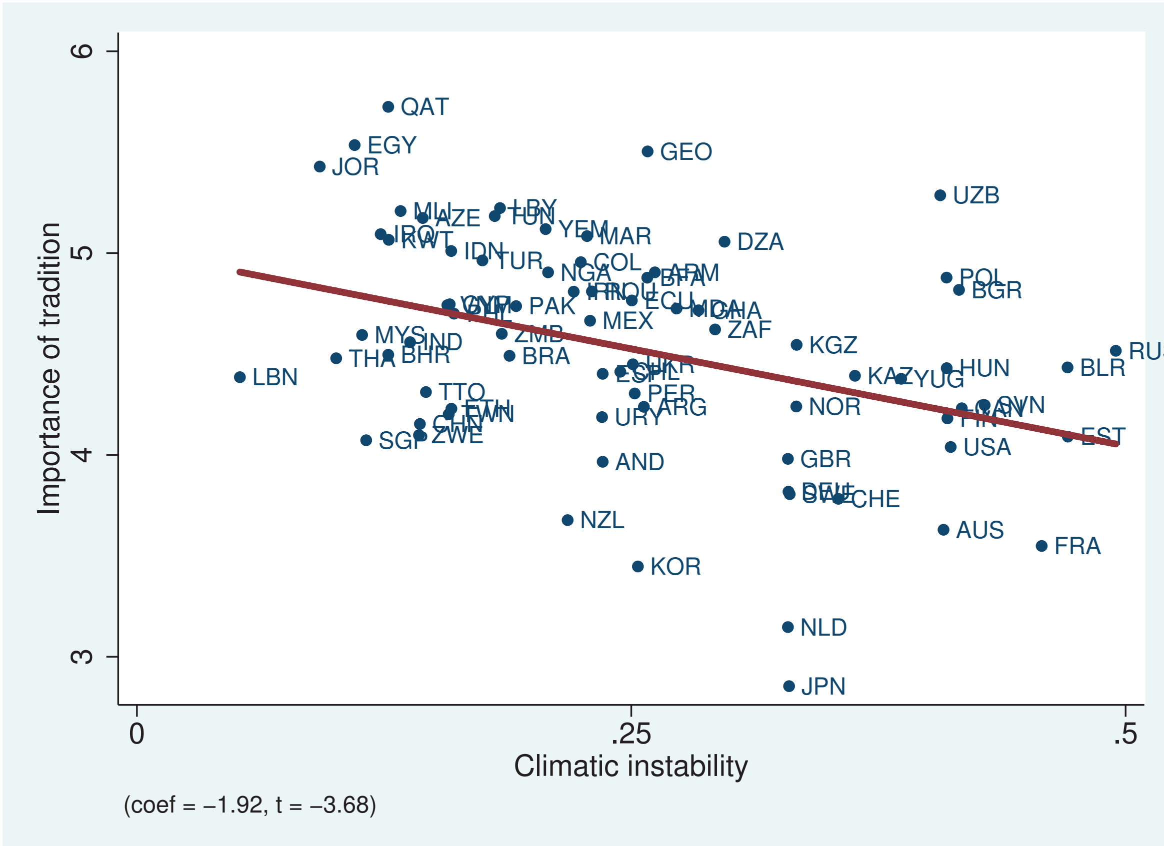


Figure 5: The bivariate cross-country relationship between average instability of the climate across previous generations and the average self-reported importance of tradition today.

try c. $\mathbf{X}_c^H$ and $\mathbf{X}_c^C$ are vectors of historical ethnographic and contemporary country-level controls. The ethnographic control variables include the following historical characteristics: economic development (proxied by the complexity of settlements);[14] a measure of political centralization (measured by the levels of political authority beyond the local community); and the historical distance from the equator (measured using absolute latitude). To link historical characteristics, which are measured at the ethnicity level, with current outcomes of interest, we follow the same procedure used to construct our measure of cross-generational climatic instability.

We include one contemporary covariate, the natural log of a country's real per capita GDP measured in the survey year. This captures differences in economic development, which could affect the value placed on tradition through channels other than the one we are interested in

[14]The categories (and corresponding numeric values) that measure the complexity of ethnic groups' settlements are: (1) nomadic or fully migratory, (2) semi-nomadic, (3) semi-sedentary, (4) compact but not permanent settlements, (5) neighborhoods of dispersed family homesteads, (6) separate hamlets forming a single community, (7) compact and relatively permanent settlements, and (8) complex settlements. We construct a variable that takes on integer values, ranging from 1 to 8 and increasing with settlement density.

identifying.[15]

The estimates, which are reported in the even columns of Table 1, show that there is less respect for tradition in countries with more climatic instability across previous generations. Not only are the estimated coefficients for the measure of the instability of the climate across generations statistically significant, but their magnitudes are also economically meaningful. Based on the estimates from column 4, a one-standard-deviation increase in cross-generational instability (0.11) is associated with a reduction in the tradition index of $1.824 \times 0.11 = 0.20$, which is 36% of a standard deviation of the tradition variable.[16]

Examining the coefficient estimates for the control variables, we see that the two measures of economic development – historical and contemporary – are significantly associated with the importance of tradition today. More economic development is associated with weaker beliefs about the importance of tradition. Given that all societies were initially at a similar level of economic development, these measures of income levels also capture average changes in the economic environment over time. Thus, the estimated relationships for the income controls are consistent with the predictions of the model. Countries that experience greater instability – that is, growth in their economic environments in the past – today place less importance in maintaining tradition. This conclusion, however, is somewhat speculative. Unlike climatic instability, economic growth may be affected by omitted factors and forms of reverse causality. Thus, it is possible that societies that place less importance on tradition, both historically and today, were able to generate faster economic growth.

A. *Sensitivity and robustness checks*

We now turn to a discussion of the robustness of the estimates. The first potential concern that we consider is historical population movements. Because our historical measures are linked to current data using ancestry (and not location), recent population movements – that is, during or after the Columbian Exchange – do not cause systematic measurement error. However, it is still possible that countries with large non-Indigenous populations may value tradition less and they

[15]In particular, it is possible that with economic development (and greater education), the cost of learning c in the model is lower. Thus, inclusion of this covariates accounts for potential reductions in c, which would result in a lower proportion of traditionalists in the population. In addition, the recent model of Doepke and Zilibotti (2017) shows how the 'economic value of making independent choices', which is likely correlated with economic development, affects parental socialization of children.

[16]Summary statistics for all samples used in the paper are reported in appendix Table A1.

Table 1: Country-level estimates of the determinants of tradition

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Importance of tradition, 1-6					
	Ancestral characteristics measures					
	Original EA		With Eastern Europe & Siberia extensions		Also with the World Ethnographic Sample extension	
Climatic instability	**-1.951*****	**-1.783****	**-1.923*****	**-1.824****	**-1.837*****	**-1.756****
	(0.540)	**(0.696)**	**(0.523)**	**(0.696)**	**(0.493)**	**(0.667)**
Historical controls:						
Distance from equator		0.005		0.005		0.006
		(0.005)		(0.005)		(0.005)
Economic complexity		-0.069*		-0.065*		-0.064*
		(0.035)		(0.035)		(0.033)
Political hierarchies		0.025		0.013		0.013
		(0.099)		(0.097)		(0.110)
Contemporary controls:						
Ln (per capita GDP)		-0.164***		-0.165***		-0.164***
		(0.048)		(0.049)		(0.051)
Mean (st. dev.) of dep var	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)
Observations	75	74	75	74	75	74
R-squared	0.147	0.388	0.148	0.388	0.144	0.384

Notes : The unit of observation is a country. The dependent variable is the country-level average of the self-reported importance of tradition. The mean (and standard deviation) of Climatic instability is 0.25 (0.11). ***, ** and * indicate significance at the 10, 5 and 1% levels.

may also have had ancestors who lived in climates with more climatic instability. To check the extent to which our estimates are affected by this possibility, we reestimate equation (1), omitting from the sample all the countries with significant population changes in recent centuries; namely, North and South America, Australia, New Zealand, and South Africa. As reported in appendix Table A5, the estimates with this restricted sample are nearly identical to those with the full sample (see Table 1), which suggests that our findings are not driven by these large historical migrations.

A potential concern with our baseline specification is the inclusion of a number of covariates that could have been affected by the cross-generational instability of the environment; namely, current per capita GDP, ancestral economic complexity, and ancestral political centralization. We, therefore, check the sensitivity of our estimates of equation (1) to the omission of these covariates, with estimates reported in appendix Table A6. In the odd-numbered columns, we report estimates with contemporary per-capita GDP omitted from the set of covariates. In the even-numbered columns, we report estimates with ancestral economic complexity and ancestral political centralization also omitted. These estimates are nearly identical to the baseline estimates reported in Table 1.

Another concern is that ancestral climatic instability could be correlated with other characteristics that may also affect our outcomes of interest. In our baseline specification, we control for confounders.

Cross-generational climatic instability is potentially related to geographic characteristics, namely the ruggedness of the terrain and the proximity to water. Since both could affect climate, we test the robustness of our estimates to controlling for average ancestral ruggedness and distance from the coast.[17] We also consider the possibility that our constructed measures of cross-generational climatic instability may be affected by the precision of the underlying data, which is determined by the number of proxy indicators (such as tree rings and ice cores) that were available for each grid-cell when the data were constructed. To account for this possibility, we also control for a measure of the average number of proxy indicators in the grid-cell inhabited by a country's ancestors. We also consider two measures of population diversity – namely, ethnic and genetic diversity – since diversity may affect the importance a society places on tradition, and it may be correlated with cross-generational climatic instability.[18]

A final factor that we consider is generalized trust. It is possible that our measure of cross-generational climatic instability is correlated with either cross-spatial variability or higher frequency (e.g., seasonal or annual) temporal variability in weather. The recent study by Durante (2010) finds that in pre-industrial Europe, such weather fluctuations – either across space or year-to-year during the growing season – are associated with more trust today. Therefore, if such short-run or cross-spatial weather fluctuations are correlated with our measure of cross-generational instability and if generalized trust is correlated with the importance placed on tradition, this could bias our estimates of interest. To address this concern, we control for each country's average measure of generalized trust.[19]

Estimates of equation (1) with these additional covariates added to the regression (either one

[17]Terrain ruggedness is taken from Nunn and Puga (2012).

[18]We take our measure of ethnic diversity from Alesina, Devleeschauwer, Easterly, Kurlat and Wacziarg (2003). Genetic diversity is from Ashraf and Galor (2012).

[19]The measure is based on the following survey question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" Respondents chose one of the following answers: "Most people can be trusted" (which we code as 1) or "Cannot be too careful" (which we code as 0).

at a time or all together) are reported in appendix Table A7.[20] The estimated coefficient for cross-generational climatic instability remains robust. The coefficient is always negative and significant and the point estimates remain stable, ranging from about -1.7 to -2.1.

B. *Within-country estimates*

Our second strategy examines the relationship between historical environmental instability and the importance of tradition today. Instead of examining country-level variation, we examine variation across individuals from the WVS, which contains information about the respondent's ethnicity, and we measure cross-generational climatic instability at the ethnicity-level. We link the current ethnicity to the historical ethnicity from the *Ethnographic Atlas* and estimate the following equation:

$$Tradition_{i,e,c} = \alpha_c + \beta\, Climatic\, Instability_e + \mathbf{X}_i \mathbf{\Pi} + \mathbf{X}_e \mathbf{\Omega} + \varepsilon_{i,e,c}, \tag{2}$$

where i denotes an individual, who is a member of ethnic group e and lives in country c. $Tradition_{i,e,c}$ is the person's self-reported importance of tradition, which is measured on a 1–6 integer scale and increasing in the importance of tradition. $Climatic\, Instability_e$ is our measure of the variation in temperature across generations in the locations inhabited by the ancestors of ethnic group e. The standard errors are clustered at the ethnicity level.

$\mathbf{X}_e$ denotes the vector of pre-industrial ethnicity-level covariates described above. $\mathbf{X}_i$ is a vector of individual-level covariates that includes a quadratic in age, a gender indicator variable, eight educational-attainment fixed effects, labor-force-participation fixed effects, a married indicator variable, ten income-category fixed effects, and fixed effects for the wave of the survey, in which the individual was interviewed. The specification also includes country fixed effects, α_c.

Estimates of equation (2) are reported in Table 2. The odd-numbered columns report estimates for a version of equation (2) with a parsimonious set of covariates; namely, gender, age, age squared, and survey-wave fixed effects. In the even-numbered columns, we report estimates for a version of equation (2) with all covariates. In all specifications, the estimated coefficients for $Climatic\, Instability_e$ are negative and significant. According to the magnitude of the estimates from column 4, a one-standard-deviation increase in cross-generational climatic instability (0.12)

[20]Due to space constraints, we only report estimates for the extended sample of 1,292 ethnic groups. The estimates using either of the other two ethnicity samples are nearly identical.

Table 2: Individual-level estimates of the determinants of tradition, measuring historical instability at the ethnicity level

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Importance of tradition, 1-6					
	Ancestral characteristics measures					
	Original EA		With Eastern Europe & Siberia extensions		Also with the World Ethnographic Sample extension	
Climatic instability	**-0.839*** **	**-0.582** **	**-0.742*** **	**-0.548** **	**-0.772*** **	**-0.561** **
	(0.268)	**(0.282)**	**(0.276)**	**(0.244)**	**(0.278)**	**(0.248)**
Historical ethnicity-level controls:						
Distance from equator		-0.003		-0.004		-0.004
		(0.004)		(0.003)		(0.003)
Economic complexity		-0.033***		-0.039***		-0.035***
		(0.012)		(0.012)		(0.012)
Political hierarchies		0.015		0.026		0.024
		(0.028)		(0.030)		(0.028)
Gender, age, age squared	yes	yes	yes	yes	yes	yes
Survey-wave fixed effects	yes	yes	yes	yes	yes	yes
Other individual controls	no	yes	no	yes	no	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
Number of countries	75	75	75	75	75	75
Number of ethnic groups	186	176	193	183	193	183
Mean (st. dev.) of dep var	4.50 (1.41)	4.49 (1.41)	4.50 (1.41)	4.49 (1.41)	4.50 (1.41)	4.49 (1.41)
Observations	140,629	127,667	140,681	127,685	139,583	126,630
R-squared	0.179	0.181	0.179	0.181	0.179	0.182

Notes: The unit of observation is an individual. The dependent variable is a measure of the self-reported importance of tradition. It ranges from 1 to 6 and is increasing in the self-reported importance of tradition. Columns 1, 3 and 5 include a quadratic in age, a gender indicator variable, and survey wave fixed effects. Columns 2, 4 and 6 additionally include eight education fixed effects, labor force participation fixed effects, an indicator variable that equals one if the person is married, and ten income category fixed effects. Standard errors are clustered at the ethnicity level. The mean (and standard deviation) of Climatic Instability is 0.27 (0.12). ***, ** and * indicate significance at the 10, 5 and 1% levels.

is associated with a decrease in the self-reported importance of tradition by $0.12 \times 0.548 = 0.07$, which is equal to about 0.05 standard deviations of the tradition index.

As the estimates from Tables 1 and 2 show, we obtain very similar estimates irrespective of which version of the ethnographic data we use. Therefore, for the remainder of the paper, we take as our baseline sample the extended sample of 1,292 ethnic groups. We do not use the largest extension, which includes the *World Ethnographic Sample*, because of the missing information for the added observations.[21] However, all of the estimates that we report are very similar if either of the other versions is used.

[21]In particular, one of the control variables for some specifications (the year in which the ethnic group was observed for the data collection) has missing information for 9 of the 17 ethnic groups in the *World Ethnographic Sample*.

5. Examining heterogeneity in the persistence of cultural traits

Our second empirical strategy is to examine the persistence of particular cultural traits and to test whether it differs systematically depending on the climatic instability across previous generations. We examine three outcomes that can be measured in a comparable manner over long periods of time: female labor-force participation (FLFP), the practice of polygamy, and the practice of consanguineous marriage.

We examine the differential persistence of these cultural practices by estimating the following regression equation:

$$\begin{aligned} \textit{Cultural Trait}_{c,t} &= \alpha_{r(c)} + \beta_1 \textit{Cultural Trait}_{c,t-1} + \beta_2 \textit{Cultural Trait}_{c,t-1} \times \textit{Climatic Instability}_c \\ &\quad + \mathbf{X}_{c,t}\mathbf{\Pi} + \mathbf{X}_{c,t-1}\mathbf{\Omega} + \varepsilon_{c,t} \qquad (3) \end{aligned}$$

where c indexes countries and t indexes time periods. Period t is the contemporary period (measured in 2012) and period $t-1$ is a historical period that varies depending on the specification. The dependent variable of interest, $\textit{Cultural Trait}_{c,t}$, is our measure of the cultural characteristic today. We are interested in the relationship between this variable and the cultural trait in the past, $\textit{Cultural Trait}_{c,t-1}$, and how this relationship differs depending on ancestral climatic instability, $\textit{Cultural Trait}_{c,t-1} \times \textit{Climatic Instability}_c$. Our interest is in whether the estimated coefficient β_2 is less than zero, which indicates that the cultural trait is less persistent among countries with an ancestry that experienced a climate that exhibited greater instability between generations.

Equation (3) also includes continent fixed effects, $\alpha_{r(c)}$, which capture broad regional differences in FLFP, polygamy, and consanguineous marriage. The vector $\mathbf{X}_{c,t}$ contains covariates that are measured in the contemporary period: log real per-capita GDP as a measure of contemporaneous development. When we examine FLFP, we also include a quadratic term to account for its well-known non-linear relationship with income (Goldin, 1995). $\mathbf{X}_{c,t-1}$ denotes our vector of historical covariates: political development (measured by the number of levels of authority beyond the local community), economic development (measured by complexity and density of settlements), average distance from the equator of the ancestral homelands, and the direct effect of the instability of the climate across generations.

A. *Female labor-force participation*

Our first application of equation (3) examines the differential persistence of FLFP. We begin by examining average country-level FLFP in 1970 and in 2012.[22] The data, from the World Bank's *World Development Indicators*, are measured as the percentage of women aged 15 to 64 who are in the labor force. Thus, it ranges from 0 to 100.

Estimates are reported in Table 3. Column 1 reports estimates from a version of equation (3) that does not include the interaction of interest, $\mathit{Cultural\,Trait}_{c,t-1} \times \mathit{Climatic\,Instability}_c$. We find a strong positive correlation between FLFP in 1970 and 2012. Column 2 reports estimates of equation (3). The persistence of FLFP is weaker in countries with greater cross-generational climatic instability. To assess the magnitude of the heterogeneity in persistence, consider the fact that $\mathit{Climatic\,Instability}_c$ ranges from 0.034 to 0.457. Thus, for the country with the lowest value, the relationship between FLFP in 1970 and FLFP in 2012 is: $0.717 - 0.034 \times 1.66 = 0.66$. For the country with the highest value, the same relationship is: $0.717 - 0.457 \times 1.66 = -0.04$, which is not statistically different from zero.

In columns 3–7, we check the robustness of our estimates by also interacting each of our control variables with FLFP in 1970, either one at a time (columns 3–6) or all at once (column 7). The estimates of interest are robust to the inclusion of the control interactions. When we include all variables together, the standard error increases noticeably, but the point estimate of our interaction of interest remains negative and the magnitude remains similar, although slightly smaller (35% lower than in column 2).

The presence of the control interactions makes the calculation of how the relationship between FLFP in 1970 and 2012 changes depending on cross-generational climatic instability slightly tricky. To calculate the baseline relationship for a country with climatic instability equal to zero, one has to evaluate the covariates that are part of any control interactions at a particular value. The most natural value to choose is the mean value of the variables among the observations in the sample. At the bottom of the table, we report this value along with its standard error. It is the predicted relationship between FLFP in 1970 and FLFP in 2012 for a country with control variables evaluated at their mean and with cross-generational climatic instability equal to zero. The additional effect

[22]Female labor-force participation has been widely used in the literature as an objective measure of equality in gender roles. See, for example, Fernandez and Fogli (2009), Fogli and Veldkamp (2011), Alesina et al. (2013), and Fernandez (2013).

Table 3: Differential persistence of FLFP, 1970 and 2012

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable: Female labor-force participation (FLFP) 2012						
FLFP 1970	0.330***	0.717***	0.704***	0.393	0.613**	-0.239	-0.768
	(0.079)	(0.161)	(0.161)	(0.590)	(0.267)	(0.879)	(1.100)
FLFP 1970 * Climatic instability		**-1.660****	**-1.813***	**-1.671****	**-1.667****	**-1.648****	**-1.088**
		(0.683)	**(0.933)**	**(0.698)**	**(0.689)**	**(0.698)**	**(1.206)**
Country-level controls:							
Climatic Instability		44.701	50.462	41.065	45.943	41.109	18.455
		(36.845)	(42.064)	(38.870)	(37.349)	(38.945)	(53.998)
Distance from equator	-0.174	-0.135	-0.201	-0.119	-0.137	-0.164	0.063
	(0.115)	(0.145)	(0.220)	(0.140)	(0.147)	(0.142)	(0.290)
Economic complexity	1.931	2.663*	2.682*	2.096	2.628*	2.193	1.781
	(1.253)	(1.546)	(1.570)	(1.839)	(1.553)	(1.591)	(1.886)
Political hierarchies	-1.606	-1.878	-1.948	-2.164	-3.119	-1.708	-2.101
	(1.567)	(1.397)	(1.479)	(1.335)	(2.980)	(1.301)	(3.419)
Ln (per-capita GDP)	-71.614***	-67.906***	-67.966***	-66.913***	-67.867***	-83.558***	-90.795**
	(24.480)	(23.724)	(23.815)	(24.111)	(23.911)	(30.525)	(35.195)
Ln (per-capita GDP) squared	3.822***	3.649***	3.652***	3.587***	3.648***	4.308***	4.608***
	(1.255)	(1.212)	(1.216)	(1.232)	(1.221)	(1.469)	(1.666)
FLFP 1970 * Distance from equator			0.002				-0.007
			(0.006)				(0.009)
FLFP 1970 * Economic complexity				0.049			0.008
				(0.082)			(0.089)
FLFP 1970 * Political hierarchies					0.029		0.016
					(0.061)		(0.079)
FLFP 1970 * Ln (per capita GDP)						0.104	0.155
						(0.089)	(0.124)
Continent fixed effects	yes	yes	yes	yes	yes	yes	yes
Mean (st. dev.) of dep. var.	50.7 (13.7)	50.7 (13.7)	50.7 (13.7)	50.7 (13.7)	50.7 (13.7)	50.7 (13.7)	50.7 (13.7)
Observations	77	77	77	77	77	77	77
R-squared	0.599	0.633	0.634	0.635	0.634	0.645	0.649
		Effect of "FLFP 1970" for mean values of controls and "Climatic instability" = 0					
		0.717	0.758	0.724	0.717	0.760	0.631
		(0.161)	(0.236)	(0.162)	(0.163)	(0.166)	(0.295)

Notes: OLS estimates are reported with robust standard errors in parentheses. The unit of observation is a country. The female labor-force participation variables (from 1970 and 2012) are measured as the percentage of women aged 15-64 in the labor force. Historical controls are defined in the appendix. Climatic instability ranges from 0.034 to 0.457 in the sample. Its mean (and standard deviation) is: 0.24 (0.09). ***, ** and * indicate significance at the 10, 5, and 1% levels.

of climatic instability on the relationship between FLFP in 1970 and FLFP in 2012 can then be calculated from this baseline value.[23]

We next examine the persistence of gender norms over a much longer time span. We measure traditional FLFP during the pre-industrial period using variable v54 from the *Ethnographic Atlas*, where ethnicities are grouped into one of the following categories that measure the extent of female participation in pre-industrial agriculture: (1) males only, (2) males appreciably more, (3)

[23]For example, according to the estimates reported in column 7, for the country with the lowest value of ancestral climatic instability, the relationship between FLFP in 1970 and FLFP in 2012 is: $0.631 - 0.034 \times 1.088 = 0.59$. For the country with the highest value of ancestral climatic instability, the same relationship is: $0.631 - 0.457 \times 1.088 = 0.13$.

equal participation, (4) females appreciably more, and (5) females only.[24] To make the traditional FLFP variable (which ranges from 1 to 5) more comparable with the contemporary measures of FLFP, we normalize it to also range from 0 to 100. Because traditional female participation in agriculture is measured in different years for different observations depending, in part, on when contact was made with the ethnic group, in these regressions we also control for the year in which the ethnographic data were collected and we allow persistence to differ accordingly. If an observation's measure of female participation in pre-industrial agriculture is from a more distant time period, then it is plausible that we may observe a weaker relationship between the historical and current measures.

We first examine the average relationship between traditional female participation in agriculture and FLFP in 2012. This is reported in column 1 of Table 4, which shows a strong positive relationship between the two measures. The point estimate of 0.248 is slightly lower than the estimate when examining persistence between 1970 and 2012 (column 1 of Table 3). This is not surprising, since one expects less persistence over a longer time.

Column 2 then reports estimates of equation (3), which allows for differential persistence. We estimate a negative coefficient for the interaction term, suggesting weaker persistence in countries with greater ancestral climatic instability. In columns 3–7, we include our set of historical covariates interacted with traditional female participation in agriculture one control at a time; in column 8, we include all controls together. The coefficient of interest remains robust.

Within-country differences in the persistence of FLFP

We now examine the continuity of FLFP using within-country, rather than cross-country, variation. For this, we use yet another data source, IPUMS-International Census data, that records respondents' ethnic identity as well as FLFP. This allows us to examine FLFP and link it to ancestral climatic instability using an individual's self-reported ethnicity. Although this can only be done for a much more limited set of countries, the presence of within-country variation across ethnic groups allows us to obtain estimates using finer variation.

[24]The original classification in the *Ethnographic Atlas* distinguishes "differentiated but equal participation" from "equal participation". Since this distinction is not relevant for our purposes, we combine the two categories into a single category of equal participation. In addition, for 232 ethnic groups, agriculture was not practiced and therefore there is no measure of female participation in agriculture. For an additional 315 ethnic groups, information for the variable is missing. These ethnic groups (547 in total) are omitted from the analysis.

Table 4: Differential persistence of FLFP, traditionally and today

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Female labor-force participation 2012							
Traditional female participation in agriculture	0.248***	0.642***	0.654***	0.696**	0.697***	1.013*	0.833**	1.409*
	(0.072)	(0.168)	(0.168)	(0.307)	(0.222)	(0.577)	(0.360)	(0.771)
Trad female part in agric * Climatic instability		**-1.703*** **	**-1.626** **	**-1.686*** **	**-1.667** **	**-1.582** **	**-1.671*** **	**-1.528** **
		(0.598)	**(0.735)**	**(0.616)**	**(0.645)**	**(0.651)**	**(0.605)**	**(0.769)**
Country-level controls:								
Climatic instability		69.112***	65.861**	67.967***	67.474***	63.248**	66.664***	58.842*
		(21.545)	(27.709)	(22.740)	(23.583)	(24.715)	(22.818)	(31.004)
Distance from equator	-0.059	-0.150	-0.105	-0.150	-0.145	-0.154	-0.155	-0.186
	(0.110)	(0.116)	(0.234)	(0.116)	(0.119)	(0.117)	(0.115)	(0.272)
Economic complexity	0.964	0.717	0.724	0.986	0.683	0.754	0.786	1.067
	(1.196)	(1.259)	(1.261)	(2.023)	(1.216)	(1.257)	(1.310)	(1.986)
Political hierarchies	-0.985	-0.633	-0.546	-0.735	0.132	-0.778	-0.559	-0.285
	(1.844)	(1.883)	(1.908)	(1.841)	(3.252)	(1.945)	(1.882)	(3.683)
Ln (per-capita GDP)	-70.613***	-58.820***	-58.612***	-58.533***	-58.947***	-51.566***	-59.999***	-52.354***
	(14.214)	(14.349)	(14.515)	(14.593)	(14.432)	(18.705)	(14.519)	(19.166)
Ln (per-capita GDP) squared	3.777***	3.102***	3.087***	3.088***	3.107***	2.791***	3.173***	2.857***
	(0.772)	(0.779)	(0.790)	(0.791)	(0.783)	(0.929)	(0.791)	(0.945)
Year ethnicity sampled	2.631	0.292	0.399	0.415	0.401	1.015	0.638	1.717
	(1.592)	(1.858)	(1.941)	(1.879)	(1.907)	(2.261)	(1.919)	(2.394)
Female part in agric * Distance from equator			-0.001					0.001
			(0.005)					(0.007)
Female part in agric * Economic complexity				-0.010				-0.009
				(0.047)				(0.047)
Female part in agric * Political hierarchies					-0.019			-0.014
					(0.065)			(0.083)
Female part in agric * Ln (per-capita GDP)						-0.045		-0.050
						(0.068)		(0.076)
Female part in agric * Year ethnicity sampled							-0.105	-0.150
							(0.172)	(0.187)
Continent fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Mean (st. dev.) of dep. var.	53.2 (15.4)	53.2 (15.4)	53.2 (15.4)	53.2 (15.4)	53.2 (15.4)	53.2 (15.4)	53.2 (15.4)	53.2 (15.4)
Observations	165	165	165	165	165	165	165	165
R-squared	0.342	0.379	0.379	0.379	0.379	0.382	0.379	0.384
		Effect of "Trad female part in agriculture" for mean values of controls & "Climatic instability"=0						
		0.642	0.620	0.632	0.629	0.601	0.647	0.598
		(0.168)	(0.204)	(0.177)	(0.182)	(0.182)	(0.169)	(0.209)

Notes: OLS estimates are reported with robust standard errors in parentheses. The unit of observation is a country. Female labor-force participation is the percentage of women in the labor force, measured in 2012 and from the *Ethnographic Atlas* . Historical controls are defined in the appendix. Climatic instability ranges from 0.034 to 0.495 in the sample. Its mean (and standard deviation) is: 0.24 (0.10). ***, ** and * indicate significance at the 10, 5 and 1% levels.

Our estimating equation is:

$$\begin{aligned} FLFP_{e,c,t} &= \alpha_{c,t} + \beta_1 \, FLFP_{e,t-1} + \beta_2 \, FLFP_{e,t-1} \times Climatic\,Instability_e \\ &\quad + \mathbf{X}_{e,t-1}\boldsymbol{\Omega} + \varepsilon_{e,c,t}, \end{aligned} \tag{4}$$

where e denotes an ethnicity, c denotes a country, and t the year of the survey in which contemporary FLFP was measured. The sample includes all surveys from IPUMS-International that report respondents' ethnicity at a sufficiently fine level and have sufficient variation. These include surveys from the following countries: Belarus, Cambodia, Malaysia, Nepal, Philippines, Sierra Leone, Uganda, and Vietnam. $\alpha_{c,t}$ denotes survey (i.e., country and survey-year) fixed effects. $FLFP_{e,c,t}$ denotes the average female labor force participation rate of ethnicity e in country c in survey year t. $FLFP_{e,c,t-1}$ is the traditional female participation in pre-industrial agriculture. $Climatic\,Instability_e$ is the cross-generational instability of the climate in the location historically

Table 5: Ethnicity-level estimates of the differential persistence of FLFP, traditionally and today

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable: Average female labor-force participation rate today						
Traditional female participation in agriculture	0.157*	0.400**	0.406**	0.685***	0.372*	3.225	4.280*
	(0.082)	(0.153)	(0.189)	(0.254)	(0.217)	(2.273)	(2.501)
Trad female part in agric * Climatic instability		**-1.268***	**-1.256***	**-1.059**	**-1.268***	**-1.362***	**-1.042**
		(0.722)	**(0.678)**	**(0.688)**	**(0.724)**	**(0.742)**	**(0.653)**
Ethnicity-level controls:							
Climatic instability		55.165	54.202	41.809	55.406	60.687*	42.052
		(34.924)	(33.472)	(33.328)	(34.965)	(36.381)	(32.735)
Distance from equator	0.045	-0.067	-0.050	-0.053	-0.068	-0.068	-0.028
	(0.131)	(0.148)	(0.224)	(0.147)	(0.147)	(0.147)	(0.248)
Economic complexity	0.935	0.824	0.831	3.469*	0.828	0.633	4.690**
	(1.000)	(0.918)	(0.921)	(2.041)	(0.925)	(0.954)	(2.240)
Political hierarchies	-0.608	-0.250	-0.253	-0.662	-0.582	-0.129	-3.283
	(1.194)	(1.206)	(1.216)	(1.219)	(2.236)	(1.223)	(2.858)
Year ethnicity sampled	-3.437	0.011	-0.006	0.119	0.127	0.820	2.088
	(2.492)	(3.387)	(3.330)	(3.486)	(3.443)	(3.365)	(3.616)
Female part agric * Distance from equator			-0.000				-0.001
			(0.005)				(0.006)
Female part agric * Economic complexity				-0.052*			-0.080**
				(0.031)			(0.037)
Female part agric * Political hierarchies					0.008		0.059
					(0.034)		(0.046)
Female part agric * Year ethnicity sampled						-1.452	-1.873
						(1.131)	(1.222)
Country-survey-year fixed effects	yes	yes	yes	yes	yes	yes	yes
Mean (st. dev.) of dep. var.	54.8 (22.37)	54.8 (22.37)	54.8 (22.37)	54.8 (22.37)	54.8 (22.37)	54.8 (22.37)	54.8 (22.37)
Number of ethnicities	109	109	109	109	109	109	109
Observations	211	211	211	211	211	211	211
R-squared	0.478	0.492	0.492	0.499	0.492	0.496	0.509
		Effect of "Trad female part in agric" for mean values of controls & "Climatic instability"=0					
		0.400	0.398	0.354	0.396	0.436	0.350
		(0.151)	(0.148)	(0.141)	(0.155)	(0.165)	(0.155)

Notes: OLS estimates are reported with standard errors clustered at the ethnicity level in parentheses. The unit of observation is an ethnicity in a given country/year. Female labor-force participation is the percentage of women in the labor force. The countries (and their survey years) included in the sample are Belarus (1999), Cambodia 1998, 2008), Malaysia (1970, 1980, 1991, 2000), Nepal (2001), Philippines (1990), Sierra Leone (2004), Uganda (1991, 2002), and Vietnam (1989, 1999, 2009). Climatic instability ranges from 0.034 to 0.516 in the sample. Its mean (and standard deviation) is: 0.19 (0.10). ***, ** and * indicate significance at the 10, 5 and 1% levels.

inhabited by ethnic group e. $\mathbf{X}_{e,c,t-1}$ denotes historical controls measured at the ethnicity level and $\alpha_{c,t}$ denotes country-survey-year fixed effects. The standard errors are clustered at the ethnicity level.

Estimates of equation (4) are reported in Table 5. Although the estimates are less precise than the country-level estimates, they do confirm the findings from the cross-country analysis. First, we find persistence between female participation in agriculture historically and FLFP today (column 1). Second, we find that this persistence is weaker for those ethnicities with greater instability of the climate across previous generations (column 2). In addition, the finding is robust to the inclusion of the ethnicity-level historical controls and their interactions with historical female participation in agriculture, either individually or together (columns 3–7).

B. *Polygamy*

Our next estimates of equation (3) examine the differential persistence of polygamy. We view this as an informative complement to FLFP, since polygamy has been declining, while FLFP has been increasing. We measure the traditional presence of polygamy using information from variable v9 in the *Ethnographic Atlas*.[25] We measure the prevalence of polygamy today using data from the *OECD Gender, Institutions and Development Database*. The variable we use is a country-level indicator that equals one if having more than one spouse is accepted or legal.

Estimates of the relationship between the traditional prevalence of polygamy and the practice today are reported in column 1 of Table 6. The remaining columns report estimates of the full version of equation (3). We find that, as was the case for FLFP, the coefficient for the interaction term, β_2, is negative and significant. The persistence of polygamy is weaker in countries where the climate faced by the populations' ancestors was more unstable from one generation to the next. This is true without (column 2) or with (columns 3–8) the inclusion of the covariates interacted with the historical measure of polygamy. Although we lose significance in two of the seven specifications, the coefficient remains negative and of a similar magnitude in all specifications.

C. *Consanguineous marriage*

Another traditional practice that, like polygamy, has been declining over time is consanguineous marriage, which is defined as a marriage between two people who are related as second cousins or closer, and commonly referred to as "cousin marriage". In some countries, the practice has declined over time. In others, it continues to persist and still accounts for a large fraction of marriages (Bittles and Black, 2010).

We measure the presence of the practice today using data on contemporaneous consanguineous marriages taken from Schulz (2017). Our measure is the proportion of all marriages that are consanguineous. The traditional presence of consanguineous marriage is calculated from the variable *v25* of the *Ethnographic Atlas*[26] which is the proportion of the population today with

[25] The categories coded in the *Ethnographic Atlas* are: independent nuclear monogamous, polygyny, preferential sororal living in the same dwelling, preferential sororal living in a separate dwelling, non-sororal living in separate dwelling, non-sororal living in the same dwelling, polyandry, and no information.

[26] The original coding of the variable has 14 categories for different forms of cousin marriage preference when cousin marriages are preferred to non-cousin marriages. The fifteenth category is for "No preferred cousin marriages". From variable v25, we create an indicator variable that equals 0 if the ethnicity has "No preferred cousin marriages" and 1 if it has a preferred cousin marriage of any type.

Table 6: Differential persistence of polygamy, traditionally and today

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Indicator variable for the practice of polygamy today, 0/1							
Traditional polygamy, 0-1	0.324***	0.845***	1.182***	0.612**	1.786***	1.862***	3.159*	2.708*
	(0.122)	(0.212)	(0.220)	(0.290)	(0.368)	(0.666)	(1.683)	(1.599)
Traditional polygamy * Climatic instability		**-2.177****	**-1.173**	**-2.153****	**-2.071*****	**-1.805***	**-2.171****	**-1.205**
		(0.878)	**(0.747)**	**(0.864)**	**(0.765)**	**(0.914)**	**(0.877)**	**(0.753)**
Country-level controls:								
Climatic instability		2.363***	1.457***	2.399***	2.184***	1.975***	2.383***	1.429***
		(0.667)	(0.476)	(0.659)	(0.511)	(0.681)	(0.666)	(0.453)
Distance from equator	-0.004	-0.006*	0.008**	-0.006*	-0.005	-0.006**	-0.006*	0.004*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
Economic complexity	-0.010	-0.013	-0.019	-0.042	-0.014	-0.014	-0.013	-0.033*
	(0.020)	(0.021)	(0.019)	(0.025)	(0.021)	(0.020)	(0.020)	(0.020)
Political hierarchies	-0.033	-0.033	-0.020	-0.034	0.186***	-0.030	-0.030	0.143***
	(0.039)	(0.036)	(0.033)	(0.036)	(0.059)	(0.035)	(0.036)	(0.053)
Ln (per capita GDP)	-0.034	-0.043	-0.043	-0.043	-0.042	0.065	-0.045	0.010
	(0.031)	(0.031)	(0.030)	(0.031)	(0.030)	(0.064)	(0.032)	(0.066)
Year ethnicity sampled	-0.104**	-0.109**	-0.122***	-0.109**	-0.108**	-0.118**	1.091	0.152
	(0.044)	(0.045)	(0.045)	(0.045)	(0.045)	(0.046)	(0.855)	(0.950)
Traditional polygamy * Distance from equator			-0.018***					-0.013***
			(0.005)					(0.005)
Traditional polygamy * Economic complexity				0.038				0.018
				(0.034)				(0.030)
Traditional polygamy * Political hierarchies					-0.262***			-0.197***
					(0.077)			(0.074)
Traditional polygamy * Log (per-capita GDP)						-0.122*		-0.060
						(0.072)		(0.073)
Traditional polygamy * Year sampled							-1.203	-0.274
							(0.867)	(0.956)
Continent fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Mean (st. dev.) of dep. var.	0.44 (0.41)	0.44 (0.41)	0.44 (0.41)	0.44 (0.41)	0.44 (0.41)	0.44 (0.41)	0.44 (0.41)	0.44 (0.41)
Observations	109	109	109	109	109	109	109	109
R-squared	0.539	0.574	0.602	0.576	0.597	0.581	0.577	0.616
		Effect of "Traditional polygamy" for mean values of controls and "Climatic instability" = 0						
		0.845	0.760	0.846	0.903	0.795	1.049	0.851
		(0.212)	(0.188)	(0.212)	(0.199)	(0.215)	(0.262)	(0.232)

Notes: OLS estimates are reported with robust standard errores in brackets. The unit of observation is a country. Polygamy is an indicator variable that equals one if having more than one spouse is an accepted or legal practice in the country. Climatic instability ranges from 0.052 to 0.495 in the sample. Its mean (and standard deviation) is: 0.21 (0.09). ***, ** and * indicate significance at the 10, 5 and 1% levels.

ancestors for whom consanguineous marriage was the preferred form. Thus, both measures range from 0 to 100.

The estimate of the persistence of consanguineous marriage is reported in column 1 of Table 7. Estimates of the differential persistence of the trait by cross-generational climatic instability are reported in columns 2–8. As above, column 2 reports the baseline estimates, while columns 3–8 report estimates with each of the baseline control variables interacted with the traditional prevalence of the practice, either individually or together.[27] The coefficient for the interaction term, β_2, is negative and significant in all specifications. Thus, the persistence of consanguineous marriage is weaker in countries where the climate of the population's ancestors was more unstable

Table 7: Differential persistence of consanguineous marriage, traditionally and today

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable: Percent of marriages that are consanguineous today, 0-100							
Traditional consanguineous marriage, 0-100	0.178***	0.401***	0.402***	0.179	0.388	0.210	0.390***	-0.104
	(0.066)	(0.086)	(0.115)	(0.438)	(0.262)	(0.516)	(0.080)	(0.884)
Trad consanguineous marriage * Climatic instability		**-1.310****	**-1.308****	**-1.323****	**-1.322****	**-1.221****	**-1.327****	**-1.196****
		(0.556)	**(0.566)**	**(0.572)**	**(0.648)**	**(0.491)**	**(0.550)**	**(0.585)**
Country-level controls:								
Climatic instability		34.223	34.105	40.472	34.771	34.960	37.643	47.573
		(22.269)	(24.022)	(33.221)	(27.336)	(23.636)	(22.524)	(39.334)
Distance from equator	0.112	0.052	0.053	0.045	0.054	0.075	0.036	0.009
	(0.146)	(0.155)	(0.161)	(0.166)	(0.159)	(0.138)	(0.155)	(0.187)
Economic complexity	0.319	-2.984*	-2.987	-5.847	-3.034	-2.443	-3.170*	-6.558
	(1.833)	(1.755)	(1.782)	(6.574)	(1.944)	(1.639)	(1.740)	(6.538)
Political hierarchies	-1.904	-0.492	-0.489	-0.272	-0.639	-0.833	-0.221	0.813
	(2.683)	(2.598)	(2.671)	(2.663)	(4.291)	(3.127)	(2.656)	(4.784)
Ln (per-capita GDP)	-3.139	-4.805*	-4.803*	-4.427*	-4.824	-5.432	-5.120*	-5.318
	(2.761)	(2.699)	(2.763)	(2.204)	(2.940)	(3.630)	(2.737)	(3.413)
Years between current and historical periods	0.001	0.001	0.001	0.000	0.001	0.000	-0.031	-0.045
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.042)	(0.045)
Trad consanguineous * Distance from equator			-0.000					0.001
			(0.003)					(0.003)
Trad consanguineous * Economic complexity				0.034				0.051
				(0.068)				(0.079)
Trad consanguineous * Political hierarchies					0.004			-0.027
					(0.073)			(0.078)
Trad consanguineous * Log (per-capita GDP)						0.019		0.023
						(0.053)		(0.055)
Trad consanguineous * Years between							0.000	0.000
							(0.000)	(0.000)
Continent fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Mean (st. dev.) of dep. var.	12.8 (16.4)	12.8 (16.4)	12.8 (16.4)	12.8 (16.4)	12.8 (16.4)	12.8 (16.4)	12.8 (16.4)	12.8 (16.4)
Observations	60	60	60	60	60	60	60	60
R-squared	0.662	0.702	0.702	0.705	0.702	0.703	0.704	0.711
		Effect of "Traditional consanguineous marriage" for mean values of controls & "Climatic instability" = 0						
		0.401	0.400	0.402	0.403	0.393	0.455	0.469
		(0.086)	(0.087)	(0.089)	(0.092)	(0.085)	(0.126)	(0.150)

Notes: OLS estimates are reported with robust standard errores in brackets. The unit of observation is a country. The dependent variable is the proportion of total marriages that are consanguineous. The measure is taken by Schulz (2017). Climatic instability ranges from 0.052 to 0.457 in the sample. Its mean (and standard deviation) is: 0.25 (0.10). ***, ** and * indicate significance at the 10, 5 and 1% levels.

across previous generations.

6. Ancestral climatic instability and the persistence of cultural traits: Evidence from U.S. immigration

Our next set of tests uses immigration as a natural setting in which to examine the importance of tradition and the differential persistence of cultural traits. We examine the extent to which traditional practices persist amongst the descendants of immigrants to the United States and whether this persistence is predicted by the historical instability of the group's climate. We examine two traditional practices that are universal in the origin countries: marrying someone from the same nationality and speaking one's mother tongue at home.

[27] In the Schulz (2017) data, the prevalence of consanguineous marriage is measured in different years in the late 20th century. Given this, in the regression equations, rather than controlling for the year of measurement in the historical ethnographic data, we control for the difference between the year of measurement in the contemporary period and the year of measurement in the historical period.

A. *Within-group marriage*

In all countries, the traditional practice is to marry someone from your own country. After migrating to the United States, for the children of immigrants continuing this tradition is difficult. The importance of the practice to both the parents and their children will affect the extent to which the children marry someone with the same heritage. Of course, other factors will also affect this decision, such as the availability of potential partners from one's own cultural background or the cultural distance between the origin country and the United States. We are, therefore, careful to control for these factors in the empirical analysis.

Our analysis examines the probability that the children of immigrants marry someone from the country of origin.[28] Before turning to formal estimates, we first examine the raw correlations between within-group marriage and climatic instability across previous generations. To do this, we use a sample of married women with at least one parent who was born outside the United States. A wife's origin country can be identified by either her mother or father's country of birth. In the empirical analysis, we will report estimates separately for both cases. In our examination of the raw data, we use the mother's country of birth. We identify a wife's husband as being of the same ancestry as her if he, or one of his parents, or both, were born in the wife's origin country.

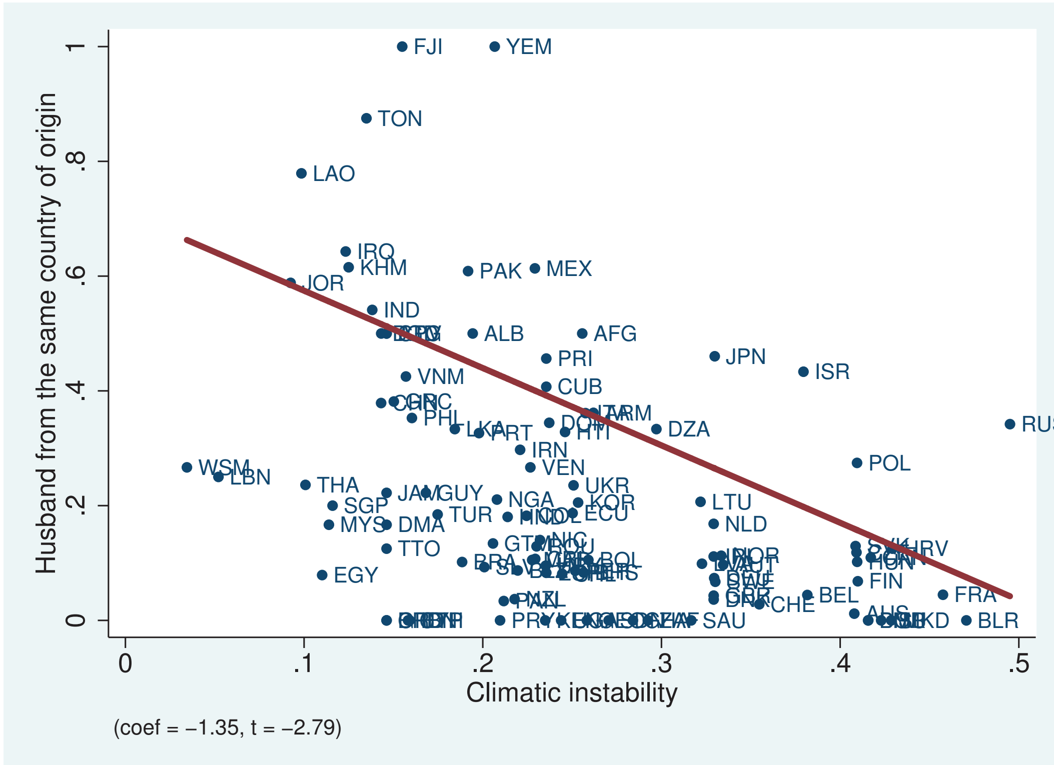
The relationship between the fraction of wives from an origin country who have married someone with the same ancestry is shown in Figures 6a and 6b. Figure 6a shows the relationship with the observations labelled with their three-digit country ISO code. Figure 6b reports the relationship with countries denoted by circles, where the size of the circle is proportional to the number of wives in the sample who are from that origin country. From the figures, a negative relationship between the two measures is apparent. Women from origin countries with more cross-generational climatic instability are less likely to have a spouse from the same country.

We now turn to a more formal examination of this relationship by estimating the following equation:

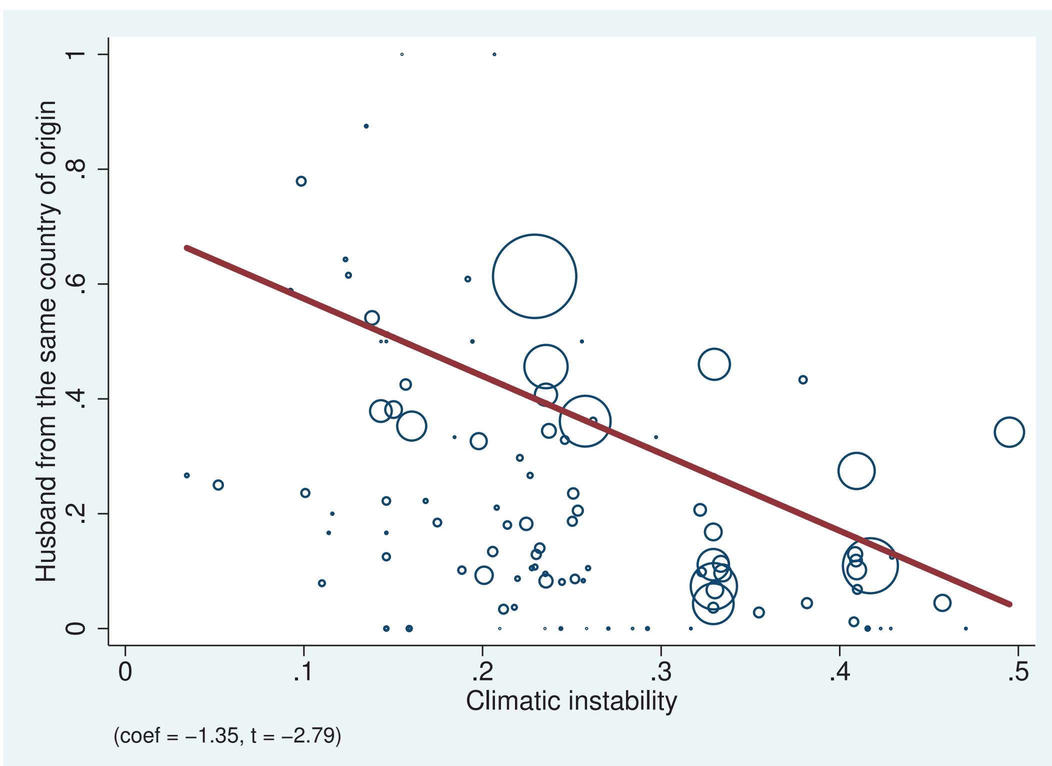
$$I_{i,c}^{\textit{Ingroup Marriage}} = \alpha + \beta\, \textit{Climatic Instability}_c + \mathbf{X}_c \boldsymbol{\Pi} + \mathbf{X}_i \boldsymbol{\Phi} + \varepsilon_{i,c}, \tag{5}$$

where i indexes married women or men (depending on the sample) who were born in the U.S., but

[28]Information on the country of origin of individuals is available for the recent period from the *March Supplement of the Current Population Survey (CPS)*. Beginning in 1994, for all individuals who were born in the United States, the CPS began recording both parents' countries of birth. In our analysis, we use each of the 21 available waves.



(a) Bivariate relationship with names of country of origin shown



(b) Bivariate relationship where the circle size denotes the number of individuals from the country of origin in the sample

Figure 6: Bivariate relationship between women marrying men from their country of origin and cross-generational climatic instability

whose parents are immigrants who were born outside the U.S., and c indexes the origin country of the individual's parents. The outcome of interest, $I_{i,c}^{Ingroup\ Marriage}$, is an indicator variable that equals one if an individual's spouse was born in origin country c or if his or her mother or father was born in country c. The vector of country-level covariates, $\mathbf{X}_c$, includes the natural log of the current per-capita GDP in the country of origin (measured in the survey year), and all the historical ethnicity characteristics from that country (distance from the equator, a measure of economic complexity, and a measure of political sophistication). We also include the genetic distance between the country of origin and the United States as a proxy of cultural distance, which could affect outgroup marriage.[29]

The following individual-level covariates, $\mathbf{X}_i$, are included in all specifications: a quadratic in age, educational-attainment fixed effects (less than high school, high school only, and more than high school), metropolitan-area fixed effects, rural/urban indicator, and survey-year fixed effects. We also control for the fraction of the population in the same metropolitan area as the individual who are first- or second-generation immigrants from the individual's country of origin.[30]

Estimates of equation (5) are reported in Table 8. In columns 1 and 2, the unit of observation is a married woman, while in columns 3 and 4, it is a married man. In columns 1 and 3, we define the origin country by the birthplace of the person's father, while in columns 2 and 4, we define it by the birthplace of the mother. Across all four specifications, we find a negative relationship between cross-generational climatic instability and the probability of marrying someone of one's own ancestry. The magnitudes and significance appear to be greater for the sample of married women than for the sample of married men. The effects also appear stronger when we define a person's origin country using the mother than when using the father. According to the estimates for married women from column 2, a one-standard-deviation increase in cross-generational climatic instability is associated with a decrease in ingroup marriage by 0.044, equal to 14 percent of the mean of the independent variable and 9 percent of its standard deviation.[31] When we look at the estimates for married men from column 4, we find that a one-standard-deviation increase in cross-generational climatic instability is associated with a decrease in ingroup marriage by 0.022, which is 8 percent of the mean of the dependent variable and 5 percent of its standard deviation.

[29]The measure is taken from Spolaore and Wacziarg (2009).

[30]For individuals who do not live in a metropolitan area, we use the fraction of the population living in non-metropolitan areas within the same state.

[31]Descriptive statistics are reported in appendix Table A1.

Table 8: Women and men marrying a spouse from their origin country, using CPS 1994–2014

	(1)	(2)	(3)	(4)
	Dependent variable: Indicator varible for spouse being from their origin country			
	Sample: Married women		Sample: Married men	
	Origin country identified from father	Origin country identified from mother	Origin country identified from father	Origin country identified from mother
Climatic instability	**-0.274***	**-0.492****	**-0.103**	**-0.250***
	(0.156)	**(0.178)**	**(0.138)**	**(0.148)**
Country-level controls:				
Distance from equator	-0.006**	-0.005	-0.008***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
Economic complexity	0.009	0.019	-0.010	-0.021
	(0.026)	(0.035)	(0.039)	(0.037)
Political hierarchies	0.089***	0.084***	0.092**	0.085**
	(0.027)	(0.029)	(0.037)	(0.037)
Ln (per-capita GDP)	-0.005	-0.022	-0.003	-0.004
	(0.030)	(0.033)	(0.036)	(0.035)
Genetic distance from the United States	0.031	0.010	0.011	-0.010
	(0.046)	(0.053)	(0.043)	(0.044)
Fraction of population in location who are first- or second-generation immigrants from their country of origin	3.314***	3.533***	3.071***	3.409***
	(0.489)	(0.627)	(0.504)	(0.483)
Individual-level controls	yes	yes	yes	yes
Number of countries	108	105	110	105
Mean (st. dev.) of dependent variable	0.33 (0.47)	0.32 (0.47)	0.28 (0.45)	0.29 (0.45)
Observations	36,082	34,045	38,419	35,639
R-squared	0.239	0.254	0.223	0.245

Notes: OLS estimates are reported with standard errors clustered at the country-of-origin level in parentheses. In columns 1 and 2, the unit of observation is a daughter of at least one immigrant parent who is married at the time of the survey. In columns 1 and 2, the dependent variable is an indicator variable that equals one if the woman is married to someone with the same ancestry (i.e., an individual born in the country or with at least one parent who was born in the country). In columns 3 and 4, the unit of observation is a son of at least one immigrant parent who is married at the time of the survey. In columns 3 and 4, the dependent variable is an indicator variable that equals one if the man is married to someone with the same ancestry. The country of origin of the observation is defined by the country of birth of the father in columns 1 and 3 and the country of birth of the mother in column 2 and 4. The following controls are included in all specifications: a quadratic in age, two indicator variables for educational attainment (less than high school and high school), metropolitan-area fixed effects, and survey-year fixed effects. The mean and standard deviation of climatic instability is 0.29 (0.09). ***, ** and * indicate significance at the 10, 5 and 1% levels.

B. *Is a foreign language spoken at home?*

The second indicator of the persistence of tradition among descendants of immigrants is whether or not English is spoken at home. In all origin countries, people speak one of the vernaculars of their country. However, since the children of migrants who are born in the United States are almost always fluent in English, they face the decision of whether to continue speaking their traditional language at home. We thus examine, as a revealed measure of the importance of maintaining tradition, the extent to which a foreign language is spoken at home among the children of immigrants. If so, it indicates that the children of the immigrants were taught their origin language, which is a sign of the parents and children valuing their tradition. It also means that the origin language is valued enough for it to be spoken within the household. Since the ease with which parents can learn English will be an important determinant of whether children speak English at home, we always control for a measure of the linguistic distance of the origin language from English.

Information about the language spoken at home is available from the 2000 Census. Unfortunately, the Census does not report the country of origin of a respondent's parents.[32] Instead, it records individuals' self-reported ancestry. Our sample includes all individuals who were born in the United States and report ancestry from a country in which English is not an official language. It is possible that ancestry is less precisely measured and potentially endogenous to the importance of tradition. This should be kept in mind when interpreting the estimates. We return to this issue below.

Figures 7a and 7b report the bivariate cross-country relationship between the proportion of individuals in our sample who speak a foreign language at home and the instability of the climate across previous generations. Figure 7a reports the country-level relationship with observations labelled with the country's name, while Figure 7b shows the relationship but with observations denoted by circles that are proportional in size to the number of individuals in the sample from that country. In the raw data, one observes a significant negative relationship. Immigrant descendants from countries with more cross-generational climatic instability are less likely to speak a foreign language at home.

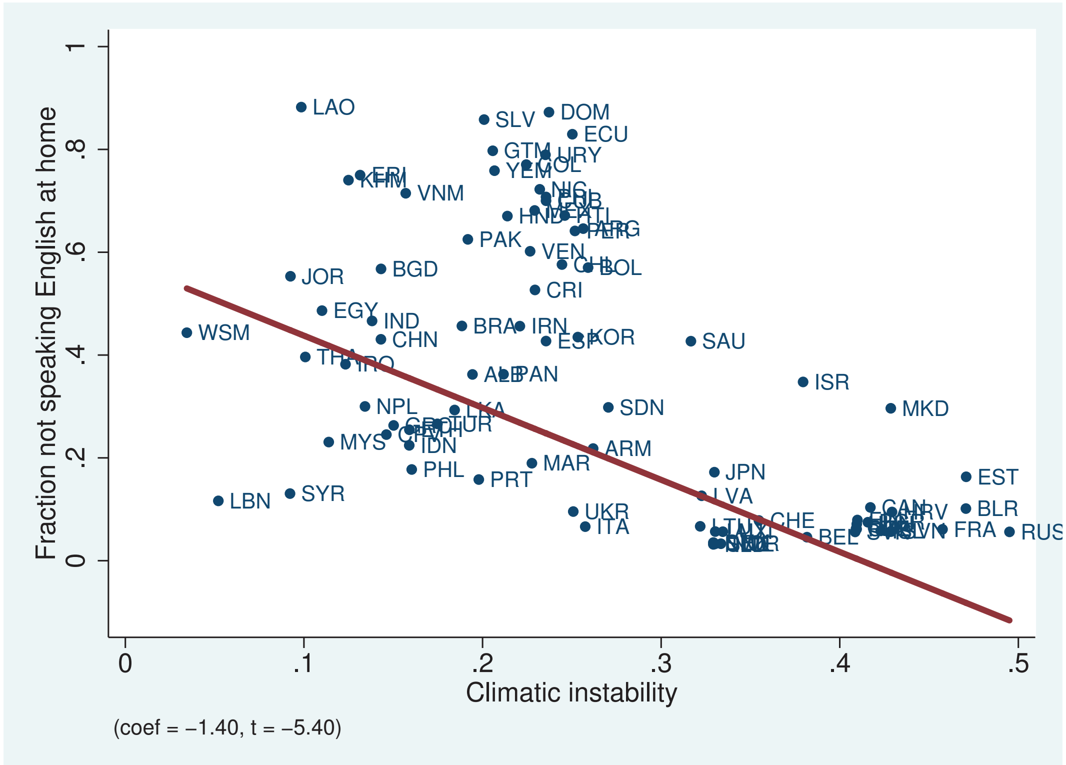
We examine this relationship more formally by estimating the following equation:

$$I_{i,c}^{\textit{Foreign Lang}} = \alpha + \beta\, \textit{Climatic Instability}_c + \mathbf{X}_c\mathbf{\Pi} + \mathbf{X}_i\mathbf{\Phi} + \varepsilon_{i,c}, \tag{6}$$

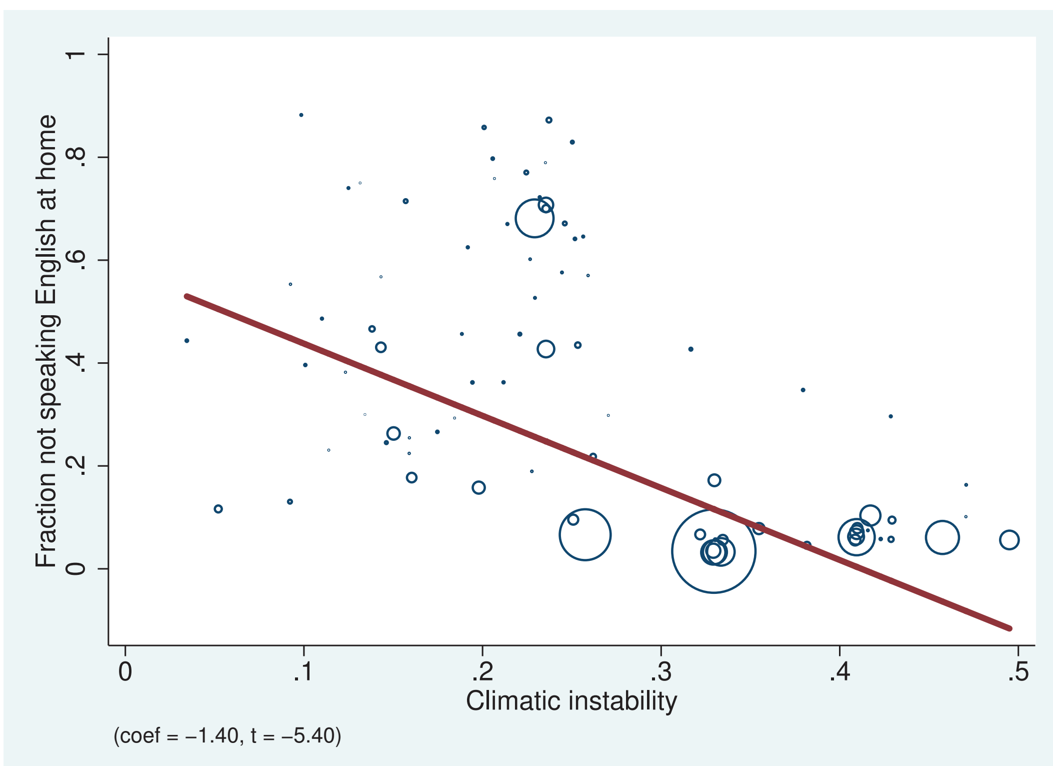
where i denotes an individual and c his/her ancestry. The dependent variable, $I_{i,c}^{\textit{Foreign Lang}}$, is an indicator that equals one if a language other than English is the primary language spoken at home. $\mathbf{X}_c$ denotes country-level covariates: historical distance from the equator, historical economic development, historical political complexity, the GDP in the country of origin measured at the time of the survey, and the genetic distance between the country of origin and the United States.[33] The vector of individual-level controls, $\mathbf{X}_i$, includes a quadratic in age, a gender indicator, an indicator for being married, educational-attainment fixed effects (less than high school, high school only, and more than high school), labor-force-status fixed effects (employed, unemployed, and outside of the labor force), the natural log of annual income, a rural/urban indicator variable, metropolitan-area fixed effects, and the fraction of those in the same metropolitan area who are

[32]The Census recorded the parental country of origin until 1970 only.

[33]Conceptually, linguistic distance is a more desirable control. It is very strongly correlated with genetic distance, but is available for fewer countries. Estimates with this measure are nearly identical to estimates using genetic distance, although the sample size is smaller.



(a) Bivariate relationship with names of country of origin shown



(b) Bivariate relationship where the circle size denotes the number of individuals from the country of origin in the sample

Figure 7: Bivariate relationship between speaking a foreign language at home and cross-generational climatic instability

Table 9: Speaking a foreign language at home, from 2000 Census

	(1)	(2)	(3)	(4)	(5)
	Dep variable: Indicator for speaking a foreign language at home				
			Living with parents		
	All 2nd gen+ individuals	Not living with parents	All ages	18 or younger	Over 18
Climatic instability	**-0.346****	**-0.279***	**-0.731*****	**-0.642*****	**-0.783*****
	(0.161)	**(0.162)**	**(0.195)**	**(0.188)**	**(0.202)**
Country-level controls:					
Distance from equator	-0.015***	-0.016***	-0.011***	-0.009***	-0.012***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
Economic complexity	-0.164***	-0.160***	-0.172***	-0.147***	-0.189***
	(0.047)	(0.048)	(0.048)	(0.044)	(0.050)
Political hierarchies	0.122	0.105	0.169*	0.151*	0.183**
	(0.090)	(0.086)	(0.087)	(0.088)	(0.086)
Ln (per-capita GDP)	0.017	0.016	0.012	0.004	0.016
	(0.021)	(0.019)	(0.025)	(0.025)	(0.026)
Genetic distance from the US	0.154**	0.144*	0.191***	0.202***	0.180**
	(0.075)	(0.076)	(0.066)	(0.060)	(0.069)
Fraction of population with the same ancestry	0.093	0.098	0.019	0.034	0.009
in the same location	(0.059)	(0.059)	(0.065)	(0.063)	(0.068)
Individual level controls	yes	yes	yes	yes	yes
Number of countries	84	84	84	84	84
Mean (st. dev.) of dependent variable	0.12 (0.33)	0.11 (0.31)	0.23 (0.42)	0.22 (0.42)	0.23 (0.42)
Observations	3,343,097	2,915,673	427,424	176,893	250,531
R-squared	0.304	0.278	0.383	0.367	0.399

Notes : OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with an ancestry from a non-English speaking country. The dependent variable is an indicator that equals one if the person does not speak English at home. All specifications include the following control varaibles: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. Standard errors are clustered at the ancestry-country level. The mean (and standard deviation) of Climatic instability is: 0.33 (0.07). ***, ** and * indicate significance at the 10, 5 and 1% levels.

first-generation immigrants of the same ancestry. The last variable is included to account for the possibility that one's incentives to learn and speak one's ancestral language may be greater the more people there are in the same location whose mother tongue is the ancestral language.

Estimates of equation (6) are reported in Table 9. Column 1 reports estimates using the full sample of individuals who were born in the United States and report a foreign ancestry. We find a negative and significant relationship between the cross-generational instability of the climate and a foreign language being spoken at home. According to the estimates, a one-standard-deviation increase in cross-generational climatic instability is associated with a reduction in the probability of speaking a foreign language at home of $0.07 \times 0.346 = 0.02$, equal to 20% of the sample mean and 7% of its standard deviation.

In columns 2 and 3, we split the samples in two groups: those not living with their parents (column 2) and those living with their parents (column 3). The magnitude of the estimated effect of interest is larger for those living with their parents, although this is potentially explained by the fact that the mean of the dependent variable is higher for this group. In columns 4 and 5, we further split the sample of children living with their parents by age: those who are 18 or younger (column 4) and those who are older than 18 (column 5). We find that the negative relationship between cross-generational climatic instability and speaking a foreign language at home is similar for both groups, although the effect is slightly larger in magnitude for those over 18.[34]

In the previous analysis of the determinants of ingroup marriage, we were able to use a parent's country of birth as a measure of ancestry. However, for this analysis, due to data availability, we must use self-reported ancestry. It is possible that this is imprecisely measured and potentially endogenous to the importance of tradition. It is unclear how this could bias the results. On the one hand, the estimates could be biased towards zero due to classical measurement error. On the other hand, if those who value tradition more are more likely to report a foreign ancestry, then this could result in nonclassical measurement error. Since the observed sample will tend to disproportionately include these observations, if the estimated effect of ancestral climatic instability is particularly strong for this group, then our estimates would be biased away from zero. Given this concern, we check the robustness of our findings to estimates that give equal weight to each origin country. Appendix Table A11 reports estimates of a variant of equation (6), in which the unit of observation is an origin country and a location of residence. The estimates are qualitatively identical to those in Table 9.

7. Climatic instability and the persistence of cultural traits: Evidence from Indigenous populations

A potential concern with our analysis involving immigrants is that immigrants are not a representative subsample of the populations in the origin countries. Migrants are a selected group, which is problematic if the nature of selection varies systematically with the climatic instability of the origin country. We, therefore, undertake a fourth exercise that examines populations that are not immigrants but, like immigrants, face pressure to change their traditions and customs. These are the Indigenous populations of the United States and Canada. Like immigrants, they are minority groups whose cultural traditions differ from those of the dominant population. However, unlike immigrants, they are not a product of selection from migration.

[34]In our baseline specification, we omit from the sample individuals whose ancestral country has English as an official language. As we report in appendix Table A10, the estimates are nearly identical if we include these observations.

As in our analysis of the children of immigrants, we take the language spoken at home as a measure of the continuity and maintenance of tradition. Thus, we estimate the relationship between the cross-generational climatic instability faced by the ancestors of today's Indigenous populations and the extent to which they speak their traditional language today. Within the United States and Canada, there is significant variation in the extent to which Indigenous populations have maintained their language. Many have lost their original language completely, while others, such as the Navajo, have done very well at retaining it (Arthur and Diamond, 2011).

The sample from the United States, which is taken from the U.S. Census, includes all individuals who identify themselves as Native Americans. We use data from all comparable Census years for which data are available (1930, 1990, and 2000).[35] We link an individual to a Native American ethnic group using self-reported tribal affiliation. Using information on the traditional location of each ethnic group from the *Ethnographic Atlas*, we then assign a measure of cross-generational climatic instability to each tribe.

Figure 8 reports a map showing the ethnic groups in our sample (according to the *Ethnographic Atlas* classification). Also shown are the climatic grid-cells and the categories of the cross-generational instability measure. One observes significant variation in cross-generational climatic instability, making the Native American experience a useful setting to examine the importance of tradition and persistence of culture.

Our estimating equation is as follows:

$$I_{i,e,k}^{Native\,Lang} = \alpha_k + \beta\,Climatic\,Instability_e + \mathbf{X}_e\mathbf{\Pi} + \mathbf{X}_i\mathbf{\Phi} + \varepsilon_{i,e,k}, \tag{7}$$

where i denotes an individual, e his/her ethnic group, and k a location of residence (metropolitan area). The dependent variable, $I_{i,e}^{Native\,Lang}$, is an indicator that equals one if the individual i reports speaking an Indigenous language at home.[36] The specification includes location (i.e., metropolitan area) fixed effects, α_k. Thus, the variation used to estimate β is across individuals from different Native American ethnic groups, but living in the same location. $\mathbf{X}_e$ denotes our baseline vector of ethnicity-level covariates. $\mathbf{X}_i$ denotes a vector of individual-level controls, which includes a quadratic in age, a gender indicator, an indicator for being married, labor-force-status fixed effects

[35] The 1910 Census records an individual's tribe. Although it also contains information about the language spoken, this is not comparable with that of other Census years, since it only records a person's ability to speak English or not. For more details on the lack of comparability of the 1910 language variable with the variables from the other census years, see `www.ipums.org`.

[36] The 1930, 1990, and 2000 U.S. Censuses ask the following question: "Does the person speaks a language other than English at home?" If yes, the person indicates which language.

Table 10: Whether Indigenous populations of the United States speak their traditional language at home: Individual-level estimates

	(1)	(2)	(3)	(4)	(5)
	Dep variable: Indicator for speaking an Indigenous language at home				
		Not living with	Living with parents		
	All individuals	parents	All ages	18 or younger	Over 18
Climatic instability	**-1.097*** **	**-1.195*** **	**-0.946*** **	**-0.856*** **	**-1.323*** **
	(0.358)	**(0.400)**	**(0.300)**	**(0.288)**	**(0.352)**
Ethnicity-level controls:					
Distance from equator	-0.008**	-0.009**	-0.007**	-0.006*	-0.010**
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Economic complexity	-0.022	-0.024	-0.020*	-0.018*	-0.026
	(0.014)	(0.016)	(0.011)	(0.010)	(0.016)
Political hierarchies	-0.118**	-0.132**	-0.097**	-0.088**	-0.137***
	(0.046)	(0.049)	(0.042)	(0.042)	(0.044)
Individual controls	yes	yes	yes	yes	yes
Number of ethnic groups	83	83	79	78	67
Number of clusters (grid cells)	40	40	40	40	40
Mean (st. dev.) of dependent variable	0.18 (0.39)	0.20 (0.40)	0.15 (0.36)	0.13 (0.34)	0.25 (0.43)
Observations	128,005	79,235	48,770	39,800	8,970
R-squared	0.334	0.373	0.289	0.250	0.424

Notes : OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses. The unit of observation is a person who identifies him/herself as a Native American. The dependent variable is an indicator that equals one if the person speaks an Indigenous (Native American) language at home. All specification include the following covariates: a quadratic in age, a gender indicator, employment-status fixed effects, an indicator for being married, metropolitan-area fixed effects, and an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11).

(employed, unemployed, and outside of the labor force), and an indicator for being educated.[37] Standard errors are clustered at the ancestral-climatic-grid-cell level.

Estimates of equation (7) are reported in Table 10. The table reports the same set of specifications as in Table 9: column 1 reports estimates using the full sample of self-reported Native Americans; column 2 examines the sample of individuals who are not living with their parents, and columns 3–5 examine the sample of individuals living with their parents (all, 18 or younger, and over 18). In all samples, we find a negative and significant relationship between cross-generational climatic instability and the likelihood of speaking an Indigenous language at home. That is, climatic instability is associated with less value being placed on the tradition of speaking one's Native language at home. Based on the estimates from column 1, a one-standard-deviation increase in climatic instability is associated with a reduction in the probability of speaking a Native American language of 0.121 percentage points, which is 67% of the sample mean and 31% of its standard deviation.

[37]In the 1990 and 2000 U.S. censuses, the indicator is constructed using information on school attainment. In the 1930 census, it is constructed using information on whether the individual is literate.

A potential concern with the individual-level estimates from equation (7) is that whether an individual reports being Native American in the Census may itself be affected by how much he or she values tradition. Individuals from ethnic groups that place less importance on tradition will be less likely to report having a Native American ancestry and will thus be underrepresented in our sample. Therefore, we also estimate a version of equation (7) that is at the ethnicity-location level, rather than the individual level. As we explain below, a benefit of this specification is that it can be replicated using Canadian data, which are not available at the individual level but are available at the ethnicity-location level. The ethnicity-location level estimating equation we use is:

$$\mathit{Frac\,Native\,Language}_{e,k} = \alpha_k + \beta\,\mathit{Climatic\,Instability}_e + \mathbf{X}_e\boldsymbol{\Pi} + \varepsilon_{e,k}, \tag{8}$$

where e indexes a Native American ethnic group and k a location of residence (metropolitan area). The dependent variable, $\mathit{Frac\,Native\,Language}_{e,k}$, is the fraction of Native Americans belonging to ethnic group e and living in location k who speak an Indigenous language at home. α_k denotes metropolitan-area fixed effects. $\mathbf{X}_e$ denotes our baseline vector of ethnicity-level covariates. Given the significant skew in the distribution of the outcome variable, we estimate equation (8) using a Poisson model.[38] Standard errors are clustered at the ancestral-climatic-grid-cell level.

The estimates of equation (8) are reported in column 1 of Table 11. We find a negative and significant relationship between cross-generational climatic instability and the proportion of the population speaking a Native American language at home.[39]

We undertake the same exercise for Canadian Indigenous populations using the 2001, 2006, and 2011 rounds of the *Census Aboriginal Population Profiles*, produced by Statistics Canada, which includes all Indigenous populations living on a reserve or a legal land base. Statistics Canada collects information on the proportion of the population who: (*a*) have an Indigenous language as their mother tongue (*b*) speak an Indigenous language at home; and (*c*) can conduct a conversation in at least one Indigenous language.

Figure 9 shows the ethnic groups in the Canadian sample (according to the *Ethnographic Atlas* classification) and grid-cells with different categories of climatic instability. As with the United States, there is significant variation in climatic instability.

[38]The histograms of the dependent variable for the U.S. and Canadian samples are shown in appendix Figures A1–A4.

[39]The largest number of different ethnic groups is observed in 1930. In appendix Table A14, we report both the individual-level and the ethnicity-level estimates for this Census year only.

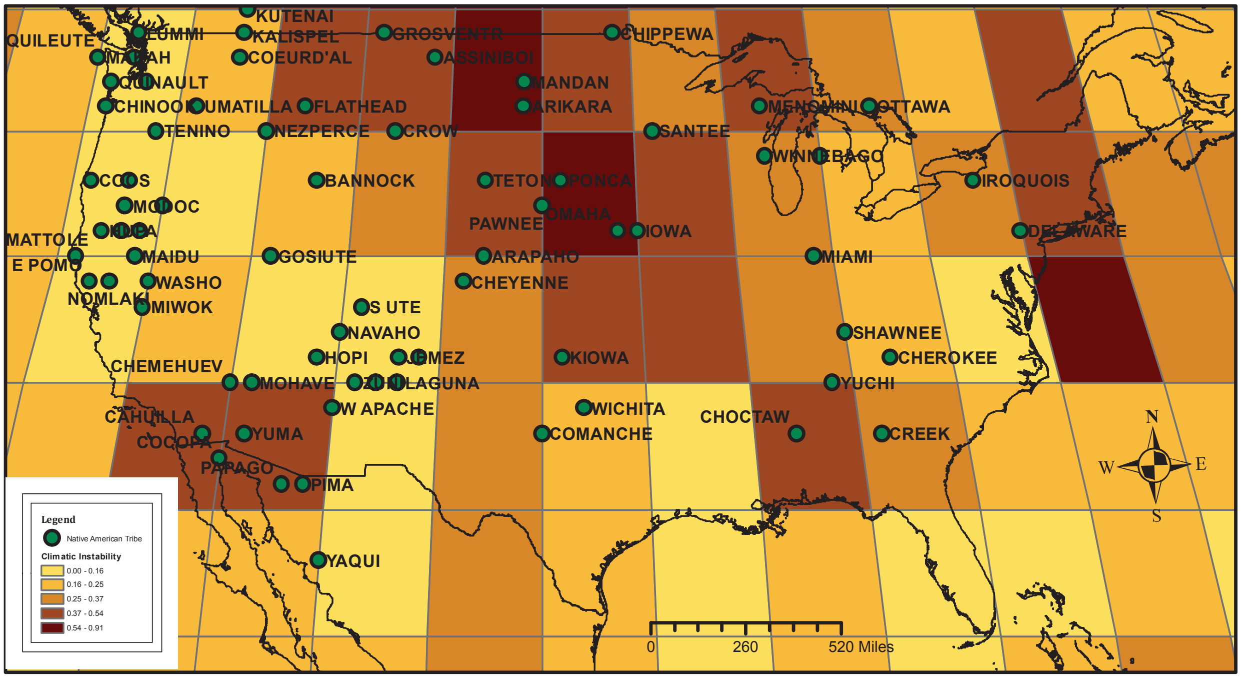


Figure 8: Ancestral climatic instability and the location of Native American populations in the *Ethnographic Atlas* and in the U.S. Census

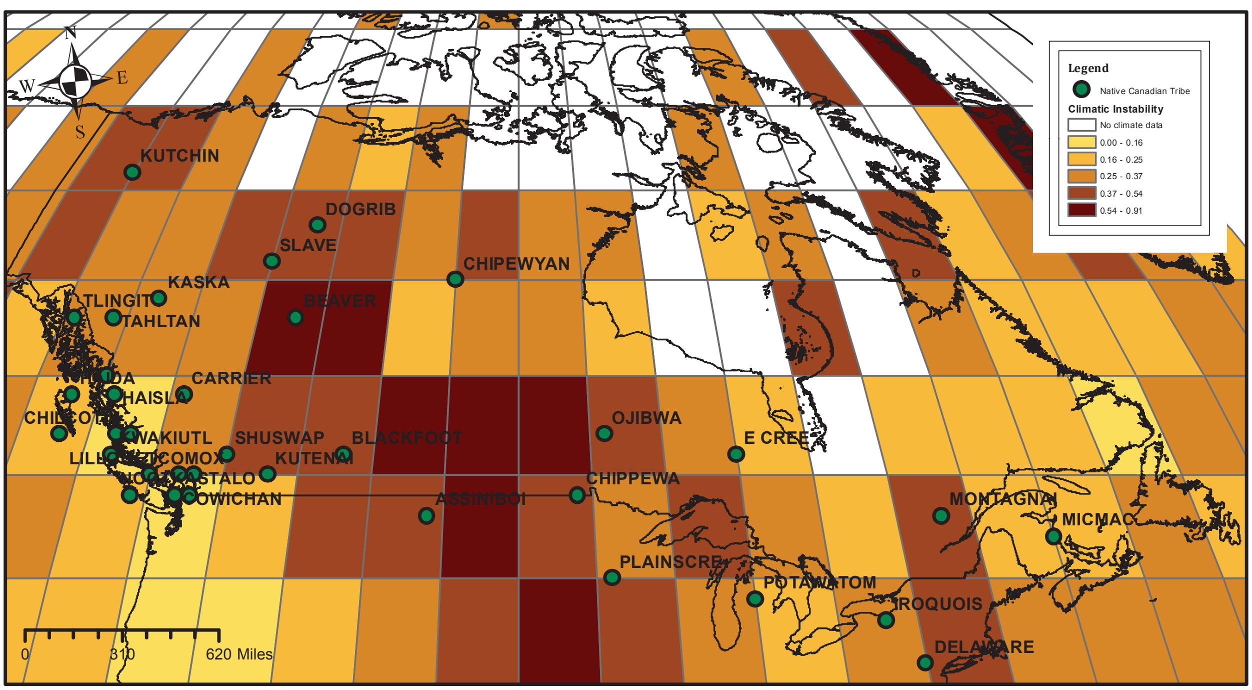


Figure 9: Ancestral climatic instability and the location of Native Canadian populations in the *Ethnographic Atlas* and in the *Canadian Aboriginal Census*.

Table 11: Whether Indigenous populations of Canada and the United States speak their traditional language: Ethnicity-level estimates

	(1)	(2)	(3)	(4)	(5)
	United States	**Canada**			**U.S. & Canada**
	Indigenous language is spoken at home	Indigenous language is mother tongue	Indigenous language is spoken at home	Conversational in Indigenous language	Indigenous language is spoken at home
Climatic instability	**-4.879****	**-2.486*****	**-2.394*****	**-1.957*****	**-4.668****
	(2.116)	**(0.754)**	**(0.890)**	**(0.623)**	**(1.889)**
Ethnicity-level controls:					
Distance from the equator	0.000	0.054***	0.058***	0.035***	0.003
	(0.023)	(0.010)	(0.012)	(0.009)	(0.020)
Economic complexity	-0.185***	-0.264***	-0.285***	-0.166***	-0.181***
	(0.072)	(0.048)	(0.068)	(0.033)	(0.067)
Political hierarchies	-0.069	0.058	-0.061	-0.002	-0.060
	(0.227)	(0.111)	(0.132)	(0.098)	(0.209)
Location FE	yes	yes	yes	yes	yes
Survey-year FE	yes	yes	yes	yes	yes
Number of ethnic groups	83	36	36	36	108
Number of clusters (grid cells)	40	24	24	24	52
Mean (st. dev.) of dependent variable	0.039 (0.14)	0.29 (0.25)	0.25 (0.26)	0.34 (0.26)	0.07 (0.18)
Observations (ethnicity-year-location)	3,564	546	546	546	4,110

Notes : Poisson estimates are reported with standard errors clustered at the grid-cell level in parentheses. The unit of observation is an Indigenous ethnic group (from the U.S. and/or Canada), in a location, and observed in a census survey. The dependent variables are different measures of the fraction of people who can speak their traditional language. The American sample includes data from the 1930, 1990, and 2000 Censuses. The Canandian sample includes data from the 2001, 2006, and 2011 Censuses. The mean (and standard deviation) of Climatic instability is: 0.30 (0.11). ***, ** and * indicate significance at the 10, 5 and 1% levels.

Using the Canadian data, we reestimate equation (8). The estimates for each of the three available measures of language ability are reported in columns 2–4 of Table 11. As in the United States, we find a negative relationship between cross-generational climatic instability and the fraction of a population who speak an Indigenous language today. Our final specification pools the U.S. and Canadian samples and uses the fraction of individuals who speak an Indigenous language at home as the outcome variable. As reported in column 5, the findings using this specification remain robust.

Overall, our findings suggest that Indigenous populations, both the United States and Canada, with ancestors who lived in locations with greater cross-generational climatic instability are less likely today to continue their tradition of speaking their Indigenous language at home.

8. Conclusion

Our analysis has addressed a simple but still unanswered question: when does culture persist and when does it change? We contribute to a better understanding of this issue by testing a hypothesis that emerges from the theoretical evolutionary anthropology literature (e.g., Boyd and Richerson, 1985, Aoki and Feldman, 1987, Rogers, 1988, Feldman et al., 1996, Boyd and Richerson, 2005). A class of models predicts that populations whose ancestors lived in locations with greater environmental instability across generations will place less importance on traditions and customs. When the environment is highly variable, the cultural practices that have evolved up until the previous generation are less likely to provide information that is relevant for the current generation. By contrast, when the environment is stable, the culture that has evolved up to the previous generation is more likely to be suitable for the current generation.

To test this hypothesis, we use grid-cell-level paleoclimatic data on the average temperature across 20-year generations from 500–1900AD to measure the instability of the environment across generations. Looking across countries, ethnicities and immigrants, and performing four tests of the hypothesis, we found that populations with ancestors who lived in more variable environments place less importance on tradition today.

In addition to providing a better understanding of when we expect culture to persist and when we expect it to change, our study also provides a direct test of a class of models from evolutionary anthropology. The core characteristic of these models is the assumption that culture evolves systematically based on the relative costs and benefits of the cultural traits. Alternative models are also possible; for example, that culture is not systematic at all, and cannot be explained. Our findings provide support for the evolution of culture as modeled in this literature. Testing these models is important because many of the current models of culture in economics – e.g., Bisin and Verdier (2000), Bisin and Verdier (2001), Hauk and Saez-Marti (2002), Francois and Zabojnik (2005), Tabellini (2008), Bisin and Verdier (2017), and Doepke and Zilibotti (2017) – implicitly built on a number of important outcomes of models from evolutionary anthropology, such as the assumption of vertical transmission and social learning. Recall that a result of Rogers' (1988) model, presented in Section 2, is that under general circumstances there are always traditionalists in the population who rely on the culture of the previous generation when making decisions. It is this result that justifies the assumption in models of cultural evolution that parents choose to – and are able to – influence the preferences of their children. Thus, the findings of this study provide empirical validation for the models in evolutionary anthropology that provide a foundation for the assumptions of many models used in cultural economics.

References

Abramitzky, Ran, Leah Boustan, and Katherine Eriksson, "Cultural Assimilation During the Age of Mass Migration," 2016. Working Paper, Stanford University.

Acemoglu, Daron, Simon Johnson, and James A. Robinson, "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution," *Quarterly Journal of Economics*, 2002, *117*, 1231–1294.

Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg, "Fractionalization," *Journal of Economic Growth*, 2003, *8*, 155–194.

_ , Paola Giuliano, and Nathan Nunn, "On the Origins of Gender Roles: Women and the Plough," *Quarterly Journal of Economics*, 2013, *128* (2), 469–530.

Algan, Yann and Pierre Cahuc, "Inherited Trust and Growth," *American Economic Review*, 2010, *100* (5), 2060–2092.

Aoki, K. and Marcus W. Feldman, "Toward a Theory for the Evolution of Cultural Communication: Coevolution of Signal Transmission and Reception," *Proceedings of the National Academy of Sciences*, 1987, *84*, 7164–7168.

Arthur, Ronan and Jared Diamond, "Understanding Tribal Fates," *Science*, November 2011, *334*, 911–912.

Ashraf, Quamrul and Oded Galor, "The "Out of Africa" Hypothesis, Human Genetic Diversity, and Comparative Economic Development," *American Economic Review*, 2012, p. forthcoming.

Baten, Joerg, "Human Stature and Climate: The Impact of Past Climate on Living Standards," in Gerold Wefer, Wolfgang H. Berger, Karl-Ernst Behre, and Eystein Jansen, eds., *Climate Development and History of the North Atlantic Realm*, Berlin: Springer Berlin Heidelberg, 2002, pp. 327–338.

Becker, Sascha O. and Ludger Woessmann, "Luther and the Girls: Religious Denomination and the Female Education Gap in Nineteenth-Century Prussia," *Scandinavian Journal of Economics*, 2008, *110* (4), 777–805.

_ and _ , "Was Weber Wrong? A Human Capital Theory of Protestant Economic History," *Quarterly Journal of Economics*, 2009, *124* (2), 531–596.

_ , Katrin Boeckh, Christa Hainz, and Ludger Woessmann, "The Empire is Dead, Long Live the Empire! Long-Run Persistence of Trust and Corruption in the Bureaucracy," *Economic Journal*, 2016, *126* (590), 40–74.

Belloc, Marianna, Francesco Drago, and Roberto Galbiati, "Earthquakes, Religion, and Transition to Self-Government in Italian Cities," *Quarterly Journal of Economics*, 2016, *131* (4), 394–399.

Bentzen, Jeanet Sinding, "Acts of God? Religiosity and Natural Disasters Across Subnational World Districts," 2015. Mimeo, University of Copenhagen.

Bisin, Alberto and Thierry Verdier, "Beyond the Melting Pot: Cultural Transmission, Marriage and the Evolution of Ethnic and Religious Traits," *Quarterly Journal of Economics*, 2000, *115*, 955–988.

_ **and** _ , "The Economics of Cultural Transmission and the Dynamics of Preferences," *Journal of Economic Theory*, 2001, *97*, 298–319.

_ **and** _ , "On the Joint Evolution of Culture and Institutions," 2017. NBER Working Paper 23375.

Bittles, A.H. and M.L. Black, "Consanguineous Marriage and Human Evolution," *Annual Review of Anthropology*, October 2010, *39*, 193–207.

Bondarenko, Dmitri, Alexander Kazankov, Daria Khaltourina, and Andrey Korotayev, "Ethnographic Atlas XXXI: Peoples of Easternmost Europe," *Ethnology*, 2005, *44* (3), 261–289.

Boyd, Robert and Peter J. Richerson, *Culture and the Evolutionary Process*, London: University of Chicago Press, 1985.

_ **and** _ , "An Evolutionary Model of Social Learning: The Effects of Spatial and Temporal Variation," in Thomas R. Zentall and Bennett G. Galef, eds., *Social Learning: Psychological and Biological Perspectives*, London: Lawrence Erlbaum Associates, 1988, pp. 29–48.

_ **and** _ , *The Origin and Evolution of Cultures*, London: Oxford University Press, 2005.

Buggle, Johannes and Ruben Durante, "Climate Risk, Cooperation and the Co-Evolution of Culture and Institutions," 2016. Mimeo, Science Po.

Burke, Marshall B., Edward Miguel, Shanker Satyanath, John A. Dykema, and David B. Lobell, "Warming Increases the Risk of Civil War in Africa," *Proceedings of the National Academy of sciences*, 2009, *106* (49), 20670–20674.

Burke, Marshall, Solomon M. Hsiang, and Edward Miguel, "Global Non-Linear Effect of Temperature on Economic Production," *Nature*, 2015, *527* (7577), 235–239.

Cantoni, Davide, "Adopting a New Religion: The Case of Protestantism in 16th Century Germany," *Economic Journal*, May 2012, *122* (560), 502–531.

_ , "The Economic Effects of the Protestant Reformation: Testing the Weber Hypothesis in the German Lands," *Journal of the European Economic Association*, August 2014, *13* (4), 561–598.

Chanda, Areendam and Louis Putterman, "Persistence of Fortune: Accounting for Population Movements, there was no Post-Columbian Reversal," *American Economic Journal: Macroeconomics*, 2014, *6* (3), 1–28.

Chaney, Eric, "Revolt on the Nile: Economic Shocks, Religion, and Political Power," *Econometrica*, 2013, *81* (5), 2033–2053.

Comin, Diego, William Easterly, and Erick Gong, "Was the Wealth of Nations Determined in 1000 B.C.?," *American Economic Journal: Macroeconomics*, 2010, *2* (3), 65–97.

Dalgaard, Carl-Johan, Casper Worm Hansen, and Nicolai Kaarsen, "Climate Shocks and (Very) Long-Run Productivity," 2015. Mimeo, University of Copenhagen.

Dell, Melissa, Benjamin F. Jones, and Benjamin A. Olken, "Temperature Shocks and Economic Growth: Evidence from the Last Half Century," *American Economic Journal: Macroeconomics*, 2012, *4* (3), 66–95.

Doepke, Matthias and Frabrizio Zilibotti, "Parenting with Style: Altruism and Paternalism in Intergenerational Preference Transmission," 2017. *Econometrica*, forthcoming.

Durante, Ruben, "Risk, Cooperation and the Economic Origins of Social Trust: An Empirical Investigation," 2010. Mimeo, Science Po.

Feldman, Marcus W., Kenichi Aoki, and Joachen Kumm, "Individual Social Learning: Evolutionary Analysis in a Fluctuating Environment," *Anthropological Science*, 1996, *104* (3), 209–232.

Fernandez, Raquel, "Women, Work and Culture," *Journal of the European Economic Association*, 2007, *5* (2–3), 305–332.

_ , "Cultural Change as Learning: The Evolution of Female Labor Force Participation over a Century," *American Economic Review*, 2013, *103* (1), 472–450.

_ **and Alessandra Fogli**, "Culture: An Empirical Investigation of Beliefs, Work, and Fertility," *American Economic Journal: Macroeconomics*, 2009, *1* (1), 146–177.

Firth, Raymond, *Social Change in Tikopia: Re-Study of a Polynesian Community after a Generation*, New York: George Allen and Unwin Ltd., 1959.

Fischer, David Hackett, *Albion's Seed: Four British Folkways in America*, New York: Oxford University Press, 1989.

Fogli, Alessandra and Laura Veldkamp, "Nature or Nurture? Learning and the Geography of Female Labor Force Participation," *Econometrica*, 2011, *79*, 1103–1138.

Fouka, Vasiliki, "Backlash: The Unintended Effects of Language Prohibition in US Schools after World War I," 2015. Mimeo, Stanford University.

Francois, Patrick and Jan Zabojnik, "Trust, Social Capital, and Economic Development," *Journal of the European Economic Association*, 2005, *3*, 51–94.

Galef, Bennett G. and Elaine E. Whiskin, "Effects of Environmental Stability and Demonstrator Age on Social Learning of Food Preferences by Young Norway Rats," *Animal Behavior*, 2004, *68* (4), 897–902.

Giavazzi, Francesco, Ivan Petkov, and Fabio Schiantarelli, "Culture: Persistence and Evolution," 2014. Mimeo, Boston College.

Giuliano, Paola, "Living Arrangements in Western Europe: Does Cultural Origin Matter?," *Journal of the European Economic Association*, 2007, *5* (5), 927–952.

_ **and Nathan Nunn**, "The Transmission of Democracy: From the Village to the Nation State," *American Economic Review Papers and Proceedings*, 2013, *103* (3), 86–92.

_ **and** _ , "Ancestral Characteristics of Modern Populations," 2016. Working Paper, Harvard University.

Goldin, Claudia, "The U-Shaped Female Labor Force Function in Economic Development," in T. Paul Schultz, ed., *Investment in Women's Human Capital and Economic Development*, Chicago: University of Chicago Press, 1995, pp. 61–90.

Greif, Avner and Steven Tadelis, "A Theory of Moral Persistence: Crypto-Morality and Political Legitimacy," *Journal of Comparative Economics*, 2010, *38*, 229–244.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, "Long-Term Persistence," 2016. Journal of the European Economic Association, forthcoming.

Hauk, Esther and Maria Saez-Marti, "On the Cultural Transmission of Corruption," *Journal of Economic Theory*, 2002, *107*, 311–335.

Henrich, Joseph, *The Secret of Our Success: How Culture is Driving Human Evolution*, New York: Princeton University Press, 2015.

_ , *The Secret of Our Success*, Princeton: Princeton University Press, 2016.

Hsiang, Solomon M., Marshall Burke, and Edward Miguel, "Quantifying the Influence of Climate on Human Conflict," *Science*, 2013, *341* (6151), 12353–67.

Iyigun, Murat and Jared Rubin, "The Ideological Roots of Institutional Change," 2017. Working paper, University of Colorado, Boulder.

_ **, Nathan Nunn, and Nancy Qian**, "Winter is Coming: The Long-Run Effects of Climate Change on Conflict, 1400–1900," 2017. Working Paper, Harvard University.

Katz, S.H., M.L. Hediger, and L.A. Valleroy, "Traditional Maize Processing Techniques in the New World," *Science*, 1974, *184* (4138), 765–773.

Korotayev, Andrey, Alexander Kazankov, Svetlana Borinskaya, and Daria Khaltourina, "Ethnographic Atlas XXX: Peoples of Siberia," *Ethnology*, 2004, *43* (1), 83–92.

Kupperman, Karen Ordahl, *Providence Island, 1630–1641: The Other Puritan Colony*, Cambridge: Cambridge University Press, 1995.

Mann, Michael E., Zhihua Zhang, Scott Rutherford, Raymond S. Bradley, Malcolm K. Hughes, Drew Shindell, Caspar Ammann, Greg Faluvegi, and Fenbiao Ni, "Global Signatures and Dynamical Origins of the Little Ice Age and Medieval Climate Anomaly," *Science*, 2009, *326*, 1256–1260.

_ **,** _ **,** _ **,** _ **,** _ **,** _ **,** _ **,** _ **, and** _ , "Supporting Online Material for: Global Signatures and Dynamical Origins of the Little Ice Age and Medieval Climate Anomaly," 2009. Online Appendix.

Matranga, Andrea, "The Ant and the Grasshopper: Seasonality and the Invention of Agriculture," 2016. Working paper, New Economic School.

McElreath, Richard, Mark Lubell, Peter J. Richerson, Timothy M. Waring, William Baum, Edward Edstein, Charles Efferson, and Brian Paciotti, "Applying Evolutionary Models to the Laboratory Study of Social Learning," *Evolution and Human Behavior*, 2005, *26*, 483–508.

Mead, Margaret, *New Lives for Old: Cultural Transformation – Manus, 1928–1953*, New York: William Morrow & Co., 1956.

Murdock, George Peter, "World Ethnographic Sample," *Ethnology*, 1957, *59* (4), 664–687.

_ , *Ethnographic Atlas*, Pittsburgh: University of Pittsburgh Press, 1967.

Nunn, Nathan, "Culture and the Historical Process," *Economic History of Developing Regions*, 2012, *27* (s1), 108–126.

_ **and Diego Puga**, "Ruggedness: The Blessing of Bad Geography in Africa," *Review of Economics and Statistics*, February 2012, *94* (1), 20–36.

Olsson, Ola and Christopher Paik, "A Western Reversal Since the Neolithic? The Long-Run Impact of Early Agriculture," 2012. Mimeo, University of Gothenburg.

Oster, Emily, "Witchcraft, Weather and Economic Growth in Renaissance Europe," *Journal of Economic Perspectives*, 2004, *18* (1), 215–228.

Rogers, Alan R., "Does Biology Constrain Culture?," *American Anthropologist*, 1988, *90* (4), 819–831.

Schulz, Jonathan, "The Churches' Bans on Consanguineous Marriages, Kin Networks and Democracy," 2017. Mimeo, Yale University.

Spolaore, Enrico and Romain Wacziarg, "The Diffusion of Development," *Quarterly Journal of Economics*, 2009, *124* (2), 469–529.

_ **and** _ , "How Deep Are the Roots of Economic Development?," *Journal of Economic Literature*, 2013, *51* (2), 325–369.

Tabellini, Guido, "The Scope of Cooperation: Values and Incentives," *Quarterly Journal of Economics*, 2008, *123* (3), 905–950.

Talhelm, Thomas, X. Zhang, S. Oishi, C. Shimin, D. Duan, X. Lan, and S. Kitayama, "Large-Scale Psychological Differences Within China Explained by Rice Versus Wheat Agriculture," *Science*, 2014, *344* (6184), 603–608.

Toelch, Ulf, Marjolijn J. van Delft, Matthew J. Bruce, Rogier Donders, Marius T.H. Meeus, and Simon M. Reader, "Decreased Environmental Variability Induces a Bias for Social Information Use in Humans," *Evolution and Human Behavior*, 2009, *30* (1), 32–40.

Voigtlaender, Nico and Hans-Joachim Voth, "Persecution Perpetuated: The Medieval Origins of Anti-Semitic Violence in Nazi Germany," *Quarterly Journal of Economics*, 2012, *127* (3), 1339–1392.

Waldinger, Maria, "The Economic Effects of Long-Term Climate Change: Evidence from the Little Ice Age," 2015. Mimeo, London School of Economics.

Web Appendix for:

Understanding Cultural Persistence and Change

(Not for Publication)

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A1. Introduction

This appendix accompanies "Understanding Cultural Persistence and Change" by Paola Giuliano and Nathan Nunn. Section A2 provides the details of the data used in the paper, as well as their sources. Sections A3 and A4 report additional figures and tables that were discussed in the body of the paper, but not reported there explicitly.

A2. Data and their sources

Dependent variables

The individual-level data on respect for tradition are taken from the most recent two waves of the *World Value Survey* (WVS), which is a compilation of national surveys on values and norms on a wide variety of topics. The surveys contain information on different types of attitudes, religions and preferences, as well as information on standard demographic characteristics, such as sex, age, education, labor market status, and income. We use data from a question that asks about the respondent's view on the importance of maintaining traditions and family customs. For the question, respondents are given the description of a person and then they are asked to report how similar they are to the person. For this measure, the following description was used: "Tradition is important to this person; to follow the family customs handed down by one's religion or family." Respondents then choose the response that best described how similar this person/description was to them: (1) very much like me; (2) like me; (3) somewhat like me; (4) a little like me; (5) not like me; and (6) not at all like me. We recoded the question, so that it is increasing in the value placed on tradition (and ranges from 1 to 6).

Measures of female labor force participation, when measured at the country level, is from the World Bank's *World Development Indicators*. The variable is defined in the standard manner: the percentage of women aged 15 to 64 that are in the labor force. Although the data are available annually, our analysis uses measures from 1970 and 2012.

For the within-country analysis, the measure of female labor force participation is taken from national Censuses, which are obtained from *IPUMS International*. We select all countries that report individual information about ethnicity and for which there is subnational variation in ethnicity. Each of the ethnicities from the Censuses are mapped to an ethnicity in the *Ethnographic Atlas*. For the case of Cambodia and the Philippines, there was no information about ethnicity and the mapping was done using information on the individual's mother tongue. The time periods available vary by country and are as follows: Belarus, 1999, Cambodia: 1998, 2008; Malaysia: 1970, 1980, 1991 and 2000;

Nepal, 2001; Philippines, 1990; Sierra Leone, 2004; Uganda, 1991, 2002; Vietnam, 1989, 1999 and 2009.

We measure the prevalence of polygamy today using data from the *OECD Gender, Institutions and Development Database*. The variable is a country-level indicator that equals one if having more than one spouse is accepted or legal.

Information on marriage among second generation U.S. immigrants is taken from the March Supplement of the *Current Population Survey* (CPS). This source is the only data source for the United States in which individuals are asked (starting from 1994) about their parents' country of birth. We pool data from eighteen years (1994–2014) to obtain the largest possible sample size. Inter-marriage is defined as an indicator variable that equals one if an individual's spouse has the same origin country. The spouse is coded as one if he/she was born in origin country *c*, or if either the mother or father were born in origin country *c*.

Information about the language spoken at home is available from the 2000 Census. This Census does not report the country of origin of the parents. Instead, it records individuals' self-reported "ancestry". Our sample includes all individuals who were born in the United States and report a foreign ancestry. Thus, the sample only includes individuals who are second-generation immigrants or later. We define an indicator variable that equals one if a language other than English (i.e., a foreign language) is the primary language spoken at home. We exclude from the analysis countries for which English is an official language.

Our analysis of whether Native American ethnic groups speak English or their aboriginal language uses data from all U.S. Census years with the necessary data available (1930, 1990, and 2000). We calculate the fraction of Native Americans belonging to a given ethnic group and living in a given location that do not speak English at home. The Censuses record the name of the tribe with which the person is connected. The Censuses ask the following question about language: "Does the person speak a language other than English at home?", which we use to code up an indicator variable.

For the analysis of Native Canadian populations, we use the 2001, 2006, and 2011 rounds of the *Census Aboriginal Population Profiles,* available from Statistics Canada. The data include all Indigenous populations that are living on a reserve or a legal land base. Statistics Canada collects information on the proportion of the population who: (i) has an Indigenous language as their mother tongue, (ii) have an Indigenous language spoken at home; and (iii) can conduct a conversation in at least one Indigenous language. Unlike the U.S. Census data, these data are not publicly available at the individual level.

Data on generalized trust are taken from the *World Values Survey*. The measure is based on the following survey questions: "Generally speaking, would you say that most people can be trust or that you can't be too careful in dealing with people?" Respondents chose on the following answers: "most people can be trusted" or "cannot be too careful". We use this information to code and indicator variable that equals 1 if the respondent answers that "most people can be trusted" and 0 if he/she answers "cannot be too careful."

Historical control variables

Historical economic development: the measure comes from variable v30 of the *Ethnographic Atlas*. Each ethnic group is categorized into one of the following categories describing their pattern of settlement: (1) nomadic or fully migratory, (2) semi-nomadic, (3) semi-sedentary, (4) compact but temporary settlements, (5) neighborhoods of dispersed family homes, (6) separated hamlets forming a single community, (7) compact and relatively permanent, (8) complex settlements. The variable takes on the listed values of 1 to 8, with 1 indicating fully nomadic groups and 8 groups with complex settlement.

Political hierarchies: we use the number of jurisdictional hierarchies beyond the local community to quantify the pre-industrial political sophistication of an ethnic group. The original measure, taken from variable v33 of the *Ethnographic Atlas*, takes on the values of 1 to 5, with 1 indicating no levels of hierarchy beyond the local community and 5 indicating four levels. Since the local community represents one level of authority, we interpret the variable as measuring the total number of jurisdictional hierarchies in the society.

Year in which the ethnicity was sampled: we construct a measure indicating the average date of observation of ancestors in the *Ethnographic Atlas* in a country. This information is taken using the variable v102 of the *Ethnographic Atlas*. This variable indicates the year in which the ethnicity was sampled.

Historical latitude: we construct a measure indicating the average historical distance from the equator of ancestors in a given country. This information is taken using the variable v104 of the *Ethnographic Atlas*, which reports the latitude of the centroid of each ethnic group. We use the absolute value of the measure, which is the distance from the equator measured in decimal degrees.

Historical cultural characteristics

Historical female participation in agriculture: we measure traditional female participation during the pre-industrial period using variable v54 from the *Ethnographic Atlas*. Ethnicities are categorized into one of the following five categories that measure the extent of female participation in pre-industrial agriculture: (1) males only, (2) males appreciably more, (3) equal participation, (4) female appreciably more and (5) female only. To make the traditional FLFP variable (which ranges from 1 to 5) more comparable with the contemporary measure of FLFP, we normalize it so that the range of possible values is from 0 to 100.

Historical polygamy: we measure the traditional presence of polygamy using variable v9 from the *Ethnographic Atlas*. The original coding in the *Ethnographic Atlas* uses the following classification for marital practices: (1) independent nuclear monogamous, (2) polygyny, (3) preferential sororal living in the same dwelling, (4) preferential sororal living in a separate dwelling, (5) non-sororal living in separate dwelling, (6) non-sororal living in the same dwelling, (7) polyandry. Using this information, we create an indicator variable that equals one if an ethnic group is coded as being in category 2 or 7.

Historical consanguineous marriage: we measure the traditional presence of polygamy using variable v25 from the *Ethnographic Atlas*. The original coding in the *Ethnographic Atlas* has 14 categories for different types of cousin marriage preference when cousin marriages are preferred to non-cousin marriage. The fifteenth category is for "No preferred cousin marriages". From variable v25, we create an indicator variable that equals 0 if the ethnicity has "No preferred cousin marriages" and zero if it has a preferred cousin marriage of any type.

Contemporary control variable

Natural log of real per capita GDP: the measure of the log of the per-capita GDP is taken from the World Bank's *World Development Indicators* and is measured in 2012.

A3. Additional Figures

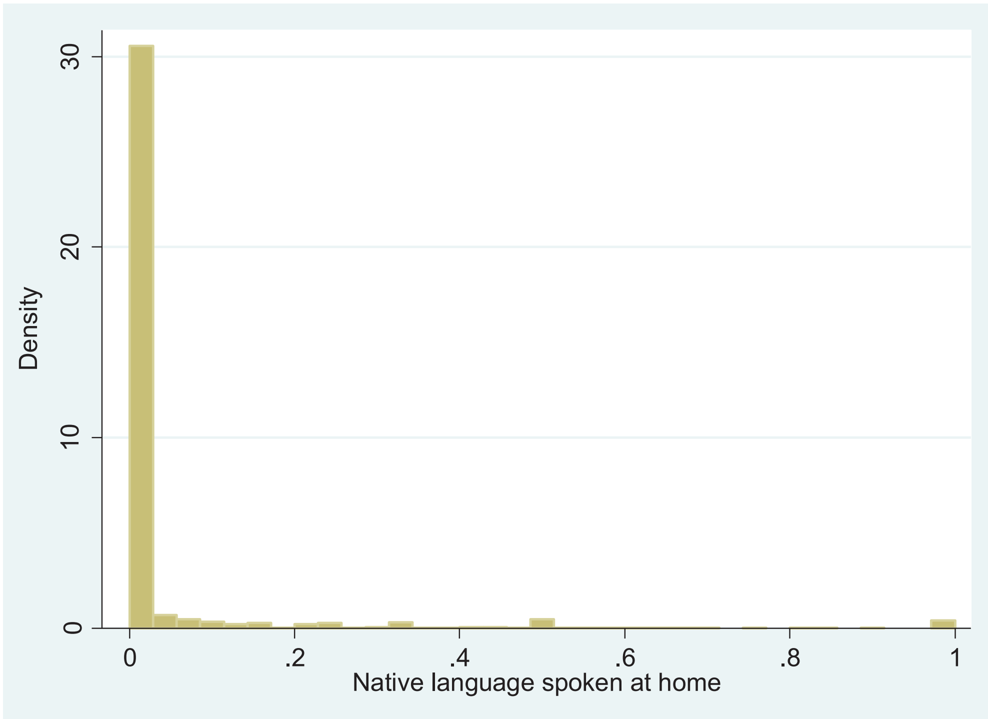

Figure A1. Native language spoken at home: U.S. Indigenous Populations

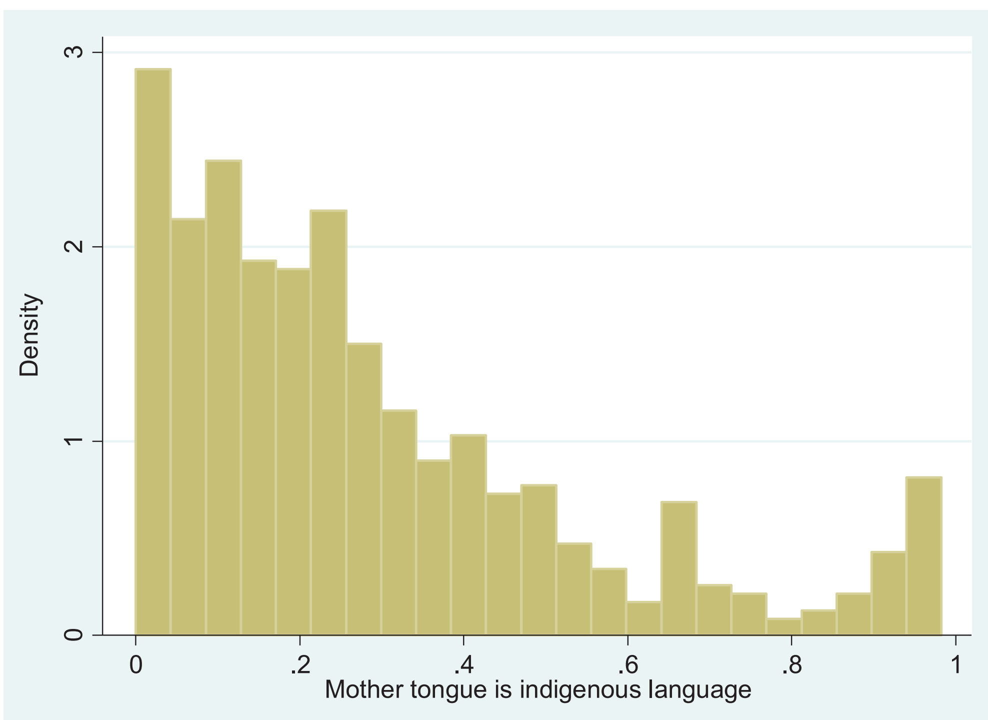

Figure A2. Mother tongue is an Indigenous language: Canadian Indigenous populations

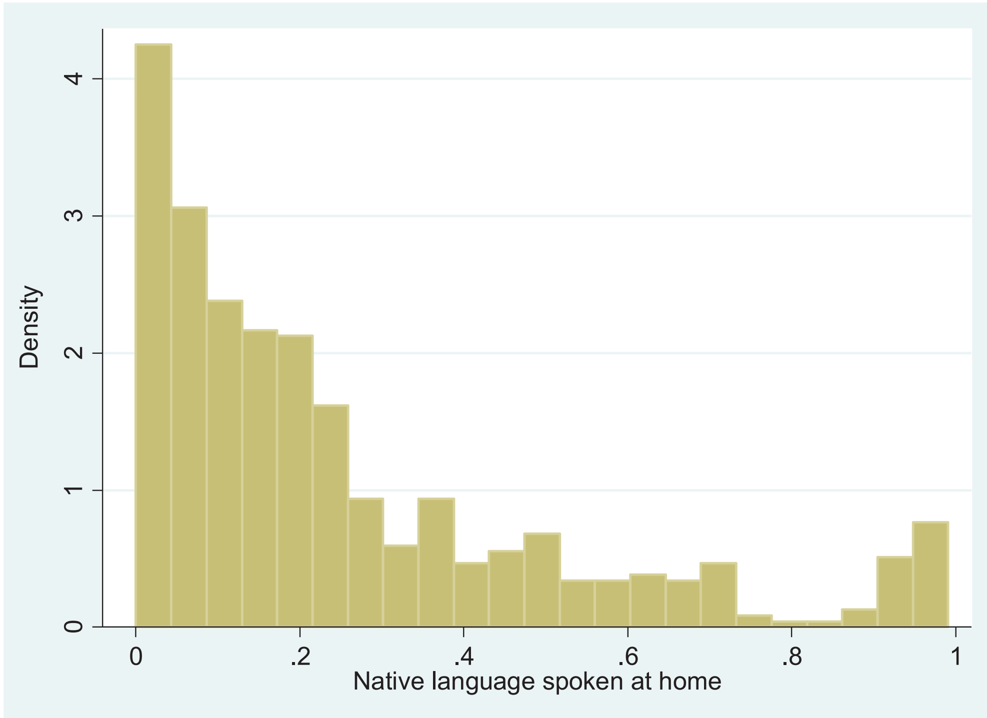

Figure A3. Indigenous language spoken at home, Canadian Indigenous populations

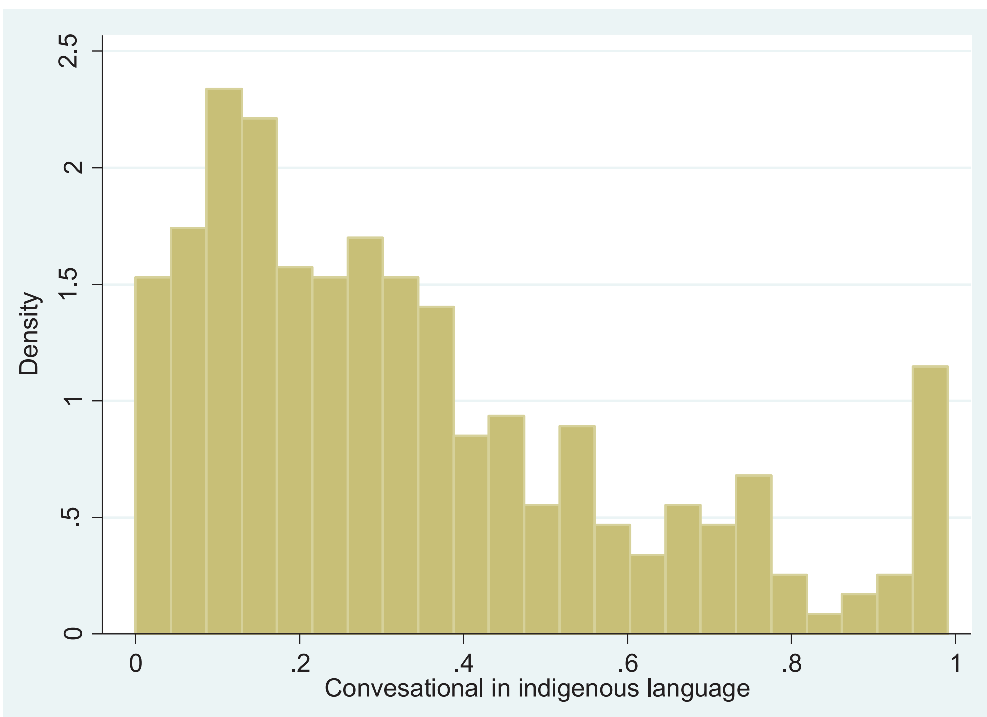

Figure A4. Conversational in Indigenous language, Canadian Indigenous populations

A4. Additional tables

Table A1. Descriptive statistics

Variable	Obs.	Mean	St. Dev.
World Values Survey, Country level sample			
Respect for tradition	75	4.521	0.549
Baseline			
Climatic instability	75	0.252	0.108
Distance from equator	74	32.814	14.309
Economic complexity	74	6.496	1.353
Political hierarchies	74	3.844	0.650
With Eastern Europe and Siberia Extension			
Climatic instability	75	0.252	0.110
Distance from equator	74	33.017	14.579
Economic complexity	74	6.471	1.363
Political hierarchies	74	3.872	0.678
With the World Ethnographic Sample Extension			
Climatic instability	75	0.253	0.113
Distance from equator	74	33.383	14.957
Economic complexity	74	6.478	1.417
Political hierarchies	74	3.900	0.628
Ln(per capita GDP)	74	8.499	1.492
World Values Survey, Individual level sample			
Respect for tradition	127,667	4.490	1.414
Baseline			
Climatic instability	127,667	0.271	0.117
Distance from equator	127,667	35.670	13.965
Economic complexity	127,667	6.679	1.365
Political hierarchies	127,667	3.008	0.854
With Eastern Europe and Siberia Extension			
Climatic instability	127,685	0.265	0.118
Distance from equator	127,685	35.696	13.995
Economic complexity	127,685	6.667	1.368
Political hierarchies	127,685	3.134	0.925
With the World Ethnographic Sample Extension			
Climatic instability	126,630	0.264	0.118
Distance from equator	126,630	35.695	14.065
Economic complexity	126,630	6.667	1.419
Political hierarchies	126,630	3.188	0.929

Variable	Obs.	Mean	St. Dev.
Cross-country, interactions regressions			
FLFP 2012	165	53.158	15.388
Traditional female part. agricult.	165	33.524	20.231
Climatic instability	165	0.236	0.103
Log(per capita GDP)	165	9.167	1.218
Distance from the equator	165	27.437	16.851
Economic complexity	165	6.430	1.332
Political hierarchies	165	3.489	0.907
Year ethnicity sampled	165	1.775	0.677
Polygamy	109	0.440	0.407
Traditional polygamy	109	0.702	0.409
Consanguineous marriage	60	12.775	16.396
Traditional consanguineous marriage	60	31.204	43.151
FLFP 1970	77	32.614	17.683
Within-countries, interactions regressions			
FLFP	211	0.548	0.224
Traditional female part. agricult.	211	0.392	0.238
Climatic instability	211	0.191	0.101
Distance from the equator	211	19.834	15.139
Economic complexity	211	6.351	1.509
Political hierarchies	211	3.199	1.447
Year ethnicity sampled	211	1.921	0.190
Women marrying men from the same country, CPS 1994-2014			
Father side			
Same country marriage	36,082	0.328	0.469
Climatic instability	36,082	0.287	0.089
Distance from the equator	36,082	40.163	10.268
Economic complexity	36,082	7.142	0.462
Political hierarchies	36,082	3.927	0.507
Ln (per capita GDP)	36,082	9.940	0.660
Genetic distance from the US	36,082	0.476	0.577
Fraction of first and second gen. Immigrants from same country of origin	36,082	0.034	0.058

Table A1-continued. Descriptive statistics

Variable	Obs.	Mean	St. Dev.
Women marrying men from the same country, CPS 1994-2014			
Mother side			
Same country marriage	34,045	0.317	0.465
Climatic instability	34,045	0.291	0.088
Distance from the equator	34,045	40.433	10.249
Economic complexity	34,045	7.147	0.423
Political hierarchies	34,045	3.927	0.498
Ln (per capita GDP)	34,045	9.968	0.652
Genetic distance from the US	34,045	0.472	0.578
Fraction of first and second gen. immigrants from same country of origin	34,045	0.032	0.056
Men marrying women from the same country, CPS 1994-2014			
Father side			
Same country marriage	38,419	0.281	0.449
Climatic instability	38,419	0.294	0.090
Distance from the equator	38,419	41.113	10.124
Economic complexity	38,419	7.170	0.460
Political hierarchies	38,419	3.947	0.500
Ln (per capita GDP)	38,419	9.985	0.649
Genetic distance from the US	38,419	0.430	0.563
Fraction of first and second gen. immigrants from same country of origin	38,419	0.031	0.056
Mother side			
Same country marriage	35,639	0.287	0.452
Climatic instability	35,639	0.298	0.089
Distance from the equator	35,639	41.348	10.037
Economic complexity	35,639	7.175	0.433
Political hierarchies	35,639	3.947	0.484
Ln (per capita GDP)	35,639	10.015	0.636
Genetic distance from the US	35,639	0.423	0.563
Fraction of first and second gen. immigrants from same country of origin	35,639	0.029	0.054

Variable	Obs.	Mean	St. Dev.
Speaking a foreign language at home, 2000 Census			
Same country marriage	3,343,097	0.124	0.330
Climatic instability	3,343,097	0.324	0.072
Distance from the equator	3,343,097	47.485	7.426
Economic complexity	3,343,097	7.142	0.394
Political hierarchies	3,343,097	3.995	0.261
Ln (per capita GDP)	3,343,097	10.014	0.837
Genetic distance from the US	3,343,097	0.168	0.382
Fraction of first and second gen. immigrants from same country of origin	3,343,097	0.089	0.094
Traditional language spoken by Indigenous population in the United States			
Native language spoken	128,005	0.182	0.386
Climatic instability	128,005	0.270	0.108
Distance from the equator	128,005	38.666	6.158
Economic complexity	128,005	4.683	2.188
Political hierarchies	128,005	1.904	0.930
Trad. Lang. spoken by Indigenous pop. in the US and Canada, pooled regressions			
United States			
Native language spoken	3,564	0.039	0.144
Climatic instability	3,564	0.296	0.106
Distance from the equator	3,564	40.086	7.429
Economic complexity	3,564	4.295	2.385
Political hierarchies	3,564	1.803	0.869
Canada			
Native language spoken	546	0.253	0.256
Climatic instability	546	0.357	0.121
Distance from the equator	546	51.172	4.953
Economic complexity	546	2.144	1.030
Political hierarchies	546	1.484	0.504

Table A2. List of ethnicities from the Word Value Survey individual-level regressions using the *Ethnographic Atlas* only

Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.
ABKHAZ	2	CZECHS	1,917	IRANIANS	1,876	MINIANKA	10	SONINKE	30
ADANGME	59	DAGARI	8	ISALA	2	MOBA	4	SOTHO	597
AFAR	6	DAGOMBA	248	ISOKO	2	MOROCCANS	2,082	SPAN BASQ	13
ALGERIANS	918	DARASA	6	IWA	17	MOSSI	659	SPANIARDS	15,211
AMHARA	652	DIULA	156	JAPANESE	3,032	MZAB	2	SUBANUN	65
AMI	1	DJUKA	96	JAVANESE	1,477	NANKANSE	6	SUMBAWANE	23
ANFILLO	1	DOGON	44	JORDANIAN	2,154	NDEMBU	8	SWAZI	76
ANNAMESE	969	DORSE	86	KABRE	1	NEAPOLITA	23	SYRIANS	1
ARMENIANS	1,093	DUSUN	12	KALMYK	4	NEGRISEMB	7	TAGBANUA	518
ASHANTI	1,866	DUTCH	19,333	KAONDE	62	NEWENGLAN	2,935	TAMIL	356
ASSINI	16	EDO	1	KAREN	3	NUPE	19	TAWI-TAWI	22
ATAYAL	144	EFIK	19	KARIERA	1	ORAON	33	TAZARAWA	95
AYMARA	18	EGYPTIANS	4,441	KASENA	1	PAEZ	2	TELUGU	144
AZJER	84	EWE	328	KASHMIRI	3	PAHARI	3	THONGA	165
BABYLONIA	3,142	FRENCHCAN	542	KASONKE	40	PAIWAN	2	TIGRINYA	147
BAKHTIARI	106	GA	183	KAZAK	1,867	PATHAN	228	TIV	8
BAMBARA	961	GBARI	3	KERALA	279	PEDI	501	TORADJA	19
BASA	2	GEORGIANS	1,419	KHASI	257	PL TONGA	218	TSAMAI	4
BASARI	40	GHEG	13	KONKOMBA	3	PUNJABI	719	TSWANA	562
BATAK	10	GREEKS	1,020	KONSO	6	QASHGAI	1,367	TUMBUKA	26
BAULE	16	GUJARATI	391	KOREANS	3	RIFFIANS	2	TUNISIANS	1,129
BEMBA	524	GURAGE	67	KUBU	3	ROMANS	794	TURKMEN	16
BENGALI	317	HADIMU	12	KUNDA	28	RUSSIANS	8,295	TURKS	3,718
BHIL	341	HAMYAN	42	KURD	363	RWALA	1,175	UKRAINIAN	1,167
BISA	3	HAZARA	121	KUSASI	4	SANUSI	1,946	UTTARPRAD	1,152
BOERS	1,008	HUNGARIAN	3,233	LEBANESE	1,161	SENOI	62	VENDA	109
BOKI	2	HUTSUL	4	LIPTAKO	59	SERBS	3,054	WALLOONS	1,243
BONTOK	8	IBAN	67	LOVEDU	244	SHAKO	1	XHOSA	1,001
BUILSA	44	IBIBIO	6	LUIMBE	10	SHANTUNG	1,814	YAMI	11
BULGARIAN	883	IBO	339	MALAYS	2,164	SHONA	1,226	YORUBA	370
BYELORUSS	95	IDOMA	6	MAMPRUSI	13	SIAMESE	2,456	ZAZZAGAWA	587
CAMBODIAN	136	IFUGAO	45	MANOBO	2	SIDAMO	171	ZULU	1,530
CHECHEN	36	IGBIRA	4	MAORI	2	SINDHI	146		
CHEKIANG	6	IJAW	8	MARGI	1	SINHALESE	2	*Total*	*127,667*
CHEWA	241	INCA	130	MARRI	72	SOMALI	2		
CHOCO	5	INGASSANA	2	MINCHINES	4,226	SONGHAI	29		

Table A3. List of ethnicities from the Word Value Survey individual-level regressions using the *Ethnographic Atlas* and the Eastern Europe and Siberian extensions.

Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.
Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.
ABKHAZ	2	CZECHS	1,909	IJAW	8	MARGI	1	SINHALESE	2
ADANGME	59	DAGARI	8	INCA	130	MARRI	72	SOMALI	2
AFAR	6	DAGOMBA	248	INGASSANA	2	MINCHINES	4,226	SONGHAI	29
ALGERIANS	918	DARASA	6	IRANIANS	1,876	MINIANKA	10	SONINKE	30
AMHARA	652	DIULA	156	ISALA	2	MOBA	4	SOTHO	597
AMI	1	DJUKA	96	ISOKO	2	MOLDOVANS	12	SPAN BASQ	13
ANFILLO	1	DOGON	44	IWA	17	MOROCCANS	2,082	SPANIARDS	15,211
ANNAMESE	969	DORSE	86	JAPANESE	3,032	MOSSI	659	SUBANUN	65
ARMENIANS	1,093	DUSUN	12	JAVANESE	1,477	MZAB	2	SUMBAWANE	23
ASHANTI	1,866	DUTCH	5,563	JORDANIAN	2,154	NANKANSE	6	SWAZI	76
ASSINI	16	EDO	1	KABRE	1	NDEMBU	8	SYRIANS	1
ATAYAL	144	EFIK	19	KALMYK	4	NEAPOLITA	23	TAGBANUA	518
AYMARA	18	EGYPTIANS	4,441	KAONDE	62	NEGRISEMB	7	TAMIL	356
AZJER	84	ENGLISH	10,035	KAREN	3	NEWENGLAN	2,935	TAWI-TAWI	22
BABYLONIA	3,142	ESTONIANS	1,010	KARIERA	1	NUPE	19	TAZARAWA	95
BAKHTIARI	106	EWE	328	KASENA	1	ORAON	33	TELUGU	144
BAMBARA	961	FRENCHCAN	542	KASHMIRI	3	PAEZ	2	THONGA	165
BASA	2	GA	183	KASONKE	40	PAHARI	3	TIGRINYA	147
BASARI	40	GAGAUZ	24	KAZAK	1,781	PAIWAN	2	TIV	8
BATAK	10	GBARI	3	KAZAN TATAR	84	PATHAN	228	TORADJA	19
BAULE	16	GEORGIANS	1,419	KERALA	279	PEDI	501	TSAMAI	4
BEMBA	524	GERMANS (PRUSSIA)	3,772	KHASI	257	PL TONGA	218	TSWANA	562
BENGALI	317	GHEG	13	KONKOMBA	3	PUNJABI	719	TUMBUKA	26
BHIL	341	GREEKS	1,020	KONSO	6	QASHGAI	1,367	TUNISIANS	1,129
BISA	3	GUJARATI	391	KOREANS	3	RIFFIANS	2	TURKMEN	16
BOERS	1,008	GURAGE	67	KUBU	3	ROMANS	782	TURKS	3,694
BOKI	2	HADIMU	12	KUNDA	28	RUSSIANS	8,295	UKRAINIAN	1,156
BONTOK	8	HAMYAN	42	KURD	363	RWALA	1,175	UTTARPRAD	1,152
BUILSA	44	HAZARA	121	KUSASI	4	SANUSI	1,946	VENDA	109
BULGARIAN	883	HUNGARIAN	2,223	LEBANESE	1,161	SENOI	62	WALLOONS	1,243
BYELORUSS	95	HUTSUL	4	LIPTAKO	59	SERBS	3,054	XHOSA	1,001
CAMBODIAN	136	IBAN	67	LOVEDU	244	SHAKO	1	YAMI	11
CHECHEN	36	IBIBIO	6	LUIMBE	10	SHANTUNG	1,814	YORUBA	370
CHEKIANG	6	IBO	339	MALAYS	2,164	SHONA	1,226	ZAZZAGAWA	587
CHEWA	241	IDOMA	6	MAMPRUSI	13	SIAMESE	2,456	ZULU	1,530
CHOCO	5	IFUGAO	45	MANOBO	2	SIDAMO	171		
CHUVASH	2	IGBIRA	4	MAORI	2	SINDHI	146	*Total*	*127,685*

Table A4. List of ethnicities from the Word Value Survey individual-level regressions using the *Ethnographic Atlas*, Eastern Europe and Siberian extensions, and *World Ethnographic Sample.*

Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.
ABKHAZ	2	CZECHS	1,917	IJAW	8	MARGI	1	SOMALI	2
ADANGME	59	DAGARI	8	INCA	130	MARRI	72	SONGHAI	29
AFAR	6	DAGOMBA	248	INGASSANA	2	MINCHINES	4,226	SONINKE	30
ALGERIANS	918	DANES (LOLLAND)	2,974	IRANIANS	1,876	MINIANKA	10	SOTHO	597
AMHARA	652	DARASA	6	ISALA	2	MOBA	4	SPAN BASQ	13
AMI	1	DIULA	156	ISOKO	2	MOLDOVANS	794	SPANIARDS	15,211
ANFILLO	1	DJUKA	96	IWA	17	MOROCCANS	2,082	SUBANUN	65
ANNAMESE	969	DOGON	44	JAPANESE	3,032	MOSSI	659	SUMBAWANE	23
ARMENIANS	1,093	DORSE	86	JAVANESE	1,477	MZAB	2	SWAZI	76
ASHANTI	1,866	DUSUN	12	JORDANIAN	2,154	NANKANSE	6	SYRIANS	1
ASSINI	16	DUTCH	2,501	KABRE	1	NDEMBU	8	TAGALOG	518
ATAYAL	144	EDO	1	KALMYK	4	NEAPOLITA	23	TAJIK (MOUNTAIN)	119
AYMARA	18	EFIK	19	KAONDE	62	NEGRISEMB	7	TAMIL	356
AZJER	84	EGYPTIANS	4,441	KAREN	3	NEWENGLAN	2,935	TAWI-TAWI	22
BABYLONIA	3,142	ENGLISH	10,049	KARIERA	1	NUPE	19	TAZARAWA	95
BAKHTIARI	106	ESTONIANS	1,010	KASENA	1	ORAON	33	TELUGU	144
BAMBARA	961	EWE	328	KASHMIRI	3	PAEZ	2	THONGA	165
BASA	2	FRENCHCAN	542	KASONKE	40	PAHARI	3	TIGRINYA	147
BASARI	40	GA	183	KAZAK	1,781	PAIWAN	2	TIV	8
BATAK	10	GAGAUZ	24	KAZAN TATAR	84	PATHAN	228	TORADJA	19
BAULE	16	GBARI	3	KERALA	279	PEDI	501	TSAMAI	4
BEMBA	524	GEORGIANS	1,419	KHASI	257	PL TONGA	218	TSWANA	562
BENGALI	317	GERMANS (PRUSSIA)	3,774	KONKOMBA	3	PUNJABI	719	TUMBUKA	26
BHIL	341	GHEG	13	KONSO	6	QASHGAI	1,367	TUNISIANS	1,129
BISA	3	GREEKS	1,020	KOREANS	3	RIFFIANS	2	TURKMEN	16
BOERS	1,008	GUJARATI	391	KUBU	3	RUSSIANS	8,295	TURKS	3,694
BOKI	2	GURAGE	67	KUNDA	28	RWALA	1,175	UKRAINIAN	1,167
BONTOK	8	HADIMU	12	KURD	363	SANUSI	1,946	UTTARPRAD	1,152
BUILSA	44	HAMYAN	42	KUSASI	4	SENOI	62	VENDA	109
BULGARIAN	883	HUNGARIAN	1,223	LEBANESE	1,161	SERBS	3,054	WALLOONS	1,243
BYELORUSS	95	HUTSUL	4	LIPTAKO	59	SHAKO	1	XHOSA	1,001
CAMBODIAN	136	IBAN	67	LOVEDU	244	SHANTUNG	1,814	YAMI	11
CHECHEN	36	IBIBIO	6	LUIMBE	10	SHONA	1,226	YORUBA	370
CHEKIANG	6	IBO	339	MALAYS	2,164	SIAMESE	2,456	ZAZZAGAWA	587
CHEWA	241	IDOMA	6	MAMPRUSI	13	SIDAMO	171	ZULU	1,530
CHOCO	5	IFUGAO	45	MANOBO	2	SINDHI	146		
CHUVASH	2	IGBIRA	4	MAORI	2	SINHALESE	2	*Total*	*126,630*

Table A5. Importance of tradition using the WVS and excluding North and South America, Australia, New Zealand, and South Africa

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Importance of Tradition, 1-6					
	Ancestral Characteristics Measures					
	Original EA		With Eastern Europe & Siberia Extension		Also with the World Ethnographic Sample Extension	
Climatic instability	**-1.836*** **	**-2.035** **	**-1.819*** **	**-2.074** **	**-1.733*** **	**-1.983** **
	(0.582)	**(0.790)**	**(0.562)**	**(0.783)**	**(0.524)**	**(0.750)**
Historical controls:						
Distance from equator		0.008		0.008		0.008
		(0.006)		(0.006)		(0.006)
Economic complexity		-0.065*		-0.061		-0.059*
		(0.037)		(0.037)		(0.035)
Political hierarchies		-0.031		-0.040		-0.046
		(0.109)		(0.106)		(0.121)
Contemporary controls:						
Ln (per capita GDP)		-0.162***		-0.164***		-0.164***
		(0.051)		(0.051)		(0.053)
Mean (st. dev.) of dep var	4.56 (0.57)	4.56 (0.57)	4.56 (0.57)	4.56 (0.57)	4.56 (0.57)	4.56 (0.57)
Observations	63	62	63	62	63	62
R-squared	0.132	0.369	0.134	0.369	0.130	0.363

Notes: The unit of observation is a country. The dependent variable is the average at the country level of a measure of the self-reported importance of tradition. The mean and st. dev. of Climatic Instability is 0.25 (0.11). ***, ** and * indicate significance at the 10, 5 and 1% levels.

Table A6. The importance of tradition using the WVS: Robustness to the exclusion of potentially endogenous covariates

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Importance of Tradition, 1-6					
	Ancestral Characteristics Measures					
	Original EA		With Eastern Europe & Siberia Extension		Also with the World Ethnographic Sample Extension	
Climatic instability	**-1.626****	**-1.842****	**-1.657****	**-1.828****	**-1.600****	**-1.704****
	(0.703)	**(0.733)**	**(0.703)**	**(0.732)**	**(0.679)**	**(0.717)**
Historical controls:						
Distance from equator	-0.003	-0.001	-0.003	-0.001	-0.003	-0.001
	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)
Economic complexity	-0.134***		-0.131***		-0.128***	
	(0.035)		(0.035)		(0.032)	
Political hierarchies	0.044		0.047		0.056	
	(0.115)		(0.112)		(0.123)	
Mean (st. dev.) of dep var	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)
Observations	75	75	75	75	75	75
R-squared	0.253	0.148	0.250	0.148	0.251	0.144

Notes: The unit of observation is a country. The dependent variable is the average at the country level of a measure of the self-reported importance of tradition. The mean and st. dev. of Climatic Instability is 0.25 (0.11). ***, ** and * indicate significance at the 10, 5 and 1% levels.

Table A7. Importance of tradition using the WVS: Robustness to additional covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent Variable: Importance of Tradition, 1-6						
Climatic instability	**-1.732****	**-1.871****	**-1.876****	**-2.131*****	**-1.663****	**-1.827****	**-1.920****
	(0.769)	**(0.848)**	**(0.714)**	**(0.689)**	**(0.661)**	**(0.693)**	**(0.791)**
Historical controls:							
Distance from equator	0.005	0.006	0.006	0.013**	0.002	0.008	0.010
	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.007)
Economic complexity	-0.066*	-0.061	-0.067*	-0.044	-0.059*	-0.054*	-0.035
	(0.035)	(0.038)	(0.035)	(0.038)	(0.033)	(0.030)	(0.036)
Political hierarchies	0.010	0.011	0.014	-0.026	0.035	0.039	0.027
	(0.097)	(0.098)	(0.098)	(0.098)	(0.102)	(0.088)	(0.091)
Contemporary controls:							
Ln (per capita GDP)	-0.158***	-0.162***	-0.167***	-0.153***	-0.145***	-0.145***	-0.113**
	(0.045)	(0.055)	(0.050)	(0.046)	(0.053)	(0.048)	(0.054)
Additional controls:							
Ruggedness	0.042						0.015
	(0.061)						(0.055)
Distance from the coast		0.037					-0.018
		(0.227)					(0.209)
Number of proxies for climatic data			0.029				0.046
			(0.026)				(0.029)
Ethnic fractionalization				0.658**			0.532*
				(0.313)			(0.317)
Genetic Diversity					1.555		1.840**
					(0.941)		(0.869)
Trust						-1.007**	-1.074**
						(0.389)	(0.437)
Mean (st. dev.) of the dependent variable	4.52 (0.55)	4.52 (0.55)	4.52 (0.55)	4.51 (0.55)	4.51 (0.55)	4.52 (0.55)	4.52 (0.55)
Observations	74	74	74	73	73	74	72
R-squared	0.391	0.388	0.389	0.440	0.404	0.445	0.516

Notes : The unit of observation is a country. The dependent variable is the average at the country level of a measure of the self-reported importance of tradition. The mean and st. dev. of Climatic Instability is 0.25 (0.11). ***, ** and * indicate significance at the 10, 5 and 1% levels.

Table A8. Intermarriage regressions using the CPS 1994-2014: List of countries of origin

Country	Obs.	Country	Obs.	Country	Obs.	Country	Obs.
Woman marrying a husband							
Father side				Mother side			
AFG	2	ISR	72	AFG	4	ISR	60
ALB	7	ITA	3,918	ALB	6	ITA	2,885
ARM	61	JAM	89	ARM	47	JAM	63
ATG	1	JOR	19	ATG	2	JOR	17
AUS	44	JPN	920	AUS	85	JPN	1,082
AUT	382	KAZ	1	AUT	320	KEN	1
BEL	86	KEN	5	BEL	113	KHM	26
BGD	5	KHM	49	BGD	2	KOR	112
BGR	9	KOR	69	BGR	5	LAO	86
BHS	17	LAO	92	BHS	12	LBN	92
BLZ	17	LBN	113	BLR	3	LKA	3
BMU	8	LBR	1	BLZ	23	LTU	150
BOL	13	LKA	3	BMU	20	LVA	81
BRA	45	LTU	175	BOL	19	MAR	19
BRB	8	LVA	82	BRA	59	MEX	7,784
CAN	2,991	MAR	6	BRB	21	MKD	2
CHE	139	MEX	8,431	CAN	3,391	MYS	6
CHL	49	MKD	4	CHE	107	NGA	19
CHN	604	MYS	6	CHL	37	NIC	100
COL	177	NGA	20	CHN	528	NLD	315
CPV	4	NIC	73	COL	170	NOR	284
CRI	31	NLD	412	CPV	2	NZL	27
CUB	558	NOR	405	CRI	28	PAK	23
CYP	4	NZL	7	CUB	555	PAN	89
CZE	166	PAK	31	CYP	1	PER	81
DEU	2,072	PAN	58	CZE	152	PHL	947
DMA	9	PER	91	DEU	2,403	POL	1,472
DNK	188	PHL	1,078	DMA	6	PRI	2,104
DOM	237	POL	1,715	DNK	110	PRT	288
DZA	4	PRI	2,219	DOM	212	PRY	1
ECU	101	PRT	395	DZA	3	ROU	93
EGY	44	PRY	2	ECU	91	RUS	959
ESP	258	ROU	116	EGY	38	SAU	3
EST	1	RUS	1,278	ESP	193	SDN	5
ETH	3	SAU	8	ETH	1	SGP	5
FIN	100	SDN	29	FIN	88	SLV	334
FJI	1	SGP	1	FJI	1	SVK	224
FRA	185	SLV	304	FRA	291	SWE	312
GBR	1,429	SVK	269	GBR	1,855	THA	72
GEO	1	SWE	377	GEO	1	TON	8
GHA	3	THA	49	GHA	2	TTO	56
GRC	456	TON	11	GRC	312	TUR	65
GRD	6	TTO	42	GRD	1	UGA	8
GTM	60	TUR	77	GTM	97	UKR	119
GUY	28	UGA	13	GUY	18	URY	21
HND	52	UKR	157	HND	61	VEN	30
HRV	27	URY	15	HRV	16	VNM	120
HTI	76	VCT	1	HTI	67	WSM	15
HUN	461	VEN	23	HUN	392	YEM	2
IDN	42	VNM	111	IDN	30	ZAF	9
IND	248	WSM	18	IND	207		
IRL	957	YEM	5	IRL	1,105		
IRN	85	ZAF	25	IRN	37		
IRQ	29			IRQ	14		
ISL	1			ISL	2		
		Total	*36,082*			*Total*	*34,045*

Table A8-continued. Intermarriage regressions using the CPS 1994-2014: List of countries of origin

Country	Obs.	Country	Obs.	Country	Obs.	Country	Obs.
Man marrying a wife							
Father side				Mother side			
AFG	4	ISR	46	AFG	2	JAM	64
ALB	12	ITA	4,832	ALB	8	JOR	8
ARM	57	JAM	85	ARM	39	JPN	1,117
ATG	7	JOR	12	AUS	99	KEN	3
AUS	46	JPN	1,007	AUT	413	KHM	22
AUT	432	KAZ	1	AZE	2	KNA	3
AZE	2	KEN	3	BEL	111	KOR	106
BEL	108	KHM	50	BGD	1	LAO	40
BGD	1	KNA	3	BGR	7	LBN	82
BGR	5	KOR	50	BHS	11	LBR	1
BHS	18	KWT	1	BLR	3	LTU	191
BLR	2	LAO	46	BLZ	17	LVA	58
BLZ	13	LBN	124	BMU	12	MAR	11
BMU	7	LBR	2	BOL	5	MDA	3
BOL	7	LCA	1	BRA	43	MEX	6,925
BRA	30	LKA	1	BRB	8	MKD	1
BRB	22	LTU	223	CAN	3,751	MYS	2
CAN	3,446	LVA	71	CHE	124	NGA	17
CHE	141	MAR	5	CHL	53	NIC	66
CHL	39	MDA	2	CHN	535	NLD	330
CHN	612	MEX	7,739	COL	145	NOR	421
CMR	1	MYS	5	CPV	5	NZL	25
COL	132	NGA	26	CRI	25	PAK	38
CPV	3	NIC	78	CUB	551	PAN	75
CRI	17	NLD	466	CYP	1	PER	60
CUB	555	NOR	529	CZE	178	PHL	875
CYP	1	NZL	7	DEU	2,656	POL	1,710
CZE	204	PAK	35	DMA	8	PRI	1,904
DEU	2,495	PAN	45	DNK	176	PRT	306
DMA	6	PER	61	DOM	176	ROU	113
DNK	230	PHL	1,056	ECU	83	RUS	1,202
DOM	179	POL	1,968	EGY	27	SAU	4
ECU	117	PRI	1,982	ESP	216	SDN	5
EGY	39	PRT	381	ETH	6	SGP	3
ESP	289	ROU	154	FIN	98	SLV	398
ETH	4	RUS	1,617	FJI	1	SVK	272
FIN	106	SAU	2	FRA	308	SWE	365
FJI	2	SDN	27	GBR	2,041	THA	80
FRA	227	SLV	341	GHA	7	TON	12
GBR	1,640	SVK	318	GRC	334	TTO	46
GHA	6	SWE	449	GRD	6	TUR	55
GRC	491	THA	33	GTM	88	UGA	11
GRD	5	TON	12	GUY	27	UKR	139
GTM	79	TTO	44	HND	45	URY	9
GUY	27	TUR	74	HRV	20	VCT	3
HND	35	TZA	1	HTI	45	VEN	35
HRV	28	UGA	24	HUN	487	VNM	90
HTI	59	UKR	225	IDN	30	WSM	19
HUN	562	URY	8	IND	177	YEM	3
IDN	26	VCT	3	IRL	1,248	ZAF	25
IND	210	VEN	30	IRN	24		
IRL	1,124	VNM	81	IRQ	17		
IRN	52	WSM	17	ISL	1		
IRQ	27	YEM	3	ISR	51		
ISL	1	ZAF	23	ITA	3,734		
		Total	*38,419*			*Total*	*35,639*

Table A9. Speaking a foreign language at home, Census 2000: Self-reported ancestry

Country	Obs.	Country	Obs.
ALB	1,024	JOR	188
ARG	610	JPN	24,099
ARM	5,735	KHM	535
AUT	16,884	KOR	5,208
BEL	8,530	LAO	518
BGD	74	LBN	8,429
BGR	508	LKA	58
BLR	148	LTU	16,815
BOL	221	LUX	1,165
BRA	495	LVA	1,560
CAN	71,315	MAR	306
CHE	21,960	MEX	251,676
CHL	493	MKD	614
CHN	15,998	MYS	78
COL	2,448	NIC	695
CPV	1,431	NLD	103,619
CRI	469	NOR	133,951
CUB	9,345	NPL	10
CZE	44,208	PAK	712
DEU	1,223,592	PAN	786
DNK	35,457	PER	1,082
DOM	4,073	PHL	16,031
ECU	1,343	POL	230,873
EGY	697	PRI	36,844
ERI	24	PRT	25,792
ESP	47,989	RUS	61,074
EST	386	SAU	1,424
ETH	161	SDN	57
FIN	18,416	SLV	1,866
FRA	192,417	SVK	20,591
GRC	26,981	SVN	4,662
GTM	1,061	SWE	101,354
HND	649	SYR	2,589
HRV	8,519	THA	853
HTI	2,550	TUR	1,003
HUN	32,813	UKR	17,477
IDN	205	URY	76
IND	5,127	VEN	324
IRN	1,394	VNM	2,534
IRQ	123	WSM	1,062
ISL	879	YEM	58
ISR	883		
ITA	456,814	*Total*	*3,343,097*

Table A10. Speaking a foreign language at home, Census 2000. Self-reported ancestry, full sample

	(1)	(2)	(3)	(4)	(5)
	Dep variable: Indicator for speaking a foreign language at home				
	All 2nd gen+ individuals	Not living with parents	Living with parents		
			All ages	18 or younger	Over 18
Climatic instability	**-0.348****	**-0.279***	**-0.735*****	**-0.653*****	**-0.786*****
	(0.149)	**(0.151)**	**(0.195)**	**(0.189)**	**(0.201)**
Country-level controls:					
Distance from equator	-0.015***	-0.015***	-0.011***	-0.009**	-0.012***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Economic complexity	-0.153***	-0.151***	-0.151***	-0.131***	-0.165***
	(0.046)	(0.047)	(0.044)	(0.039)	(0.047)
Political hierarchies	0.117	0.100	0.164*	0.147*	0.178*
	(0.090)	(0.086)	(0.089)	(0.088)	(0.090)
Ln (per capita GDP)	0.011	0.012	-0.002	-0.007	0.000
	(0.020)	(0.018)	(0.025)	(0.024)	(0.026)
Genetic distance from the US	0.157*	0.149*	0.189**	0.202***	0.177**
	(0.081)	(0.082)	(0.074)	(0.067)	(0.077)
Fraction of population with the same ancestry	0.098*	0.099*	0.063	0.064	0.061
in the same metropolitan area	(0.055)	(0.054)	(0.062)	(0.056)	(0.067)
Individual level controls	yes	yes	yes	yes	yes
Number of countries	106	106	106	106	106
Mean (st. dev.) of dependent variable	0.09 (0.29)	0.08 (0.27)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)
Observations	5,162,026	4,553,894	608,132	249,261	358,871
R-squared	0.278	0.249	0.371	0.351	0.390

Notes: OLS estimates are reported with standard errors clustered at the ancestry-country level in parentheses. The unit of observation is a person born in the United States with an ancestry from a country other than the United States. The dependent variable is an indicator that equals one if the person does not speak English at home. All specifications include the following individual-level control variables: a quadratic in age, two indicator variables for education (less than high school and high school), labor force participation fixed effects, personal income, and location (i.e., MSA) fixed effects. The mean and standard deviation of Climatic instability is 0.33 (0.07). ***, ** and * indicate significance at the 10, 5 and 1% levels.

Table A11. Speaking a foreign language at home, Census 2000. Self-reported ancestry, regressions collapsed at the ancestry-MSA level

	(1)	(2)	(3)	(4)	(5)
	Dep variable: Indicator for speaking a foreign language at home				
	All 2nd gen+ individuals	Not living with parents	Living with parents		
			All ages	18 or younger	Over 18
Climatic instability	**-0.351***	**-0.257**	**-0.436****	**-0.443****	**-0.481*****
	(0.198)	**(0.175)**	**(0.198)**	**(0.201)**	**(0.170)**
Country-level controls:					
Distance from equator	-0.007***	-0.007***	-0.006***	-0.006***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Economic complexity	-0.019	-0.015	-0.038*	-0.041**	-0.061***
	(0.017)	(0.012)	(0.020)	(0.020)	(0.020)
Political hierarchies	0.045	0.045	0.060	0.062	0.087
	(0.051)	(0.046)	(0.057)	(0.060)	(0.056)
Ln (per capita GDP)	-0.026	-0.012	-0.034*	-0.037**	-0.011
	(0.017)	(0.016)	(0.018)	(0.018)	(0.018)
Genetic distance from the US	0.022	0.008	0.036	0.039	0.027
	(0.043)	(0.043)	(0.045)	(0.045)	(0.047)
Fraction of population with the same ancestry	-0.012	0.048	-0.067	-0.070	0.018
in the same metropolitan area	(0.317)	(0.352)	(0.264)	(0.260)	(0.241)
Number of countries	84	84	84	84	84
Mean (st. dev.) of dependent variable	0.25 (0.33)	0.21 (0.31)	0.28 (0.36)	0.28 (0.36)	0.24 (0.36)
Observations	15,760	14,372	12,227	11,678	7,528
R-squared	0.278	0.221	0.318	0.322	0.325

Notes: OLS estimates are reported with standard errors clustered at the ancestry level in parentheses. The unit of observation is an ethnic/ancestral group in a location (i.e., MSA) in the United States. The dependent variable is the fraction of individuals that do not speak English at home. The mean and standard deviation of Climatic Instability is 0.27 (0.11). ***, ** and * indicate significance at the 10, 5 and 1% levels.

Table A12. Speaking an indigenous language at home, Census 1930, 1990 and 2000. Individual-level estimates, Native Americans

Ethnicity	Obs.	Ethnicity	Obs.
ACHOMAWI	55	MAIDU	19
ACOMA	48	MAKAH	23
ALEUT	2,329	MANDAN	13
ARAPAHO	84	MATTOLE	3
ARIKARA	37	MENOMINI	61
ASSINIBOI	76	MIAMI	28
BANNOCK	25	MIWOK	18
BLACKFOOT	3,831	MODOC	4
CADDO	19	MOHAVE	49
CAHUILLA	7	NAVAHO	26,814
CHEMEHUEV	8	NEZPERCE	26
CHEROKEE	38,515	NOMLAKI	2
CHEYENNE	1,306	OMAHA	59
CHINOOK	60	OTTAWA	107
CHIPPEWA	13,601	PAPAGO	1,913
CHOCTAW	10,698	PAWNEE	23
COCHITI	20	PIMA	965
COCOPA	20	PONCA	41
COEURD'AL	23	POTAWATOM	2,034
COMANCHE	1,241	PUYALLUP	38
COOS	1	QUILEUTE	7
CREEK	4,926	QUINAULT	27
CROW	478	S UTE	95
DELAWARE	54	SANTEE	38
E CREE	43	SHASTA	11
E POMO	53	SHAWNEE	22
FLATHEAD	89	TENINO	30
GOSIUTE	25	TETON	179
GROSVENTR	50	TLINGIT	1,143
HAIDA	931	TSIMSHIAN	29
HOPI	126	UMATILLA	8
HUPA	45	W APACHE	6,882
IOWA	17	WASHO	56
IROQUOIS	6,304	WICHITA	17
JEMEZ	1	WINNEBAGO	76
KALISPEL	13	WINTU	17
KIDUTOKAD	26	YAQUI	1,088
KIOWA	531	YUCHI	1
KLALLAM	42	YUMA	84
KLAMATH	29	ZUNI	1
KUTENAI	54		
LAGUNA	86		
LUMMI	27	*Total*	*128,005*

Table A13. Speaking an indigenous language at home Native Americans (Census 1930, 1990 and 2000) and Native Canadians (Census 2001, 2006, 2011). Ethnicity-location level estimates

Ethnicity	Obs.	Ethnicity	Obs.	Ethnicity	Obs.
United States				*Canada*	
ACHOMAWI	2	LUMMI	1	ASSINIBOI	8
ACOMA	1	MAIDU	1	BEAVER	13
ALEUT	142	MAKAH	1	BELLABELL	2
ARAPAHO	1	MANDAN	1	BELLACOOL	2
ARIKARA	1	MATTOLE	1	BLACKFOOT	9
ASSINIBOI	1	MENOMINI	1	CARRIER	22
BANNOCK	1	MIAMI	3	CHILCOTIN	7
BLACKFOOT	296	MIWOK	1	CHIPEWYAN	13
CADDO	1	MODOC	1	CHIPPEWA	15
CAHUILLA	1	MOHAVE	2	COMOX	5
CHEMEHUEV	1	NAVAHO	254	COWICHAN	3
CHEROKEE	517	NEZPERCE	1	DELAWARE	5
CHEYENNE	133	NOMLAKI	1	DOGRIB	6
CHINOOK	1	OMAHA	1	E CREE	9
CHIPPEWA	321	OTTAWA	4	HAIDA	3
CHOCTAW	321	PAPAGO	56	HAISLA	2
COCHITI	1	PAWNEE	1	IROQUOIS	1
COCOPA	1	PIMA	30	KASKA	5
COEURD'AL	1	PONCA	1	KUTCHIN	6
COMANCHE	147	POTAWATOM	167	KUTENAI	9
COOS	1	PUYALLUP	2	KWAKIUTL	10
CREEK	225	QUILEUTE	1	LILLOOET	9
CROW	41	QUINAULT	1	MICMAC	60
DELAWARE	1	S UTE	2	MONTAGNAI	9
E CREE	1	SANTEE	1	NOOTKA	13
E POMO	2	SHASTA	1	OJIBWA	118
FLATHEAD	1	SHAWNEE	3	PLAINSCRE	78
GOSIUTE	1	TENINO	1	POTAWATOM	3
GROSVENTR	1	TETON	1	SHUSWAP	16
HAIDA	67	TLINGIT	37	SLAVE	34
HOPI	1	TSIMSHIAN	1	SQUAMISH	3
HUPA	1	UMATILLA	1	STALO	15
IOWA	1	W APACHE	305	TAHLTAN	3
IROQUOIS	320	WASHO	1	THOMPSON	12
JEMEZ	1	WICHITA	1	TLINGIT	3
KALISPEL	1	WINNEBAGO	2	TSIMSHIAN	15
KIDUTOKAD	1	WINTU	1		
KIOWA	38	YAQUI	68		
KLALLAM	1	YUCHI	1		
KLAMATH	1	YUMA	3		
KUTENAI	1	ZUNI	1		
LAGUNA	1	*Total*	*3564*	*Total*	*546*

Table A14. Whether the Indigenous language is spoken at home: Using the 1930 Census only

	(1)	(2)	(3)	(4)	(5)	(6)
	Dep variable: Indicator for speaking an Indigenous language at home					Dep var: Fraction speaking an Indigenous language at home
			Living with parents			
	All individuals	Not living with parents	All ages	18 or younger	Over 18	
Climatic instability	**-1.010***	**-0.862***	**-1.113***	**-1.129***	**-0.906***	**-4.955****
	(0.513)	**(0.448)**	**(0.561)**	**(0.567)**	**(0.531)**	**(2.119)**
Ethnicity-level controls:						
Distance from equator	-0.013*	-0.012*	-0.014*	-0.015*	-0.009	-0.029
	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.074)
Economic complexity	-0.027*	-0.022	-0.031**	-0.033**	-0.020	0.165
	(0.014)	(0.013)	(0.015)	(0.015)	(0.016)	(0.128)
Political hierarchies	-0.143*	-0.124*	-0.153*	-0.153*	-0.142*	-0.819
	(0.079)	(0.071)	(0.083)	(0.083)	(0.082)	(0.626)
Individual controls	yes	yes	yes	yes	yes	-
Number of ethnic groups	82	82	78	77	66	82
Number of clusters (grid cells)	39	39	39	39	39	39
Mean (st. dev.) of dependent varia	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.17 (0.38)	0.15 (0.36)	0.02 (0.13)
Observations	11,468	5,757	5,711	4,850	861	137
R-squared	0.450	0.474	0.450	0.461	0.435	

Notes: OLS estimates are reported with standard errors clustered at the level of the climatic grid cell in parentheses, in columns 1-5. Poisson estimates are reported with standard errors clustered at the grid cell level in column 6. The unit of observation is a person who identifies him/herself as a Native American in columns 1-5 and an Indigenous ethnic group living in a given location, in column 6. The dependent variable is an indicator that equals one if the person speaks an indigenous (i.e., Native American) language at home in columns 1-5, and the fraction of poeple speaking an Indigenous language at home in column 6. All specification in columns 1-5 include the following covariates: a quadratic in age, a gender indicator, employment status fixed effects, an indicator for being married, metropolitan area fixed effects, an indicator for whether the individual has any education. The mean (and standard deviation) of Climatic instability is 0.27 (0.11).