Ancestral Roots of Locus of Control

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Abstract

People have different beliefs about how their own actions, relative to external factors, determine their outcomes. This belief, known as locus of control, predicts differences in education, wages, parental investment, job search effort, health, and financial behavior. I show that locus of control has origins in ancestral control over subsistence. I proxy for ancestral subsistence control with the preindustrial importance of agriculture and the level of rainfall risk in an ethnic homeland. Agricultural societies with an important external input, rainfall, that varied more from year-to-year had less control over their yields. I exploit ancestral differences between individuals residing in the same subnational region today. I show that descendants of societies that relied more on agriculture with greater rainfall risk have a more external locus of control. This relationship persists in the face of a change to the susceptibility of crop yields to rainfall shocks induced by the Columbian Exchange. Evidence from second-generation migrants suggests that the intergenerational transmission of beliefs is a primary mechanism for this persistence. The association between ancestral control and contemporary locus of control is consistent with limited learning where locus of control is partly informed by the intergenerational transmission of ancestor's circumstances. The ancestral origins of locus of control are an important mechanism for explaining differences in schooling effort among an international sample of 15-year-olds.

JEL Classifications: O13, J24, I25, D91, Z1

Keywords: Locus of Control, Education Effort, Intergenerational Persistence, Agriculture, Climatic Variability

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1 Introduction

People who face a set of constraints with similar abilities and preferences should take similar actions and have similar outcomes. However, this is often not the case. One explanation is that people have different beliefs about the consequences of their actions. This belief can diverge between two individuals facing the same set of constraints if they start with different priors. Divergent priors about the state of the world can occur if these beliefs are rooted deep in an individual's culture or ancestral history (Bisin and Verdier, 2011; Fernández, 2011; Nunn, 2012).

This paper shows that ancestral experiences with the control over subsistence influence contemporary locus of control. I compare individuals whose ancestors differ along two dimensions: (1) the importance of agriculture for subsistence, and (2) the variance of inter-annual rainfall in their homeland, a crucial agricultural input outside human control. Consistent with two channels hypothesized by Diamond (1987) and Harari (2015), preindustrial societies that relied more on agriculture in environments with a greater rainfall risk would have had less control over their subsistence. First, unlike hunter-gatherers, agricultural societies were more vulnerable to a negative shock impacting a single crop as they relied on less variety of sources for subsistence. Second, unlike pastoralists, their subsistence is not mobile, rendering them unable to relocate in the event of a local shock. I find that descendants of societies that relied more on agriculture in an environment that had greater levels of rainfall risk have a more external locus of control. That is, they believe that factors outside of their control are more important, relative to their own actions, in shaping their outcomes.

Individuals invest or put forth effort when they believe that it will influence their outcomes. Defined as locus of control (Rotter, 1966), the belief about the relationship between an individual's actions and their outcomes has important economic implications. Locus of control is linked with differences in human capital and wages (Coleman and DeLeire, 2003; Heckman, Stixrud and Urzua, 2006), job search effort (Caliendo, Cobb-Clark and Uhlendorff, 2015), and parental investment (Cunha, Heckman and Schennach, 2010; Lekfuangfu et al., 2018). Moreover, locus of control varies significantly within and across populations (Haushofer, 2013), and differences manifest themselves across ethnic groups (Dyal, 1984; Choi, Nisbett and Norenzayan, 1999). Economists and psychologists have grappled with whether observed differences in perceptions of control of otherwise similar individuals solely reflect their economic circumstances, or whether these differences are partly determined by an historically-rooted cultural belief (Andrisani, 1977; Landau, 1995; Cheng et al., 2013; Elkins, Kassenboehmer and Schurer, 2017).

Locus of control beliefs are partly rooted in ancestral experiences with agriculture. I exploit variation in the degree of ancestral reliance on agriculture arising from two sources. First, I match the ethnicity of an individual with records on the preindustrial share of subsistence from agriculture of a society from the *Ethnographic Atlas* (Murdock, 1967). Second, I exploit differences in the agro-climatic characteristics of their homeland that determine the potential calories from agriculture (Galor and Özak, 2015). I measure the vulnerability of crop yields in a society's homeland to unpredictable weather by its rainfall risk.[1]

I compare individuals of different ethnicities in the World Values Survey who had different ancestral experiences but reside in the same subnational region. This allows for the isolation of time-invariant institutional, geographic, and climatic characteristics at the local level. I additionally account for a host of geographic and climatic characteristics of ancestral homelands. These include (1) characteristics associated with agriculture, such as the distance to the equator, average temperature and precipitation, elevation, or length of the growing season, and (2) characteristics associated with trade, such as the distance to the coast, presence of a major river, or ruggedness of the terrain. The results hold when accounting for additional geographic characteristics associated with differences in institutions (Bentzen, Kaarsen and Wingender, 2017; Mayshar et al., 2018), or the length of experience with agriculture (Ashraf and Michalopoulos, 2015; Olsson and Paik, 2016). Results from a method devised by Oster (2016) suggest it is unlikely that additional unobserved biogeographic characteristics would bias my results to zero.

The relationship between ancestral control over subsistence and contemporary locus of control is operating through a channel that is distinct from other beliefs, preferences, and traits. Ancestral subsistence experiences and climatic variability have been shown to have a persistent relationship with collectivism or individualism (Talhelm et al., 2014; Davis, 2016; Olsson and Paik, 2016; Buggle, 2017), trust (Litina, 2016; Buggle and Durante, 2017), long-term orientation (Galor and Özak, 2016), religiosity (Ager and Ciccone, 2017; Bentzen, 2017), preferences for redistribution (Alesina and Giuliano, 2011), the importance of tradition (Giuliano and Nunn, 2017), loss aversion (Galor and Savitskiy, 2017), and attitudes towards gender equality (Alesina, Giuliano and Nunn, 2013). I show that ancestral control over subsistence is correlated with some of these traits. However, the magnitudes of these relationships are smaller than the association with locus of control, and accounting for these traits does not change my results.

An alternative interpretation for the link between ancestral subsistence control and locus of control is that individuals sorted into environments that provided different levels of control over subsistence based on their locus of control thousands of years ago. I exploit differences

[1]Rainfall risk is defined as the average variance in inter-annual log monthly rainfall following Ager and Ciccone (2017).

in the agro-climatic suitability for maize, a crop native to the Americas, in the Old World to provide evidence that my findings are driven by the environment shaping locus of control beliefs. Maize is a highly productive staple crop that was widely adopted by Old World societies in the decades following Christopher Columbus' voyage to the Americas in 1492 (Crosby, 1972). However, the yields for maize are more sensitive to water and sunlight deprivation than native Old World staples such as wheat, sorghum, and barley (McCann, 2001). I show that individuals whose ethnic homeland received a larger potential caloric boost from maize, over and above the potential calories from the set of crops available prior to the Columbian Exchange, have a more external locus of control today. Under the assumption that ethnic homelands in the Old World did not change due to the introduction of maize, this provides evidence that the subsistence environment shapes control perceptions.

The introduction of maize changes the sensitivity of agricultural yields to weather swings during the preindustrial era. I exploit this change to explore how persistent the experiences with agriculture and rainfall risk under the set of pre-1500 crops are in the face of this new shock. I show that accounting for the introduction of maize reduces the magnitude of the relationship of ancestral control over subsistence and contemporary locus of control by 20%. This suggests that changed circumstances do alter deeply held locus of control beliefs, but that these changes are slow-moving.

I argue that intergenerational transmission of beliefs is the primary mechanism for the persistence of the relationship between ancestral control and contemporary locus of control. I follow the epidemiological approach (Fernández, 2011) and compare second generation migrants who were born in the same country but who had a parent born in a different country. Second generation migrants are individuals who have been exposed to the same geography and institutions since birth but whose ancestors differed in their control over subsistence. I show that the ancestral control over subsistence for the country of birth of parents is associated with the respondent's locus of control.[2] Therefore, this suggests that the relationship between the parent's ancestral subsistence and their children's locus of control represents an intergenerationally transmitted, culturally portable belief. However, this approach comes with the caveat that the parents of those in my sample may have endogenously selected into moving and are not representative of their ancestral populations.

Finally, to illustrate the practical importance of locus of control, I demonstrate that these findings have implications for math learning effort of 15-year-olds in a sample of second generation migrants. Locus of control is considered a fundamental determinant of effort (Bandura, 1989; Skinner, 1996). Moreover, experimental evidence suggests that individuals

[2] I use a measure of the importance of agriculture and rainfall risk that adjusts for population movements over the last several centuries.

with an internal locus of control are more intrinsically motivated and less responsive to external incentives (Borghans, Meijers and ter Weel, 2008). I create an index from a series of questions on locus of control for mathematics achievement and self-reported effort in learning mathematics for students in the 2012 Programme for International Student Assessment (PISA). I show that preindustrial control over subsistence in their parent's country of birth is related to their locus of control over math achievement and their effort in learning mathematics. Math locus of control is a primary mechanism for the relationship with effort in math, and I show that it mediates one-third of the magnitude of the relationship.

This paper contributes to several strands of the literature that seek to understand the importance of noncognitive traits, culture, and the persistent effect of ancestral experiences on economic behavior. First, I contribute to the literature on the importance of internal constraints on the behavior of those in poverty (Banerjee and Mullainathan, 2010; Mani et al., 2013; Haushofer and Fehr, 2014; Dalton, Ghosal and Mani, 2016; Wuepper and Lybbert, 2017; Lybbert and Wydick, 2018), and the literature on noncognitive skills, socioemotional skills, and personality traits in economics (Bowles, 2011; Borghans et al., 2008; Almlund et al., 2011; Becker et al., 2012; Kautz et al., 2014). To date, a majority of studies on this topic have sought to understand the implications of differences in noncognitive skills, socioemotional skills and personality traits, or whether programs that target changing these traits has an impact on economic outcomes. This paper demonstrates that the origins of differences in one of these traits, locus of control, is rooted in ancestral experiences. Therefore, I show that traits that can serve as an internal constraint of poverty may not be solely reflective of an individual's current constraints. The exercise using the PISA sample demonstrates that this has real implications for human capital investment.

Second, my identification strategy exploiting differences in ancestral experiences with subsistence relates to work that showcases that these experiences influence modern economic outcomes (Alesina, Giuliano and Nunn, 2013; Talhelm et al., 2014; Galor and Özak, 2016; Olsson and Paik, 2016; Wuepper and Drosten, 2017; BenYishay, Grosjean and Vecci, 2017; Galor and Savitskiy, 2017). I add to this literature by studying a dimension of culture whose origins have received little attention in economics. Moreover, the exercise exploiting the introduction of maize in the Old World demonstrates that deep-rooted ancestral experiences can be remarkably persistent in the face of a more proximate shock. Additionally, my finding that ancestral experiences are transmitted across generations contributes to the growing literature on the persistence of culture in economics (Guiso, Sapienza and Zingales, 2006; Tabellini, 2010; Fernández, 2011; Nunn and Wantchekon, 2011; Nunn, 2012; Voigtlander and Voth, 2012; Spolaore and Wacziarg, 2013; Grosjean, 2014; Alesina and Giuliano, 2015; Guiso, Sapienza and Zingales, 2016; Giuliano and Nunn, 2017).

Finally, the persistent relationship between ancestral control over subsistence and locus of control of their descendants contributes to the literature on heterogeneity in the outcomes of agricultural societies driven by geographic or climatic characteristics (Litina, 2016; Bentzen, Kaarsen and Wingender, 2017; Buggle, 2017). Historians and anthropologists cite the transition to agriculture as important in fostering the development of modern civilizations (Diamond, 1997). Within economics, Hibbs and Olsson (2004) and Putterman (2008) provide empirical cross-country evidence that an early agricultural transition is linked with state formation and contemporary income, and Michalopoulos, Putterman and Weil (2016) show a link with individual education and income in Africa. However, Diamond (1987) and Harari (2015) argue that agriculture may have been a negative for early agriculturalists at the individual level because it made them more vulnerable to weather swings. My findings contribute to this literature by suggesting a new dimension of heterogeneity within agricultural societies that has economic implications.

2 Conceptual Framework

Locus of control has a long history in the social sciences. I discuss in this section how my finding that ancestral control influences contemporary locus of control and contemporary effort in human capital is consistent with this literature. First, I give a definition of locus of control, and provide a brief overview of the literature that links locus of control with economic outcomes in the fields of psychology, sociology, and economics. Second, I discuss the literature on how locus of control is formed. Third, I draw on the theories and findings in the literature to discuss a conceptual framework of how ancestral experiences with agriculture informs locus of control beliefs and behavior today.

2.1 Locus of control: Definition and its influence on behavior

Locus of control is defined as “a generalized attitude, belief, or expectancy regarding the nature of the causal relationship between one’s own behavior and its consequences” (Rotter, 1966). An individual with an internal locus of control will “attribute outcomes to their own actions” while an individual with an external locus of control will attribute it “to circumstances beyond their control” (Rotter, 1966). That is, individuals with an internal locus of control believe that their outcomes are primarily determined by their own actions, including their personal level of effort or investment, as well as their own mistakes and failings. Conversely, individuals with an external locus of control believe that factors such as luck, chance, fate, destiny, or the actions of others play a larger role in determining their outcomes.

Locus of control is one of the most widely studied concepts in psychology and is considered fundamental to understanding differences in effort and motivation (Bandura, 1989; Skinner, 1996). A large body of literature links a more internal locus of control with positive outcomes such as higher education and income (see Findley and Cooper (1983), Skinner et al. (1998), Judge and Bono (2001), Eccles and Wigfield (2002), and Ng, Sorensen and Eby (2006) for reviews of the literature). Additionally, economists have linked an internal locus of control with positive outcomes such as higher earnings, faster earnings growth, greater job satisfaction, and quicker reemployment (see Cobb-Clark (2015) for an excellent review from the perspective of an economist).[3]

Specifically, locus of control and its link with academic and educational achievement has a long history in the social sciences. In the landmark Coleman Report, a comprehensive 1960s study of educational equality in the US, the sociologist James Coleman notes that "a pupil attitude factor, which appears to have a stronger relationship to achievement than do all the school factors together, is the extent to which an individual feels that he has some control over his own destiny" Coleman (1966, p23). He goes on to discuss its potential importance as "If a child feels that his environment is capricious, or random, or beyond his ability to alter, then he may conclude that attempts to affect it are not worthwhile, and stop trying" (Coleman, 1966, p288). There is evidence that locus of control impacts education effort, motivation, and persistence in problem solving (Ross and Broh, 2000), and there is experimental evidence that locus of control impacts internal motivation, as those with a high locus of control are less responsive to rewards on cognitive tasks (Borghans, Meijers and ter Weel, 2008). Thus, locus of control has the potential for important implications for human capital investment through its effect on the perceived returns to effort.

Economists have included locus of control in a model of human capital investment, where it enters as a differential perception about the returns to education (Coleman and DeLeire, 2003). A 1 standard deviation difference in locus of control is linked with a 2-7 percentage

[3]For example, economists have incorporated locus of control into models of job search and shown it has implications for job search effort, unemployment duration, and reservation wages (Caliendo, Cobb-Clark and Uhlendorff, 2015; McGee, 2015; McGee and McGee, 2016) and the likelihood of dropping out of the job market after a health shock (Schurer, 2017). Moreover, those with a more internal locus of control may save more (Cobb-Clark, Kassenboehmer and Sinning, 2016) and invest in riskier assets (Salamanca et al., 2016). Cobb-Clark, Kassenboehmer and Schurer (2014) find that locus of control is linked with health outcomes through the choice of diet and frequency of exercise. Development economists have shown that locus of control is associated with a higher likelihood of adopting agricultural technologies in Ethiopia (Abay, Blalock and Berhane, 2017; Taffesse and Tadesse, 2017). In addition, economists have studied how an internal locus of control may serve as a complement to higher aspirations (Bernard, Dercon and Taffesse, 2011; Lybbert and Wydick, 2018) in breaking free from an aspirations-based poverty trap (Dalton, Ghosal and Mani, 2016; Genicot and Ray, 2017).

point increase in the probability of completing high school (Cebi, 2007; Barón and Cobb-Clark, 2010) and this relationship is stronger for low-socioeconomic status students (Mendolia and Walker, 2014). The relationship with education is a primary mechanism for the link between locus of control and income (Piatek and Pinger, 2016). However, it is unclear if these beliefs about the returns to effort reflect accurate perceptions of their constraints.

2.2 Formation of Locus of Control Beliefs

Initially, Rotter (1966) described locus of control as a continuously updated belief that takes into account the continuous feedback that individuals receive about the influence of their actions on their outcomes. However, the feedback people receive about the importance of their own actions versus factors outside of their control in determining their outcomes may be incomplete. Within this environment, individuals may fall back on a prior about the belief of the importance of their own actions in shaping outcomes. This prior, which can take the form of a heuristic or rule of thumb, may be informed by ancestral experiences that have been passed down for generations because these beliefs contributed to individual and group survival over time (Boyd and Richerson, 1985). These heuristics, which evolve separately across cultures (Nunn, 2012), therefore reflect the experiences of the ancestors of an individual, and may not be applicable to current circumstances. Thus, locus of control beliefs are also potentially informed by culture or could be passed down through generations.

There is evidence that locus of control beliefs are primarily determined prior to and during adolescence (Cobb-Clark and Schurer, 2013; Elkins, Kassenboehmer and Schurer, 2017). Thus, there is a relatively short window for locus of control beliefs to be formed. Moreover, there is evidence that parental actions shape locus of control (Anger, 2011; Elkins and Schurer, 2018; Lekfuangfu et al., 2018) primarily through the parent's perceptions about the returns to their own investment in their children.[4] This suggests that ancestral experiences may be important in informing locus of control beliefs.

Therefore, there are two sources for the formation of locus of control: (1) rational perceptions based on actual constraints, updated through experiences and (2) intergenerational transmission from my parents. My analysis provides evidence that the origins of (2) can be traced back to the actual constraints experienced by an individual's ancestors, which is then propagated through generations. Thus, this reflects rational beliefs on the part of individuals and their ancestors, but within a framework of limited learning where experiences with the returns to effort of my ancestors form a prior to fill in the gaps in information about the returns to effort obtained through my own experiences.

[4] This is consistent with evidence from Cunha, Heckman and Schennach (2010) about the importance of noncognitive maternal skills, made up of locus of control and self-esteem, in the technology of skill formation.

2.3 Agriculture and control over subsistence

I use agricultural experiences to proxy for ancestral experiences with the returns to effort because agriculture was the major economic activity for most societies prior to the industrial revolution. From the outset, early agriculturalists faced many obstacles. This included a more volatile life expectancy (Shennan et al., 2013; Timpson et al., 2014) and longer hours worked for a worse caloric return (Bowles, 2011) all for an output that is at the mercy of sudden environmental swings (Harlan, 1992). These early challenges are cited as part of the reason why agriculture is called both "the worst mistake in the history of the human race" (Diamond, 1987) and "history's biggest fraud" (Harari, 2015). While Diamond and Harari provide multiple reasons for their assertions, both cite weather risk among their arguments for two reasons: (1) agriculture led to a situation where subsistence was at the mercy of the whims of the weather due to a reliance on less variety and (2) a lack of geographic mobility.

First, agricultural societies depended on less variety of food for subsistence, especially compared to hunters and gatherers. If one species of plant or animals failed, then hunter-gatherers could simply forage or hunt more of another species. However, sedentary agriculturalists generally relied on just two to three staple crops (Olsson and Hibbs, 2005). Thus, agriculturalists risked starvation if just a single crop failed, which could happen due to drought, flood, or a plague, all of which could arise without warning and were factors outside of their control. Additionally, less variety meant that early agriculturalists' diets were deficient in vitamins and minerals, meaning they were less healthy and thus more vulnerable to disease and starvation.

Second, agricultural societies were more likely to subsist in a single, settled area. This again left them more vulnerable to unpredictable weather shocks as all of their potential subsistence was tied to a single geographic area, and they were less able to get up and move when faced with a shock. This contrasts with hunter-gatherers who were familiar with the available game and plants for subsistence over a wide geographic area, and often moved in anticipation of inhospitable weather. Moreover, the closer quarters in permanent settlements made them more vulnerable to infectious disease.

These assertions are supported by numerous examples of famines in agricultural societies brought on by extreme rainfall events. These events include the biblical seven-year famine of Genesis brought on by drought, the collapse of the Maya civilization around 1000AD (Evans et al., 2018), the Great European Famine of the 14th century brought on by torrential flooding, to the more contemporary examples of the potato famine in Ireland and the dust bowl of the the Great Plains in the US. Even in the past 100 years, most famines in poor economies are associated with extreme weather on the harvest (Gráda, 2007). Taken together this supports the hypothesis that agriculturalists in environments with uncertain rainfall had less control over their subsistence.

3 Agriculture, Rainfall Risk and Locus of Control

This section provides evidence that ancestral control over subsistence is linked with contemporary locus of control beliefs. I exploit differences in the ancestral experiences with subsistence of individuals residing in the same subnational region today. I do this by linking individuals with ethnographic records on the importance of agriculture for subsistence, as well as the agro-climatic suitability for agriculture and inter-annual variability of precipitation in their ancestral homelands. I provide evidence that the interaction between a greater importance of agriculture of an individual's ancestors for subsistence and more variable inter-annual rainfall is negatively associated with locus of control. This relationship is robust to the inclusion of a host of geographic characteristics, does not appear to be driven by population movements, and is distinct from other culturally persistent traits.

3.1 Identification Strategy and Data

I exploit ancestral differences in the control that societies had over their agricultural yields of individuals who today reside in the same subnational region. My empirical specification will be an ordinary least squares regression of the form

$$LoC_{iert} = \beta_1 V_e \times A_e + \beta_2 A_e + \beta_3 V_e + \phi' X_e + \gamma' X_{iert} + w_t + \delta_r + \varepsilon_{iert} \tag{1}$$

where LoC_{iert} is the locus of control for individual i of ethnicity e living in subnational region r interviewed in survey wave t. A_e is the preindustrial importance of agriculture for subsistence for ethnicity e and V_e is the inter-annual precipitation variability in e's homeland. X_e are observable geographic characteristics of ethnicity e's homeland and X_{iert} are exogenous individual characteristics (gender and a fourth-order polynomial in age). w_t will represent survey wave fixed effects to account for differences in the structure and timing of a survey that takes place in multiple waves, and δ_r is a subnational region of residence fixed effect. I cluster standard errors by ethnicity.The interaction term, $V_e \times A_e$, represents the ancestral control over subsistence.

I use the World Values Survey (WVS) to construct my primary sample. The WVS is a nationally representative survey measuring the beliefs and values of individuals around the world. The survey has been conducted in six waves from 1981 through 2014 in 100 countries with a total of over 340,000 observations representative of 90% of the world's population. To measure individual's locus of control, I use responses to the following question that was asked in each wave of the survey: "Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means 'no choice at all' and 10 means 'a great deal of choice' to indicate how much freedom of choice and control you feel you have over the way your life turns out." Figure A2 shows the average locus of control by country. I use respondent's self-reported ethnicity and language spoken at home to match individuals with societies in the *Ethnographic Atlas* (Murdock, 1967).[5]

I rely on an updated version of the *Ethnographic Atlas* compiled by Kirby et al. (2016) to identify the preindustrial importance of agriculture in a society (A_e). The importance of agriculture is recorded on an ordinal scale from 0-9 where each 1 unit increase corresponds with a 10% increase in the share of a society's subsistence coming from agriculture relative to hunting, gathering, fishing, and animal husbandry. The average for the 1,307 societies in the *Ethnographic Atlas* on this scale is 4.46. For societies that match with individuals in my primary sample, this average is 6.14.[6]

Inter-annual precipitation variability (V_e) is constructed following Ager and Ciccone (2017)'s definition of rainfall risk. Rainfall risk is the variance of the annual average log monthly rainfall. I use monthly gridded terrestrial precipitation from 1900-1999 (Matsuura and Willmott, 2015) to calculate these measures.[7] I calculate the rainfall risk separately for each month in each grid cell, then average across all months to get the average monthly rainfall risk for each grid cell. Then, I define a society's rainfall risk as the average across all grid cells within a homeland.

I control for a host of geographic and climatic characteristics (X_e) that could potentially confound the relationship between the importance of agriculture, rainfall risk, and locus of control. These geographic variables fall into two categories. The first category includes geographic variables that are associated with the suitability for agriculture. These include the continent of the homeland, average temperature, precipitation, length of the growing season, share of land suitable for agriculture, average elevation, absolute latitude, ruggedness of the

[5] I rely on the respondent's self-reported ethnicity for 76% of matches. For language spoken at home, I only match with an ethnicity if: (1) the language is unique to a single ethnicity, (2) it is not the official language of the country of residence, and (3) does not conflict with the reported ethnicity when the reported ethnicity is coarse (e.g., white, black).

[6] The average is 1.01 for gathering, 1.43 for hunting, 1.54 for fishing, and 1.56 for animal husbandry for all societies. Of those in my sample, the averages are 0.21 for gathering, 0.44 for hunting, 0.75 for fishing, and 2.45 for animal husbandry.

[7] Ideally, I would use values from the pre-Columbian era, but reliable year-to-year records of precipitation for the entire globe prior to 1900 do not exist. The closest is coarser data that is available for Europe only from 1500-1900. I rely on a strong correlation between the rainfall risk from 1900-1999 and the pre-industrial era. Based on other studies, this seems plausible. For example, Buggle and Durante (2017) find that the variability in precipitation in 1500-1750 and 1901-2000 has a correlation coefficient of 0.85.

terrain, and stability of malaria transmission. I control for these to show that it is not a specific characteristic of the suitability for agriculture that is driving my results. Second, I include additional geographic variables that are associated with trade.[8] This second set of geographic variables include if the ancestral homeland is landlocked, the distance to the coast from the ancestral population centroid of their homeland, the presence of a navigable river in their homeland, the presence of a harbor along the coast of their homeland, and the size of their homeland. I control for these to hold constant the ability of individuals in their homeland to deal with negative rainfall shocks by trading with other societies or within their own homeland.

Individual level controls (X_{iert}) include gender to allow for a difference in average locus of control between men and women and a fourth order polynomial in age to account for systematic differences in locus of control through the life cycle.[9] Survey wave fixed effects (w_t) are included to account for differences in the structure of the survey in different waves.

I employ subnational region of residence fixed effects (δ_r) in order to hold local institutional, geographic, and climatic time-invariant characteristics constant.[10] This strategy allows for the comparison of individuals with different ancestral experiences that currently reside in the same geographic region and are subject to the same local conditions. This is important because it has been established that climatic variability and ancestral subsistence plays a significant role in shaping institutions (Haber, 2012; Bentzen, Kaarsen and Wingender, 2017), and local institutions may play a role in shaping locus of control.

3.2 Determinants of the Reliance on Agriculture

A concern with the empirical specification presented in equation 1 is that the preindustrial reliance on agriculture of a society is an endogenous choice and is vulnerable to reverse-causality if pre-existing different levels of locus of control led societies to choose how reliant to be on agriculture. Therefore, I supplement this measure with the plausibly exogenous agro-climatic potential for agriculture in an ethnic group's homeland that is orthogonal to human actions. This measure comes from the Caloric Suitability Index (Galor and Özak, 2015, 2016) that contains data on the potential calories from agriculture, measured in calories per hectare per year, across the globe. The Caloric Suitability Index provides an estimate of the potential calories from crop yields based on the agro-climatic potential yield in tons, per hectare, per year calculated by the Global Agro-Ecological Zones (GAEZ) project of the

[8]Ruggedness of the terrain and stability of malaria transmission are also associated with the ability to trade (Henderson et al., 2018).

[9]Evidence from panel data suggests that locus of control increases in adolescence, remains relatively stable during adulthood, and decreases in old age (Cobb-Clark and Schurer, 2013).

[10]The number of subnational regions in a country ranges from 2-50 with a median of 10 within the WVS.

Food and Agriculture Organization (FAO) (Ramankutty et al., 2002). I focus on the caloric potential under a rain-fed, low input technology for the set of crops available prior to 1500 in order to capture the agricultural suitability under conditions that are orthogonal to human intervention.[11]

The measure of potential calories due to exogenous agro-climatic conditions of a society's homeland is highly correlated with that society's reliance on agriculture for subsistence recorded in the *Ethnographic Atlas*.[12] Figure 1 panel A depicts this relationship, with continent fixed effects partialled out, for 1,062 societies in the *Ethnographic Atlas*.[13] This demonstrates that a primary driver of a society's decision to rely on agriculture is the exogenous potential caloric productivity of the land determined by agro-climatic conditions.

An additional concern is that societies may consider the level of rainfall risk when selecting into agriculture. Figure 1 panel B depicts the relationship between rainfall risk and the share of subsistence from agriculture, with continent and average precipitation partialled out, for the societies in the *Ethnographic Atlas*. The results suggest that, conditional on average precipitation in their homeland, societies were not selecting into the degree of reliance on agriculture based on the level of rainfall risk they faced.[14] Overall, this suggests that the main driver of the degree of reliance on agriculture was the exogenous potential caloric productivity of the land.

3.3 Ancestral Agriculture, Rainfall Risk, and Locus of Control

I examine the relationship between ancestral agriculture, rainfall risk, and contemporary locus of control. Table 1 estimates equation 1, controlling for average precipitation in all columns. Column 1 does not include any additional controls, and column 2 includes individual controls, the year of the primary ethnographic record in the Ethnographic Atlas, and survey wave fixed effects. Column 3 controls for country fixed effects and column 4 controls for subnational fixed effects. Column 5 introduces the geographic controls associated with engaging in agriculture and column 6 geographic controls associated with trade. In each column, the results show that the interaction between the preindustrial share of subsistence from agriculture and the rainfall risk of their homeland is negatively associated with locus of control. The results suggest that for every additional 1 S.D. increase in the level of rainfall

[11] I focus on this index instead of the original FAO-GAEZ potential yields because the potential yield in calories is a measure better suited to capture the importance of agriculture to a society in the preindustrial era than the potential yield in weight (Galor and Özak, 2015).

[12] The correlation coefficient is $\rho = 0.42$.

[13] Panel A of figure A1 shows that this is very similar to the relationship for the 152 societies that I match with individuals in my sample.

[14] Panel B of Figure A1 shows that this is also the case for the societies that I match with individuals in my sample.

risk, the difference in the locus of control between a society with a 10% reliance on agriculture and one with a 90% reliance is 0.43 S.D.

I supplement the above findings with results exploiting differences in the agro-climatic potential for calories from agriculture of a society's homeland. I use the potential calories from potential yields under a low-input rainfed technology that is exogenous to human interventions.

Table 2 presents results analogous to Table 1 but interacting the agro-climatic potential for calories from agriculture with rainfall risk instead of the share of ancestral subsistence from agriculture. Once country fixed effects are included in column 3, the results all point in the same direction as in Table 1: unpredictable rainfall interacted with the potential for agriculture is negatively associated with locus of control. This provides complementary evidence that the more important agriculture is to the preindustrial subsistence of a society combined with more variable inter-annual rainfall, the less control the society has over subsistence. The magnitudes suggest that for two societies with a 1 SD difference in their average caloric potential for agriculture, a 1 SD increase in the rainfall risk increases the difference in locus of control between the descendants of the two societies by 0.08 SD.

3.4 Robustness Checks

Thus far, the results suggest a strong relationship between ancestral control over subsistence and contemporary locus of control. In this subsection, I first consider the sensitivity of my core results to alternative measures of inter-annual rainfall variation. Second, I show that potential omitted variables, such as other geographic or ethnographic characteristics, are not driving my result. Third, I provide evidence that the results are not biased by differential likelihood of individuals in my sample residing outside their ethnic homeland.

3.4.1 Alternative Measures of Precipitation Variability

Table A4 presents results using two alternative methods of calculating the instability of inter-annual rainfall patterns. First, in columns 1-3, I use the coefficient of variation of rainfall, defined as the inter-annual standard deviation divided by mean rainfall. An advantage of this measure is that it is scale-invariant. The second alternative, presented in columns 4-6, is a precipitation predictability index. This measure, adapted from Colwell (1974), takes on a value of 0 to 1 where 0 is completely unpredictable and 1 is completely predictable. An advantage of this measure is that it takes into account both the inter- and intra-annual predictability of precipitation patterns. For both of these alternative measures of the instability of precipitation patterns, the results are consistent with the results using the preferred measure of rainfall risk.[15]

3.4.2 Additional Geographic and Ethnographic Characteristics

An additional concern is that the results are picking up differences in institutions. For example, more autocratic societies or societies with more development political hierarchies may lead to a perception of less control. Irrigation suitability has been associated with autocracy (Bentzen, Kaarsen and Wingender, 2017), the potential advantage of cereals relative to roots and tubers is associated with differences in state hierarchies (Mayshar et al., 2018), and nonlinear participation and temperature is associated with state formation (Haber, 2012). I control for each of these in turn in columns 2-4 of Table A6. The results are unchanged.

Societies that adopted agriculture sooner developed earlier (Diamond, 1997) and are more collectivist (Olsson and Paik, 2016). I control for two geographic characteristics that have been associated with the timing of the adoption of agriculture: distance to a Neolithic site and a quadratic of the standard deviation of temperature. Column 5 of Table A6 controls for the distance to the closest of the seven independent sites of the invention of agriculture during the Neolithic.[16] Column 6 controls for the standard deviation of temperature and its square, since this is found to be associated with the adoption of agriculture by Ashraf and Michalopoulos (2015). The results are unchanged. In addition, I include Oster (2016) δ values that represent the degree of selection on unobservables, relative to observables, that would be needed to bias the result to zero. These values are all well outside the range of 0 to 1, which suggests that it is unlikely that there are additional omitted variables that would bias the result to zero.[17]

Next, I check to see if the result is robust to controlling for other ethnographic characteristics recorded in the Ethnographic Atlas. These could potentially be endogenous to the reliance on agriculture. However, if controlling for other ethnographic characteristics leaves the results unchanged, then this suggests that they are not driving the result.[18] Results are presented in Table A8. Column 2 controls for the settlement patterns of the society, that

[15] Reduced form results using the interaction of these measures with the caloric potential of agriculture are presented in Table A5.

[16] These sites are from Matranga (2017), and I use the distance as a proxy for the time since the adoption of agriculture following Olsson and Paik (2016) who find that the distance to the fertile crescent is associated with individualism in Europe.

[17] Table A7 repeats this exercise for the interaction of rainfall risk with the caloric potential of the ethnic homeland and the results are largely the same.

[18] I do not repeat this exercise for the results interacting caloric potential with the rainfall risk. This is because the ethnographic characteristics are clear post-treatment variables, where treatment is the geography and climate of the homeland. Thus, they are clearly "bad controls" (Angrist and Pischke, 2009), and controlling for them could introduce unpredictable biases (Acharya, Blackwell and Sen, 2016). Therefore, I explore them as potential mechanisms for the reduced form results in the appendix.

is the level of nomadicity of the society, as agricultural societies are typically less mobile. The concern is that the results are driven solely by less mobile societies that are more vulnerable to rainfall risk. Locus of control could be picking up preindustrial differences in the number of political hierarchies beyond the local level, which is associated with contemporary development in Africa (Michalopoulos and Papaioannou, 2013). I control for this in column 3. I control for the closeness of kinship ties (Enke, 2018) in column 4, as this is associated with cooperation and trust. This will show that I am not simply picking up close family ties, and individuals feeling as if their outcomes are determined by their families (Alesina and Giuliano, 2010). Column 5 controls for whether the society allowed polygyny, which can impact investment incentives (Tertilt, 2005). Column 6 controls for bride price, that is if there is an exchange between families at the time of marriage, as this may be related to the social structure of a society (Anderson, 2007). The result remains largely unchanged when controlling for each of these ethnographic characteristics.

Table A9 provides results using alternative specifications. Columns 1 and 2 restrict the sample to exclude individuals who work in agriculture or reside in households where the household head works in agriculture to show that this is not picking up the effect of a contemporary reliance on farming. Next, I relax the strict cardinality assumption I've made on my dependent variable. First, I partially relax it in Columns 3 and 4 where I present results that define the dependent variable as answering from 6-10 to the question on locus of control. I call these individuals "internals," of which about two-thirds of my sample would qualify. Columns 5 and 6 relax the cardinality assumption completely and estimates an ordered probit specification since the measure of locus of control is ordinal but not cardinal. The results for each of these are consistent with my preferred specification.

3.4.3 Movers

My preferred specification includes subnational district fixed effects in order to hold constant local time-invariant geographic and institutional characteristics. However, 30% of my sample lives in a subnational region outside their ethnic homeland, including 7% that lives in a country that does not contain their ethnic homeland. I do not observe if these individuals moved in their own lifetime, or if they are descendants of individuals who moved. This endogenous selection into place of residence could bias my results if ancestral control led to differential selection into subnational districts.

Table A10 shows that ancestral control over subsistence, using the share of subsistence from agriculture, does not predict living outside of the ethnic homeland. However, when using the caloric potential for agriculture as a proxy for its importance, it shows that descendants of societies with less ancestral control were more likely to live in a country that did not contain their homeland. Table A11 removes the 7% of the sample that resides outside of a country containing their homeland and employs a specification that employs country fixed effects but not subnational district fixed effects. The results are qualitatively similar to those presented in Table 2. As an additional check, Table A12 presents results for my preferred specification controlling for being a mover, and the results are largely unchanged. Overall, this provides evidence that differential population movements are not biasing my results.

3.5 Other Culturally Persistent Traits

In this subsection, I explore the relationship of my results with other persistent cultural traits that could be related with locus of control or have been shown to be persistently associated with ancestral agriculture or the variability of the ancestral climate. Specifically, locus of control has been associated with preferences for redistribution, individualism, religiosity, and risk preferences. In particular, individualism or collectivism has been shown to be a culturally persistent trait that is associated with ancestral experiences with climatic variability (Davis, 2016) as well as agricultural experiences (Talhelm et al., 2014; Olsson and Paik, 2016; Buggle, 2017). In addition, generalized trust has been associated with the suitability for agriculture (Litina, 2016), and climatic variability (Buggle and Durante, 2017). Finally, the importance of tradition (Giuliano and Nunn, 2017) and degree of loss aversion (Galor and Savitskiy, 2017) have been linked with measures of ancestral climatic instability, while long-term orientation (Galor and Özak, 2016) and gender attitudes (Alesina, Giuliano and Nunn, 2013) have been linked with the ancestral agriculture experience.

Figure 2 presents results for each of these additional cultural traits as the dependent variable. Each row shows the coefficient for an estimation of equation 1, with 95% confidence intervals, for different cultural traits as the outcome variable.[19] Each outcome variable is standardized. Locus of control, in the first row, repeats the results found in column 6 of Table 1. Less ancestral control is positively associated with collectivism, the importance of tradition, and long term orientation, and is negatively associated with the importance of risk and adventure, trust, and equal gender attitudes. However, the magnitude of the relationship of ancestral control with each of these traits is smaller than the magnitude of the relationship with locus of control. Moreover, results presented in Panel C of Table A13 shows that controlling for these additional traits in my prefered specification does not change my core result. Overall, these results suggest that the relationship between ancestral control over subsistence and locus of control is distinct from other persistent cultural traits.[20]

[19]Panel A of Table A13 presents these regression results.

[20]Table A14 performs the same exercise but using the caloric potential for agriculture rather than the

4 Introduction of Maize in the Old World

I have shown that ancestral control of subsistence is associated with a more external locus of control of their descendants today. However, it is unclear if this relationship is driven primarily by the environment shaping locus of control or by individuals with an internal locus of control sorting into different regions. This section exploits a change in the vulnerability of agricultural yields to unpredictable weather due to the introduction of maize after the Columbian Exchange. This provides evidence that the environment shapes locus of control.

I exploit the change to the set of suitable crops in ancestral homelands after the Columbian Exchange (Crosby, 1972; Galor and Özak, 2016). The Columbian Exchange refers to the wide exchange of crops, animals, culture, people, technology, and ideas between the Americas and the Old World following the arrival of Christopher Columbus in the Americas in 1492 (Nunn and Qian, 2010). Specifically, I exploit the change in the agro-climatic potential for calories from agriculture due to the introduction of maize in the Old World. I focus on maize for three reasons. First, it is a crop that is native to the Americas, meaning that it was not cultivated by societies in Africa, Asia, Europe and Oceania prior to 1500. Second, it is a high-potential calorie crop that is widely suitable and was rapidly adopted in the Old World (Crosby, 1972; McCann, 2005). Third, relative to other Old World staple crops (e.g. sorghum, millet, barley, wheat), its yield is more susceptible to drought and sunlight deprivation and rots easily when stored in tropical climates (McCann, 2001).

This final point suggests that maize yields are more susceptible to unpredictable weather patterns outside of human control. Thus, if a society has the incentive to move into growing maize because maize is more productive on average than the set of crops that were suitable prior to the Columbian Exchange, this could induce a change in perceptions of control that reflect their changed circumstances. I shows that descendants of societies with a greater incentive to grow maize have a more external locus of control.

4.1 Identification Strategy and Data

I investigate if societies that had a greater incentive to adopt maize have a more external locus of control today. I test this by estimating

$$LoC_{iect} = \beta_1 \Delta M_e + \beta_2 PC_e + \phi' X_e + \gamma' X_i + \delta_c + w_t + \varepsilon_{iect} \tag{2}$$

share of subsistence from agriculture. Preferences for redistribution is the only trait positively associated with ancestral subsistence control. Controlling for these other traits, presented in Panel C, does not meaningfully alter the size of the coefficient on ancestral control over subsistence when compared with Panel B.

that exploits differences in the increase in potential calories from maize (ΔM_e) over and above the caloric potential of crops available prior to 1500 (PC_e), both under a low-input rainfed technology.[21] I define $\Delta M_e = max\left(\frac{\text{Caloric Potential Maize}_e - PC_e}{PC_e}, 0\right)$. Thus, it captures the potential caloric rate of return, relative to the set of Old World crops grown prior to 1500, of growing maize. The identifying assumptions are (1) societies did not have pre-existing differences of locus of control that correlated with the potential for maize prior to 1500 and (2) the location of homelands did not change systematically based on the potential for maize. I again rely on the Caloric Suitability Index to obtain the potential calories of different crops, under a rainfed low-input technology. In the sample of Old World societies, 31 receive no boost from maize, 43 received a positive boost of less than 10%, 51 received a 10-50% boost, and 27 received a boost of greater than 50%.

If $\beta_1 < 0$, this is consistent with my main hypothesis, that ancestral reliance on a source of subsistence whose output was more sensitive to weather factors outside of their control negatively impacts contemporary locus of control. If I fail to reject that $\beta_1 = 0$, then I cannot rule out that the persistent effect of ancestral control over subsistence on contemporary locus of control is due solely to preindustrial sorting.

4.2 Potential Caloric Return to Maize over Pre-1500 Crops

Table 3 presents results estimating equation 2 on the set of Old World societies in my sample. The main variable of interest, ΔM_e, is represented by the potential caloric rate of return to investing in maize, relative to all pre-1500 crops. Column 1 does not include any controls, column 2 includes individual controls and survey wave fixed effects, and column 3 controls for the population density in 1500AD to account for differences in the pre-Columbian Exchange level of economic development. Column 4 introduces country fixed effects, column 5 subnational region fixed effects, column 6 the geographic controls associated with engaging in agriculture and column 7 geographic controls associated with trade.

The results show that a greater incentive to grow maize is associated with a more external locus of control. My preferred specification in column 7 shows that descendants of societies where maize had the potential to double the number of calories from agriculture have a more external locus of control by 0.20 S.D. This provides evidence that an individual's ancestral agricultural environment shapes their perceptions of control. While it is still possible that sorting explains part of the story, if control over subsistence played no role in shaping perceptions of control, then the exogenous change to the set of suitable crops brought on by the Columbian Exchange should not have a relationship with contemporary locus of control.

[21] I identify the set of crops available prior to the Columbian Exchange in each continent from Table A2 of the Online Appendix for Galor and Özak (2016).

This also suggests that the prior results associating ancestral control and locus of control can be interpreted as the environment shaping these beliefs, rather than the other way around.

Table A15 presents results for the additional calories from maize (Δ caloric potential) rather than the caloric rate of return. This is an alternative way of measuring the incentive to grow maize. The results lead to the same conclusion: a larger incentive to grow maize is associated with a more external locus of control.

One major advantage of agriculture is the ability to smooth consumption through the storability of a surplus. In particular, cereals are most likely to do this, as opposed to tree crops that rot easily in storage or roots and tubers that can be harvested at any time. Therefore, I show in Table A16 that even when compared directly with the suitability for other cereals, maize is still associated with a more external locus of control. This provides additional support for the mechanism of unpredictable weather holding constant the seasonality and storability of the yield.

I show that the results are robust to controlling for the potential caloric rate of return of all other crops that became available after the Columbian Exchange. Column 2 of Table A17 shows that the point estimate for the potential caloric rate of return of all other crops is positive, while the negative coefficient on the potential caloric rate of return for maize more than doubles in magnitude. Finally, I control for the additional geographic characteristics discussed in Section 3.4.2 to address concerns about differences in institutions and the length of experience with agriculture. These results are presented in columns 3-9 of Table A17.

5 Maize and the Persistence of Ancestral Control

The introduction of maize also provides an exogenous change during the preindustrial era to the degree of control that societies had over their subsistence. I exploit this change to investigate if it weakens the relationship with ancestral control proxied by the interaction of rainfall risk with the pre-1500 potential for calories from agriculture. I find that the introduction of maize weakens this relationship. This suggests that the influence of deeper experiences with agriculture on locus of control are attenuated, but still remain, even in the face of changed circumstances.

Table 4 presents results that include both the interaction of rainfall risk with the importance of agriculture and the potential caloric rate of return to growing maize. Column 1 reproduces the result from column 6 of Table 1 but only for the set of Old World societies as well as including controls for the pre-1500 caloric potential of their homeland and the population density in the year 1500 (both of which are included in the maize regression). Column 2 presents results for the caloric rate of return from maize. Column 3 includes both the caloric rate of return from maize and the interaction of the share of subsistence from agriculture and rainfall risk in a horserace regression.

The results in column 3 show that the coefficient on the ancestral control of agriculture changes very little from column 1 to column 3, and a Wald test indicates that the difference is not statistically significant. In contrast, the coefficient on the caloric rate of return to maize is reduced by 46% and the result of a Wald test indicates that the difference is statistically significant. This suggests that the importance of agriculture for a society is remarkably persistent even when a shock changes the degree of control.

However, it is possible that the importance of agriculture is endogenous to the caloric rate of return to maize.[22] Therefore, I turn to the reduced form results using the pre-1500 caloric potential of homelands as a proxy for the ancestral importance of agriculture propagated over centuries. Column 4 reports the results using the pre-1500 caloric potential in millions of kilocalories per hectare per day as a proxy for the importance of agriculture prior to the Columbian exchange,[23] column 5 estimates the potential caloric rate of return to growing maize, and column 6 includes both.

The magnitude of the coefficient on the pre-1500 caloric potential for agriculture and the interaction with rainfall risk is attenuated by 20% from column 4 to column 6. The coefficient on the caloric rate of return from maize is attenuated by 30% from column 5 to column 6. Wald tests for both indicate that this attenuation is statistically significant. This provides evidence that while the introduction of maize may have attenuated the relationship between the ancestral control over subsistence and contemporary locus of control associated with characteristics before the Columbian Exchange, the relationship is still remarkably persistent.

Overall, the results suggest that the perception of control, shaped in part by ancestral experiences with control over agricultural yields formed based on millenia of experiences with agriculture, is partly attenuated by a shock to the control over subsistence yields due to the introduction of maize that occurred over the last 500 years. This provides evidence that a more proximate shock can reduce the relationship between my ancestors' experiences and my perception of control today, but not completely, suggesting that changes are slow moving to reflect current circumstances.

[22]For example, maize replaced cattle grazing as the primary economic activity in the Balkans during the eighteenth and nineteenth century because of maize's productive advantage in supporting a larger population (Crosby, 1972, p180).

[23]This differs from Table 2 which converts this caloric potential to a z-score.

6 Exploration of Potential Mechanisms

In this section, I provide evidence that rules out some potential mechanisms for the relationship between ancestral control and contemporary locus of control. Then, I provide evidence in support of a preferred mechanism: the intergenerational transmission of beliefs. First, I show evidence that individual outcomes, such as income and education, and society-level economic development are not primary mechanisms for the persistent relationship between ancestral control. Then, I provide evidence of the persistence of the relationship between ancestral control over agricultural yields and locus of control in a sample of second generation migrants. This second finding suggests that the intergenerational transmission of beliefs is a key mechanism behind its persistence.

6.1 Potential Intermediate Outcomes

I first investigate if individual outcomes that have been associated with differences in locus of control are potential mechanisms for the association between ancestral agriculture and locus of control. These potential outcomes include education level, income, saving behavior, and employment. The WVS records highest education level achieved by respondents,[24] within-country income decile, whether the household increased their saving in the last year, and if the respondent is currently employed.[25]

Table A18 presents results with education level as the dependent variable in columns 1 and 2, income decile in columns 3 and 4, an indicator for current employment in columns 5 and 6, and an indicator for if the household increased their savings in the past year in columns 7 and 8. The results suggest that the interaction of the share of ancestral subsistence from agriculture and rainfall risk is negatively associated with each outcome in the odd columns. However, only the likelihood of saving is associated with the interaction of the caloric potential for agriculture and rainfall risk.

Table A19 investigates if ancestral control over subsistence is associated with contemporary development, proxied by the 1990 GDP per capita in the latitude and longitude of the ethnic group's ancestral population centroid, and historical development, proxied by the 1500 population density in their ethnic homeland.[26] The results in columns 1 and 2 indicate that ancestral control over subsistence yields is negatively associated with contemporary development, but is not associated with historical development in columns 3 and 4.

[24]I convert the reported education level to an ordinal variable that takes on a value from 0-6, where 0 = no education, 1= incomplete primary, 2 = complete primary, 3 = incomplete secondary, 4 = complete secondary, 5 = incomplete post-secondary, and 6 = complete secondary

[25]Details on variable construction included in data appendix.

[26]See the data appendix for sources and details of these variables.

Next, I investigate if there is evidence that these differences in individual and society differences are potential channels. I first test if my main results change when including these potential outcomes as additional control variables in my regression.[27] Table 5 presents results controlling for education level, income decile, employment, saving, living outside of their homeland, population density in 1500, and GDP per capita in 1990. Even when including these potentially endogenous controls, there is still a statistically significant association between ancestral control over subsistence and locus of control. Notably, the relationship is attenuated by about 16% when controlling for education in column 2 and 40% in column 3 when controlling for income decile. This suggests that education and income could be part of the causal link between ancestral control over subsistence and locus of control.[28]

6.2 Evidence of Cultural Transmission from Second Generation Migrants in Europe

I turn now to providing evidence that the intergenerational transmission of beliefs is a primary mechanisms for the persistence of the relationship between ancestral control over subsistence yields and contemporary locus of control. I do this in an analysis of second generation immigrants. This compares individuals whose parents had different ancestral experiences, but the respondents faced the same external environment, including climate, geography, and institutions, during their own lifetimes.

This approach allows for the isolation of the portable, culturally transmitted relationship between ancestral control and locus of control from the institutions, geography, and climate of the ancestral homeland. A caveat is that the children of immigrants are not a random sample of the populations of their parent's home country. Thus, the results are an average association for the sample I consider: children of individuals who left their home country.

For the analysis of second generation migrants I use the European Values Study (EVS), a companion survey to the WVS. The EVS asks many of the same questions as the WVS including the question on locus of control. The EVS does not ask about the ethnicity of the respondent, but in the 2005-2010 wave it does ask for the country of birth for both the respondent and the respondent's parents.[29] Therefore, I use the EVS to explore the

[27]This method is far from perfect, as all of these outcomes are "bad controls" (Angrist and Pischke, 2009), and these additional controls are prone to omitted variable bias, reverse causality, and measurement error that could render the results meaningless. Therefore, I take these results as merely suggestive.

[28]Table A20 presents results for the reduced form specification, which also investigates additional characteristics in the Ethnographic Atlas. This finds that the reduced form relationship is primarily mediated by the share of subsistence from agriculture, as well as the settlement patterns of the society. The Online Appendix discusses results from a method devised by Acharya, Blackwell and Sen (2016) that helps overcome intermediate variable bias and has the same qualitative results for both specifications.

[29]The WVS does not ask about country of birth or parent country of birth.

relationship between ancestral control of subsistence and contemporary locus of control of individuals who were born and reside outside of their ancestral homeland. I define their ancestral homeland as the country of birth of their parents. The sample for this analysis consists of 3,653 respondents who were born and interviewed in 44 different European countries with both or a single parent born in 106 different countries.[30]

I restrict the sample to respondents who were born in the country they are interviewed in and had both parents born in the same different country or had a single parent born in a different country. I will estimate the following equation similar to equation 1:

$$LoC_{ipc} = \beta_1 V_p \times A_p + \beta_2 A_p + \beta_3 V_p + \phi' X_p + \gamma' X_{ipc} + \delta_c + \varepsilon_{ipc}. \tag{3}$$

where LoC_{ipc} is the locus of control for individual i whose parent was born in country p born and living in country c. A_p is the ancestral importance of agriculture for subsistence of individuals who today reside in country p and V_p is the inter-annual precipitation variability in country p. X_p are observable geographic characteristics of country p and X_{ipc} are exogenous individual characteristics (age quartic and gender). δ_c is a country of birth and residence fixed effect. Standard errors are clustered by parent country of birth, which is the level that my variable of interest varies. The interaction term, $V_p \times A_p$, represents the ancestral control over subsistence for the country of birth of the parent of individuals in my sample.

I measure the importance of agriculture for a country's ancestors in two ways. First, I use the ancestral share of subsistence from agriculture using a dataset compiled by Giuliano and Nunn (2018) that aggregates characteristics from the Ethnographic Atlas up to the country level. This data set uses the contemporary spoken languages in a country to adjust for historical population movements. Second, I use the caloric potential of agriculture under the set of crops available prior to 1500 from the Caloric Suitability Index for the parent country of birth. I adjust this value for ancestral movements using the post-1500 migration matrix compiled by Putterman and Weil (2010). Therefore, I obtain a weighted average based on the countries of the ancestors of the current residents, not the caloric suitability of their country of birth. I additionally adjust all other geographic and climatic characteristics of parent's home countries in the same way.

Table 6 presents results estimating equation 3 for the sample of second generation migrants in the EVS. The first three columns use the share of ancestral subsistence from agriculture, relative to hunting, gathering, fishing and animal husbandry, to proxy for the importance of agriculture for a country's ancestors. Column 1 controls for a fourth order polynomial of age, gender, an indicator for if one parent was native born, parent continent

[30] I do not include those who had parents born in two different countries abroad.

of birth, ancestry adjusted, the average year ethnicities are sampled, and country fixed effects. Column 2 adds controls for geographic characteristics associated with agriculture, and column 3 controls for geographic characteristics associated with trade. The results suggest a negative association between the level of ancestral control based on the parent's country of birth and the locus of control of their children who are born in a different country.

Columns 4-6 of Table 6 repeats the specifications in columns 1-3 but uses the pre-1500 caloric potential of their parent's country of birth, adjusted for post-1500 population movements, to proxy for the importance of agriculture. The results are consistent with those in columns 1-3. Moreover, the magnitudes in columns 1-3 and 4-6 are similar to those in columns 3-6 of Table 1 and Table 2, suggesting that a primary mechanism for the persistence of the relationship between the ancestral control over subsistence yields and locus of control today is the cultural transmission of beliefs.

7 Implications for Human Capital Investment

I have established a persistent relationship between ancestral control over subsistence yields and contemporary locus of control. A large literature in the social sciences links locus of control with effort and investment. I demonstrate in this section that ancestral control also impacts effort and that locus of control is a key mechanism for this finding.

I investigate a link between ancestral control and contemporary effort within a sample of 15-year-old students that participate in the 2012 Programme for International Student Assessment (PISA), a nationally representative study of 15-year-old achievement in math, science and reading administered in OECD (Organisation for Economic Co-operation and Development) and partner countries.[31] In conjunction with a test to assess the level of their math, reading, and science skills, students are administered a survey about themselves, their homes and their school and learning experiences, with a focus on a specific subject (OECD, 2014). I use the 2012 PISA, which has a focus on mathematics, and has questions related to math-specific locus of control as well as effort put into mathematics learning.

Students are asked to what extent they agree with a series of statements pertaining to their control over learning mathematics. This includes statements about whether they felt they could control their success (e.g., whether or not I do well in mathematics is completely up to me), or if their success is due to the actions of others (e.g., if I had different teachers, I would try harder in mathematics) or bad luck (e.g., I have done badly on mathematics quizzes because I made bad guesses or am just unlucky). In total, there are 11 questions

[31]The PISA test is designed to provide information that is comparable across countries about the outcomes of students as well as to evaluate education systems more broadly worldwide.

that correspond to the student's perception of control over their mathematics learning and achievement. In addition, there is a battery of questions used to ascertain the effort that the student puts into learning math. This includes if they agree with statements like "I work hard on my mathematics homework" and "I keep studying until I understand the material." There are a total of eight questions on math learning effort. For both math locus of control and math learning effort, I combine responses into a single index using principal component analysis. Full text of all questions used are included in the data appendix.

I match students with their ancestral control over subsistence by focusing on second generation migrants to again isolate the culturally portable, intergenerational transmission of beliefs.[32] This results in a sample of 8,705 students who reside in 27 different countries with a parent or parents born in 69 different countries.

Table 7 presents results estimating equation 3 on this sample. The dependent variable in columns 1-3 is the principal component of the questions pertaining to math locus of control, and in columns 4-6 the principal component for the questions pertaining to math learning effort. Columns 1 and 4 include controls for country fixed effects, age (in months), gender, survey fixed effects, an indicator for if one parent was native born, and controls for the continent (ancestry adjusted) of the parent country of birth. Columns 2 and 5 control for ancestry-adjusted geographic characteristics of the parent's country of birth associated with agriculture. Columns 3 and 6 add controls for ancestry-adjusted geographic characteristics associated with trade.[33] The results indicate a negative association between the ancestral control over subsistence of the student's parents and math locus of control in columns 1-3, and a similar relationship with math learning effort in columns 4-6. This provides evidence of the persistence of the relationship between ancestral control over subsistence and locus of control in an additional setting. Moreover, it suggests that it may play a role in the level of human capital investment, proxied by math learning effort.

It is possible that ancestral control of subsistence has a relationship with both math locus of control and math learning effort independent of each other. I investigate if this is the case, along with other potential channels, in Table 8. Column 1 repeats the specification from column 6 in Table 7 for the subsample that has non-missing values for all potential mechanisms. Columns 2-7 repeat this specification while controlling for each candidate mechanism. This method is suggestive as it is vulnerable to reverse-causality and omitted variable concerns.[34] One such key assumption is that math locus of control is determined

[32] Students are not asked to report a specific ethnicity that could be matched with the Ethnographic Atlas.

[33] Table A21 presents reduced form results using the ancestry-adjusted pre-1500 caloric potential of their parent's country of birth for the importance of agriculture.

[34] Online Appendix Section B presents results applying a method devised by Acharya, Blackwell and Sen (2016) that accounts for omitted variable bias due to intermediate variables and the results are similar to

prior to math learning effort, and is not then endogenously updated due to this effort.[35]

The results show that the magnitude of the relationship between ancestral control over subsistence and math learning effort is attenuated by 34% when controlling for math locus of control in column 2, 21% when controlling for parent education in column 3, and 12% when controlling for the average socioeconomic status of the parent's occupation. Wald tests for equivalence of these attenuated magnitudes with the baseline magnitude in column 1 show that these differences are statistically significant. There is no change when controlling for household wealth, log of 1500 population density (ancestry adjusted) of the parent's home country, or the 2000 GDP per capita of the parent's home country in columns 5-7.

This suggests that part of the mechanism for the relationship between ancestral control over subsistence and math learning effort is parental education and occupation status. However, a more important mechanism is the relationship with locus of control for learning mathematics. This provides suggestive evidence that ancestral control over subsistence has a persistent relationship with math learning effort, and about a third of this relationship is operating through locus of control.

8 Conclusion

How do people form beliefs about the returns to effort? In this paper, I study how the economic experiences of a society's ancestors inform the locus of control beliefs of their descendants. I provide evidence of this by exploiting differences in the control that preindustrial societies had over their subsistence in three settings. I proxy for control by the importance of agriculture for a society's preindustrial subsistence and the level of rainfall risk in their ancestral homeland. First, I compare individuals of different ethnicities residing in the same subnational region. Second, I exploit differences from the parental homeland of second generation migrants to provide evidence that the relationship is a culturally portable belief. Third, I demonstrate its importance for human capital investment in a sample of 15 year old students from the PISA. I show that ancestral control has a persistent effect on locus of control for math achievement, and that this belief mediates a third of the relationship with math learning effort.

My findings highlight the important role of cultural factors in informing beliefs about the returns to effort in an uncertain world. I use the introduction of maize in the Old World to demonstrate that locus of control beliefs that are informed by historical experiences

those discussed here.

[35] Empirical evidence suggests that locus of control beliefs are primarily determined prior to and during adolescence (Cobb-Clark and Schurer, 2013).

with agriculture are remarkably persistent. This result suggests that people make economic decisions based on beliefs that are not solely reflective of their current circumstances. More broadly, my results show that psychological characteristics that contribute to the internal constraints of poverty (Banerjee and Mullainathan, 2010; Mani et al., 2013; Haushofer and Fehr, 2014) may have deep, cultural roots and do not solely reflect their current external constraints.

An example of where this is important is illustrated by a recent literature that illustrates the role of aspirations in understanding the behaviors of those in poverty. A theoretical literature advances the possibility of an aspirations based poverty trap (Dalton, Ghosal and Mani, 2016), and shows very high aspirations may induce lower levels of effort than more moderate aspirations (Genicot and Ray, 2017).[36] Building on this, Lybbert and Wydick (2018) advance a framework of how interventions that raise aspirations must be complemented with a release of external constraints (e.g., a cash transfer) and the belief that their actions will lead them to achieve their aspiration (i.e., an internal locus of control) in order to be most effective. This is consistent with recent work highlighting the success of multi-faceted development programs that exploit complementaries in different types of interventions (Banerjee et al., 2015). Therefore, an understanding of when internal constraints are (partly) determined by circumstances not reflective of the current state of the world will help policymakers implementing programs aimed at exploiting the complementaries of relaxing both the internal and external constraints of poverty.

[36]These theories are complemented by an empirical literature that shows a link between adolescent aspirations and later outcomes (Serneels and Dercon, 2014; Ross, 2017; Sánchez and Singh, 2018) and that programs that causally raise education and occupation aspirations also increase education levels (Beaman et al., 2012; Glewwe, Ross and Wydick, 2018; Ross et al., 2018).

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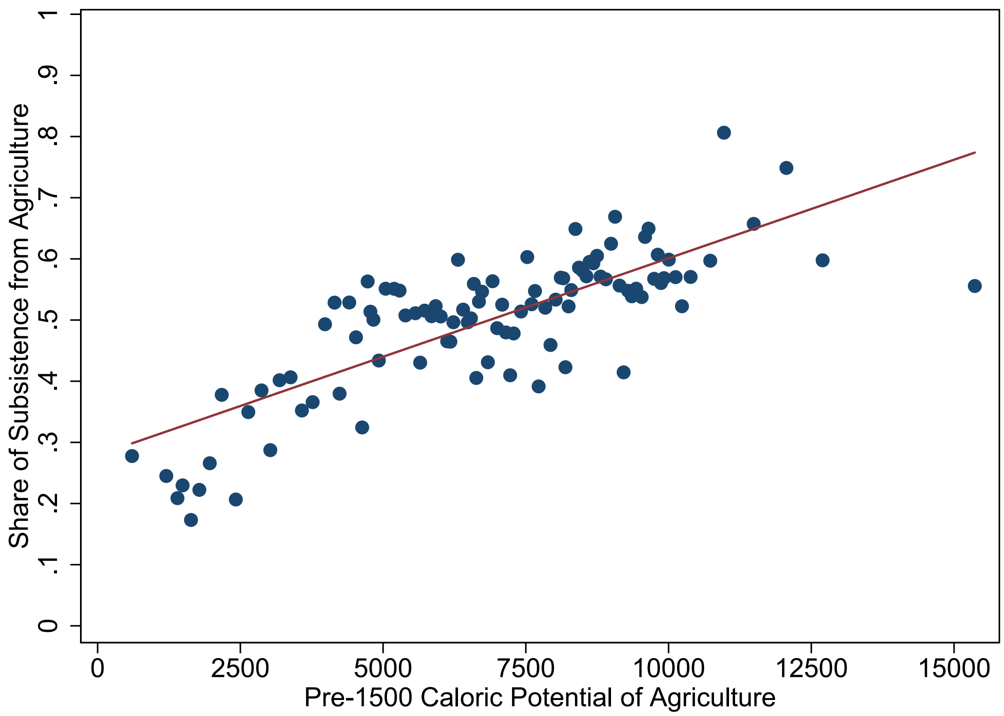
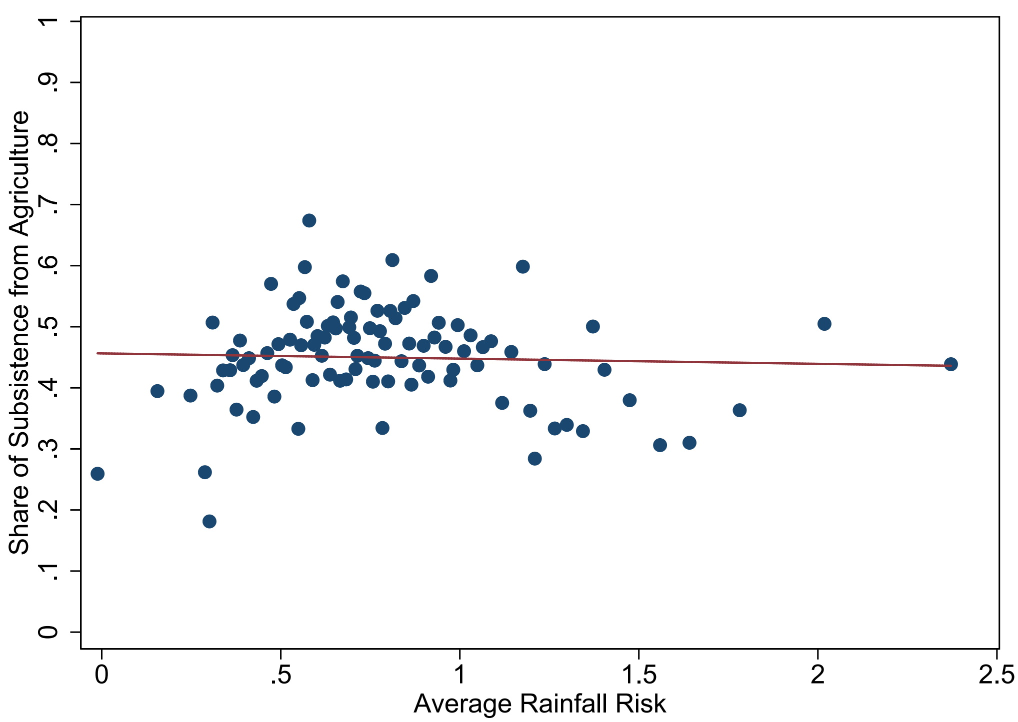
Figure 1: Bin Scatter Plot of Caloric Potential for Agriculture and Rainfall Risk on Share of Subsistence from Agriculture of Ethnographic Atlas Societies

(a) Pre-1500 Caloric Potential

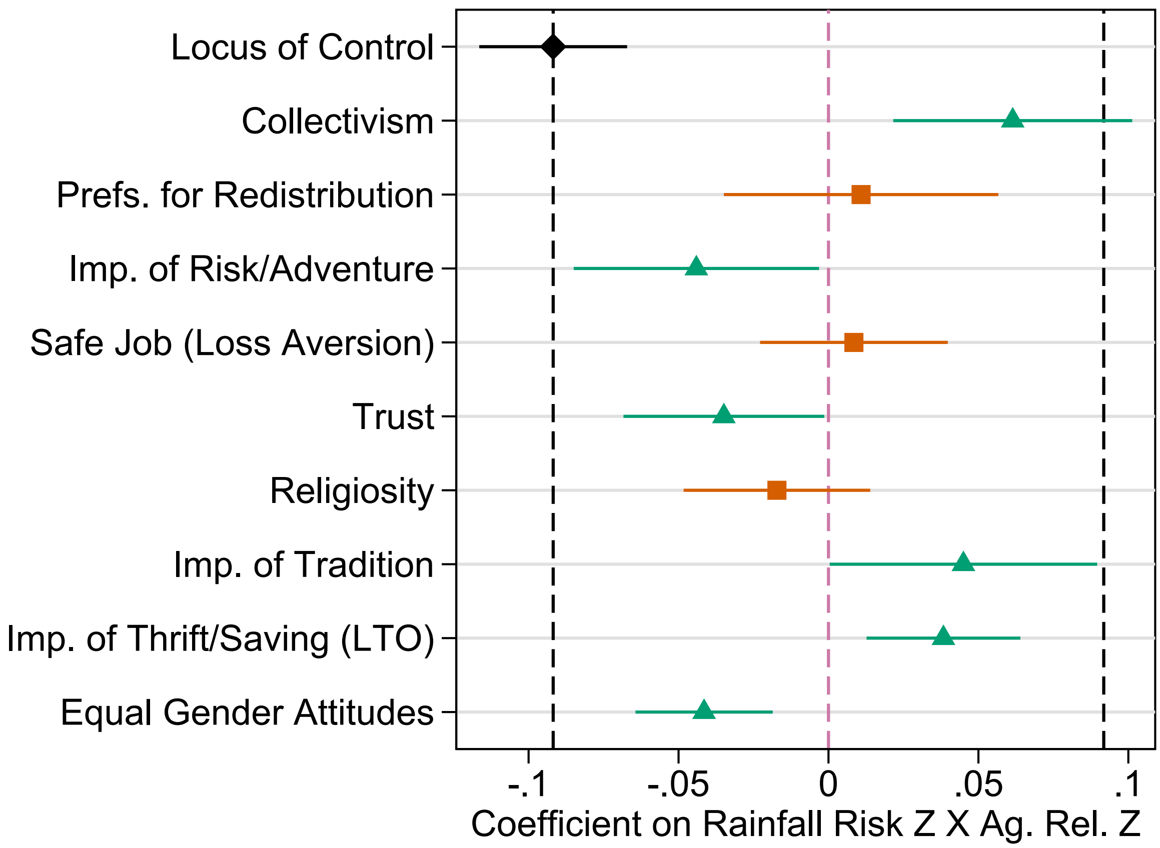


(b) Rainfall Risk



Notes: Each figure presents a bin scatter plot with 100 bins. Total sample size is 1,026. Share of subsistence from agriculture taken from the *Ethnographic Atlas* (Murdock, 1967) and is relative to hunting, gathering, fishing, and animal husbandry. Caloric potential in millions of kilo-calories per hectare per day. Both panels have continent fixed effects partialled out. Panel (b) additionally partials out average precipitation.

Figure 2: Other Cultural Traits as Dependent Variable



Notes: Presents the coefficient on the interaction of rainfall risk z-score and share of subsistence from agriculture z-score from an OLS regression of equation 1 with 95% confidence interval bars. 95% confidence interval calculated from robust standard errors clustered by ethnicity. Each row has a different dependent variable listed on the y-axis. All dependent variables are standardized. All specifications control for gender, a quartic of age, survey wave fixed effects, the year the ehtnicity was sampled, and geographic controls of the ethnic homeland that includes: absolute latitude, average temperature, length of growing season, elevation, share of land suitable for agriculture, malaria ruggedness of land, malaria transmission index, distant to coast, indicator for homeland being landlocked, presence of a major river, presence of a harbor within 25km of the homeland, and log of the size of the homeland. Regression result for locus of control presented in column 6 of Table 1. Regression results for all other outcomes presented in panel A of Table A13.

Table 1: Agriculture Reliance, Rainfall Risk, and Locus of Control

Dependent variable: Locus of control Z-score	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall risk Z × share of subsistence agriculture Z	-0.057**	-0.087***	-0.046***	-0.062***	-0.084***	-0.090***
	(0.024)	(0.023)	(0.010)	(0.008)	(0.014)	(0.012)
Rainfall risk Z-score	0.024	0.001	0.031	-0.007	-0.023	-0.049
	(0.030)	(0.032)	(0.034)	(0.036)	(0.044)	(0.050)
Share of subsistence from agriculture Z-score	-0.106***	-0.051**	-0.036***	-0.015	-0.001	-0.002
	(0.028)	(0.021)	(0.012)	(0.012)	(0.015)	(0.014)
Mean monthly precipitation	Y	Y	Y	Y	Y	Y
Age quartic, gender, survey wave FE	N	Y	Y	Y	Y	Y
Year ethnicity sampled	N	Y	Y	Y	Y	Y
Country FE	N	N	Y	N	N	N
Subnational FE	N	N	N	Y	Y	Y
Agriculture geographic controls	N	N	N	N	Y	Y
Trade geographic controls	N	N	N	N	N	Y
Observations	65498	65498	65498	65498	65498	65498
Societies	140	140	140	140	140	140
Countries	50	50	50	50	50	50
Subnational regions	340	340	340	340	340	340
R^2	0.039	0.073	0.101	0.122	0.123	0.123

Notes: Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Agriculture geographic controls includes absolute latitude, average temperature, length of growing season, elevation, share of land suitable for agriculture, malaria ruggedness of land, and malaria transmission index. Trade geographic controls include distant to coast, indicator for homeland being landlocked, presence of a major river, presence of a harbor within 25km of the homeland, and log of the size of the homeland.

Table 2: Caloric Potential, Rainfall Risk, and Locus of Control

Dependent variable: Locus of control Z-score	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall risk Z × Pre-1500 caloric potential Z	0.076	0.030	-0.096***	-0.085***	-0.073***	-0.082***
	(0.050)	(0.045)	(0.029)	(0.028)	(0.026)	(0.024)
Rainfall risk Z-score	0.208***	0.134***	-0.047	-0.030	-0.028	-0.071
	(0.040)	(0.049)	(0.049)	(0.039)	(0.052)	(0.064)
Pre-1500 caloric potential Z-score	0.001	0.019	-0.014	-0.021	0.045	0.071**
	(0.037)	(0.030)	(0.022)	(0.023)	(0.041)	(0.036)
Mean monthly precipitation	Y	Y	Y	Y	Y	Y
Age quartic, gender, survey wave FE	N	Y	Y	Y	Y	Y
Country FE	N	N	Y	N	N	N
Subnational FE	N	N	N	Y	Y	Y
Agriculture geographic controls	N	N	N	N	Y	Y
Trade geographic controls	N	N	N	N	N	Y
Observations	64925	64925	64925	64925	64925	64925
Societies	138	138	138	138	138	138
Countries	48	48	48	48	48	48
Subnational regions	339	339	339	339	339	339
R^2	0.026	0.057	0.097	0.121	0.122	0.122

Notes: Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Agriculture geographic controls includes absolute latitude, average temperature, length of growing season, elevation, share of land suitable for agriculture, malaria ruggedness of land, and malaria transmission index. Trade geographic controls include distant to coast, indicator for homeland being landlocked, presence of a major river, and presence of a harbor within 25km of the homeland, and log of the size of the homeland.

Table 3: Potential Caloric Rate of Return to Maize and Locus of Control
Relative to All Pre-1500 Crops

Dependent variable: Locus of control Z-score	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Caloric rate of return from maize	-0.097	-0.233*	-0.234*	-0.213***	-0.143*	-0.231***	-0.202***
	(0.183)	(0.118)	(0.120)	(0.071)	(0.078)	(0.080)	(0.077)
Pre-1500 caloric potential	0.004	0.016	0.015	-0.007	-0.008	-0.028*	-0.019
	(0.020)	(0.012)	(0.015)	(0.007)	(0.006)	(0.015)	(0.016)
Age quartic, gender, survey wave FE	N	Y	Y	Y	Y	Y	Y
Population density 1500AD	N	N	Y	Y	Y	Y	Y
Country FE	N	N	N	Y	N	N	N
Subnational FE	N	N	N	N	Y	Y	Y
Agriculture geographic controls	N	N	N	N	N	Y	Y
Trade geographic controls	N	N	N	N	N	N	Y
Observations	61945	61945	61945	61945	61945	61945	61945
Societies	135	135	135	135	135	135	135
Countries	47	47	47	47	47	47	47
Subnational regions	328	328	328	328	328	328	328
R^2	0.001	0.054	0.054	0.097	0.120	0.121	0.121

Notes: Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Agriculture geographic controls includes absolute latitude, average temperature, length of growing season, elevation, share of land suitable for agriculture, malaria ruggedness of land, and malaria transmission index. Trade geographic controls include distant to coast, indicator for homeland being landlocked, presence of a major river, presence of a harbor within 25km of the homeland, and log of the size of the homeland.

Table 4: Persistence of Ancestral Control and Maize

Dependent variable: Locus of control Z-score	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall risk Z × share of subsistence agriculture Z	-0.078***		-0.075***			
	(0.012)		(0.012)			
Rainfall risk Z-score × Pre-1500 caloric potential				-0.040***		-0.032**
				(0.014)		(0.014)
Caloric rate of return from maize		-0.214**	-0.116		-0.257***	-0.181**
		(0.095)	(0.084)		(0.093)	(0.091)
Rainfall risk Z-score	-0.100*		-0.089	0.185		0.150
	(0.052)		(0.054)	(0.124)		(0.119)
Share of subsistence from agriculture Z-score	-0.014		-0.013			
	(0.014)		(0.014)			
Pre-1500 caloric potential	-0.004	0.017	-0.009	0.019	0.014	0.011
	(0.016)	(0.022)	(0.016)	(0.018)	(0.021)	(0.019)
Subnational FE, 1500 populaton density & all controls	Y	Y	Y	Y	Y	Y
Wald test p: RR × share subs. ag.			0.336			
Wald test p: RR × pre-1500 caloric pot.						0.085
Wald test p: Caloric rate of return from maize			0.051			0.040
Observations	65222	65222	65222	64925	64925	64925
Societies	137	137	137	138	138	138
Countries	49	49	49	48	48	48
Subnational regions	337	337	337	339	339	339

Notes: Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. All columns control for age quartic, gender, survey wave fixed effects, absolute latitude, average temperature, length of growing season, elevation, share of land suitable for agriculture, malaria ruggedness of land, malaria transmission index, distant to coast, indicator for homeland being landlocked, presence of a major river, presence of a harbor within 25km of the homeland, and log of the size of the homeland.

Table 5: Controlling for Other Outcomes

Dependent variable: Locus of control Z-score	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
							Pop. Dens.	GDP per
Other outcome	Baseline	Education	Income	Employed	Saved	Mover	1500	Capita 1990
Rainfall risk Z × share of subsistence agriculture Z	-0.081***	-0.068***	-0.048***	-0.077***	-0.075***	-0.082***	-0.084***	-0.081***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.014)	(0.013)
Other outcome		0.058***	0.062***	0.122***	0.177***	-0.043**	0.011	0.001
		(0.006)	(0.005)	(0.018)	(0.022)	(0.021)	(0.014)	(0.016)
Wald test p for = baseline		0.004	0.000	0.002	0.001	0.739	0.417	0.951
Observations	50188	50188	50188	50188	50188	50188	50188	50188
Societies	134	134	134	134	134	134	134	134
Countries	49	49	49	49	49	49	49	49
Subnational regions	336	336	336	336	336	336	336	336
R^2	0.141	0.146	0.157	0.143	0.146	0.141	0.141	0.141

Notes: Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. All columns control for age quartic, gender, survey wave fixed effects, absolute latitude, average temperature, length of growing season, elevation, share of land suitable for agriculture, malaria ruggedness of land, malaria transmission index, distant to coast, indicator for homeland being landlocked, presence of a major river, and presence of a harbor within 25km of the homeland.

Table 6: Agriculture Importance, Rainfall Risk, and Locus of Control
Second Generation Migrants

Dependent variable: Locus of control Z-score	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall risk Z × share of subsistence agriculture Z	-0.025	-0.026*	-0.033**			
	(0.016)	(0.015)	(0.013)			
Rainfall risk Z × Pre-1500 caloric potential Z				-0.037***	-0.034**	-0.035**
				(0.012)	(0.013)	(0.015)
Share of subsistence from agriculture Z-score	0.009	0.023	0.025			
	(0.014)	(0.017)	(0.019)			
Pre-1500 caloric potential Z-score (anc. adj.)				0.004	0.006	0.054
				(0.025)	(0.056)	(0.060)
Rainfall risk Z-score (anc. adj.)	0.009	0.033	0.035	-0.033	-0.029	-0.007
	(0.034)	(0.051)	(0.044)	(0.036)	(0.058)	(0.057)
Mean monthly precipitation (anc. adj.)	Y	Y	Y	Y	Y	Y
Age quartic, gender, native parent	Y	Y	Y	Y	Y	Y
Parent continent (anc. adj.)	Y	Y	Y	Y	Y	Y
Year ethnicity sampled	Y	Y	Y	N	N	N
Country FE	Y	Y	Y	Y	Y	Y
Agriculture geographic controls (anc. adj.)	N	Y	Y	N	Y	Y
Trade geographic controls (anc. adj.)	N	N	Y	N	N	Y
Observations	3634	3634	3634	3653	3653	3653
Parent birth countries	105	105	105	106	106	106
Respondent birth countries	44	44	44	44	44	44
R^2	0.071	0.072	0.073	0.071	0.072	0.075

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Agriculture geographic controls includes absolute latitude, average temperature, length of growing season, elevation, share of land suitable for agriculture, malaria ruggedness of land, malaria transmission index, and share of land in a tropical climate. Trade geographic controls include distant to coast, indicator for homeland being landlocked or an island, presence of a major river, and presence of a harbor within 25km of the homeland.

Table 7: Ancestral Control over Subsistence, Math Locus of Control, and Math Effort
2nd Generation Migrants

Dependent variable	Math LoC Z-score			Math Effort Z-score		
	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall risk Z × share of subsistence agriculture Z	-0.030**	-0.044***	-0.041***	-0.050***	-0.058***	-0.038***
	(0.014)	(0.013)	(0.014)	(0.017)	(0.016)	(0.012)
Share of subsistence from agriculture Z-score	0.006	-0.018	-0.019	0.011	0.021	-0.022
	(0.019)	(0.020)	(0.020)	(0.011)	(0.015)	(0.015)
Rainfall risk Z-score (anc. adj.)	0.069***	0.071**	0.085**	0.054**	0.018	-0.008
	(0.023)	(0.033)	(0.039)	(0.021)	(0.027)	(0.035)
Country FE	Y	Y	Y	Y	Y	Y
Age, gender, native parent, survey FE	Y	Y	Y	Y	Y	Y
Parent continent (anc. adj.)	Y	Y	Y	Y	Y	Y
Year ethnicity sampled	Y	Y	Y	Y	Y	Y
Agriculture geographic controls (anc. adj.)	N	Y	Y	N	Y	Y
Trade geographic controls (anc. adj.)	N	N	Y	N	N	Y
Observations	8281	8281	8281	8414	8414	8414
Parent birth countries	68	68	68	68	68	68
Respondent birth countries	26	26	26	26	26	26
R^2	0.048	0.049	0.050	0.060	0.061	0.063

Notes: Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable in columns 1-3 is the principal component of 11 questions pertaining to math learning locus of control. Dependent variable in columns 4-6 is the principal component of 8 questions pertaining to effort put into math learning. Agriculture geographic controls includes absolute latitude, average temperature, elevation, share of land suitable for agriculture, share of land in a tropical climate, ruggedness of land, and malaria transmission index. Trade geographic controls include distant to coast, indicator for homeland being landlocked or an island, presence of a major river, and presence of a harbor within 25km of the homeland.

Table 8: Potential Mechanisms - Math Effort in PISA

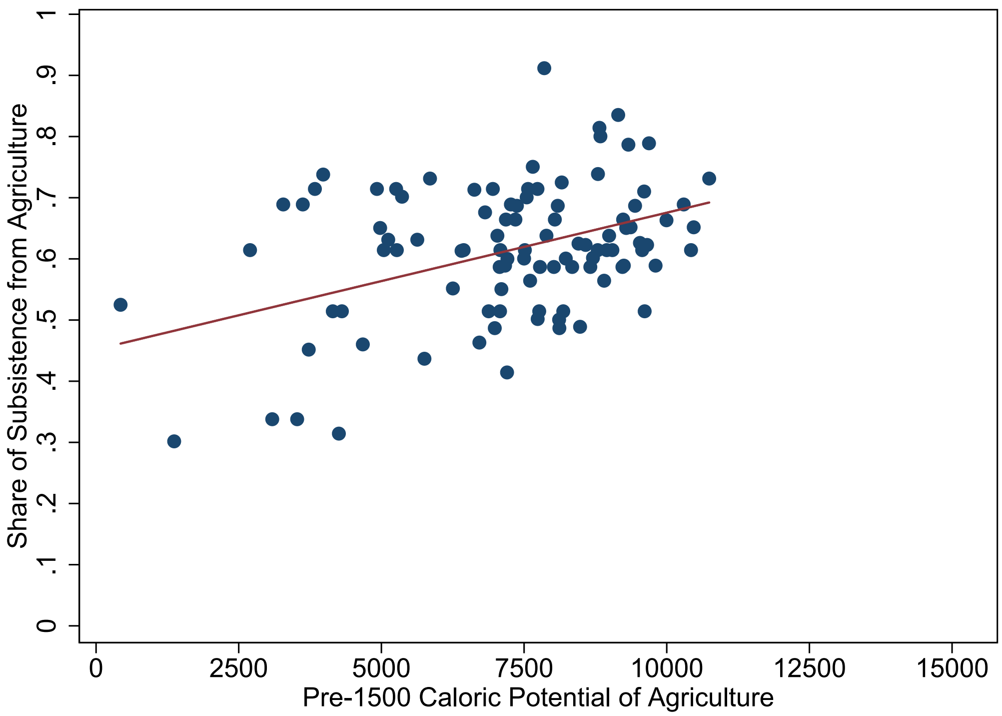
Dependent variable: Math effort Z-score Other Outcome	(1) Baseline	(2) Math LoC	(3) Par. Ed.	(4) Par. SES	(5) Wealth	(6) Pop Dens. 1500	(7) GDP PC 2000
Rainfall risk Z × share of subsistence agriculture Z	-0.037***	-0.023*	-0.027*	-0.032**	-0.037***	-0.037***	-0.037***
	(0.013)	(0.012)	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
Other outcome		0.289***	0.015***	0.002**	0.008	0.007	-0.023
		(0.020)	(0.004)	(0.001)	(0.014)	(0.046)	(0.036)
Wald test p-value for equivalent to baseline		0.002	0.001	0.053	0.716	0.886	0.945
Observations	7497	7497	7497	7497	7497	7497	7497
Societies	68	68	68	68	68	68	68
Countries	26	26	26	26	26	26	26
R^2	0.066	0.147	0.068	0.068	0.066	0.066	0.066

Notes: Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Dependent variable is the principal component of 8 questions pertaining to effort put into math learning. All columns control for gender, age quartic, indicator for having a native parent, average year ethnicities sampled, continent fixed effects (ancestry adjusted), and the following ancestry-adjusted geographic controls: absolute latitude, average temperature, elevation, share of land suitable for agriculture, share of land in a tropical climate, ruggedness of land, malaria transmission, distant to coast, indicator for homeland being landlocked or an island, presence of a major river, and presence of a harbor within 25km of the homeland.

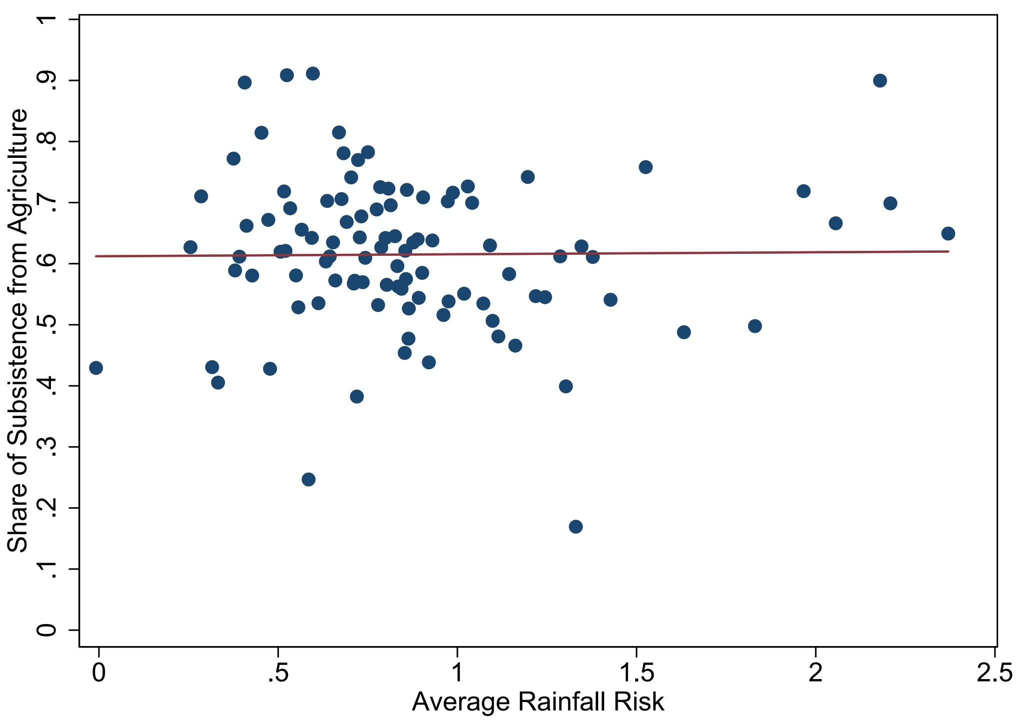
A Additional Tables and Figures

Figure A1: Bin Scatter Plot of Caloric Potential for Agriculture and Rainfall Risk on Share of Subsistence from Agriculture - Ethnicity Matches in WVS

(a) Pre-1500 Caloric Potential - Full EA Sample



(b) Rainfall Risk - Full EA Sample



Notes: Each figure presents a bin scatter plot with 100 bins. Total sample size is 152. Share of subsistence from agriculture taken from the *Ethnographic Atlas* (Murdock, 1967) and is relative to hunting, gathering, fishing, and animal husbandry. Caloric potential in millions of kilo-calories per hectare per day. Both panels have continent fixed effects partialled out. Panel (b) additionally partials out average precipitation.

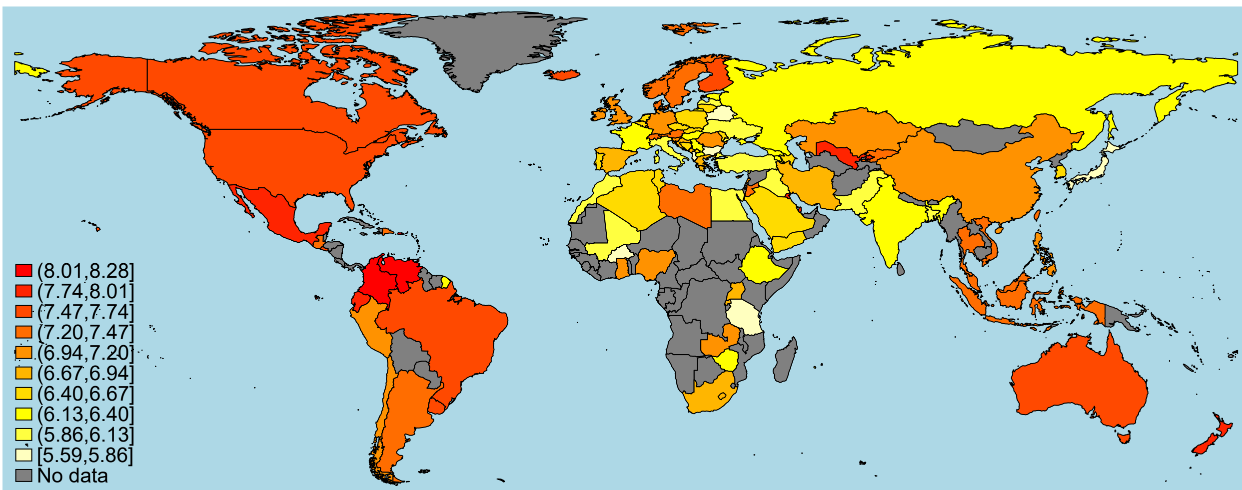


Figure A2: Average Locus of Control from World Values Survey/European Values Study

Notes: Presents mean response to “Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means ‘no choice at all’ and 10 means ‘a great deal of choice’ to indicate how much freedom of choice and control you feel you have over the way your life turns out.”

Table A1: WVS Summary Statistics

	Mean	Median	S.D.	Min.	Max.	N
Locus of control	6.501	7.000	2.504	1.000	10.000	67839
Share of subsistence from agriculture	0.600	0.600	0.166	0.100	0.925	66931
Pre-1500 caloric potential from agriculture	7213.495	7984.718	2373.740	569.080	10803.202	67688
Rainfall risk	0.821	0.583	0.585	0.267	3.177	67839
Potential caloric rate of return to maize	0.160	0.026	0.268	0.000	3.237	67519
Female	0.520	1.000	0.500	0.000	1.000	67819
Age	38.829	36.000	15.663	15.000	98.000	67704
Average mean of monthly temperature (℃)	15.174	16.819	9.023	-0.974	29.140	67839
Average monthly precipitation (cm)	7.261	5.226	5.390	0.130	28.222	67839
Mean reference length of growing period (days)	170.461	156.389	83.356	0.748	365.994	67839
Share of land not suitable for agriculture	0.287	0.104	0.325	0.000	1.000	67839
Absolute latitude	31.425	32.000	17.178	1.000	59.000	67839
Mean altitude (m)	554.630	302.292	515.834	13.026	3661.807	67839
Malaria transmission index	4.330	0.041	8.390	0.000	33.660	67839
Ruggedness (000s of index)	3.367	2.267	3.102	0.061	14.420	67839
Homeland on coast	0.582	1.000	0.493	0.000	1.000	67839
Distance to coast (km)	357.361	216.648	383.298	0.580	2029.644	67839
Harbor on homeland	0.484	0.000	0.500	0.000	1.000	67839
Major river within boundary	0.727	1.000	0.446	0.000	1.000	67839
Homeland area (km^2)	665450.968	94596.730	1561433.817	511.363	5667895.685	67795
Year society sampled	1858.426	1920.000	417.447	-1400.000	1960.000	65726

Notes:

Table A2: EVS Summary Statistics - 2nd Generation Migrants

	Mean	Median	S.D.	Min.	Max.	N
Locus of control	6.784	7.000	2.349	1.000	10.000	3701
Share of ancestral subsistence from agriculture	0.622	0.600	0.101	0.100	0.922	3674
Pre-1500 caloric potential (anc. adj.)	7490.805	8102.091	1991.094	1403.040	10137.393	3663
Rainfall risk (anc. adj.)	0.556	0.467	0.285	0.349	2.833	3661
Female	0.559	1.000	0.497	0.000	1.000	3700
Age	43.919	42.000	17.374	16.000	103.000	3693
One parent native born	0.734	1.000	0.442	0.000	1.000	3701
Average mean of monthly temperature (℃)	7.151	8.541	7.357	-5.830	27.623	3661
Average monthly precipitation (mm)	58.576	53.633	25.866	4.130	218.889	3661
Length of growin season (days)	178.320	186.368	57.022	8.671	344.888	3663
Share of land not suitable for agriculture	0.300	0.181	0.305	0.000	0.952	3663
Absolute latitude	47.832	47.185	10.347	0.839	64.495	3663
Mean altitude (m)	443.251	355.123	272.582	36.611	2827.906	3663
Share of land in tropical climate	0.032	0.000	0.148	0.000	1.000	3663
Malaria transmission index	0.256	0.007	1.568	0.000	25.143	3661
Ruggedness (000s of index)	1.316	0.929	0.852	0.093	5.123	3663
Landlocked	0.115	0.012	0.288	0.000	1.000	3663
Island	0.042	0.000	0.188	0.000	1.000	3663
Distance to coast (km)	554.094	249.950	627.230	4.699	1880.106	3663
Harbor on homeland	0.870	0.988	0.304	0.000	1.000	3661
Major river within boundary	0.828	0.992	0.349	0.000	1.000	3663
lnarea_aa	13.502	13.187	2.041	6.293	17.259	3663
Average year societies sampled	1916.994	1940.891	128.117	-1400.521	1960.000	3654

Notes:

Table A3: PISA Summary Statistics - 2nd Generation Migrants

	Mean	Median	S.D.	Min.	Max.	N
Share of ancestral subsistence from agriculture	0.584	0.599	0.116	0.109	0.922	9137
Pre-1500 caloric potential (anc. adj.)	7536.081	7934.840	1729.703	1403.040	10113.274	8906
Rainfall risk (anc. adj.)	0.649	0.497	0.379	0.349	2.833	9058
Female	0.510	1.000	0.500	0.000	1.000	9299
One parent native born	0.607	1.000	0.489	0.000	1.000	9299
Average mean of monthly temperature (℃)	11.366	9.938	5.978	-5.830	27.045	9058
Average monthly precipitation (mm)	70.822	77.012	28.398	4.130	195.678	9058
Share of land not suitable for agriculture	0.247	0.199	0.252	0.002	0.939	9058
Absolute latitude	42.398	43.548	11.192	4.872	62.338	9058
Mean altitude (m)	497.982	366.720	328.386	36.611	1785.984	9058
Share of land in tropical climate	0.104	0.006	0.250	0.000	1.000	9058
Malaria transmission index	0.457	0.050	1.226	0.000	8.692	9058
Ruggedness (000s of index)	1.455	1.310	0.793	0.093	4.321	9058
Landlocked	0.060	0.002	0.207	0.000	1.000	9058
Island	0.164	0.000	0.353	0.000	1.000	9058
Distance to coast (km)	246.353	133.686	341.108	19.567	1782.886	9058
Harbor on homeland	0.927	0.998	0.227	0.000	1.000	9058
Major river within boundary	0.836	0.990	0.342	0.000	1.000	9058
lnarea_aa	12.886	13.091	1.432	7.023	17.259	9058
Average year societies sampled	1868.810	1940.864	285.554	-1400.521	1959.780	9087

Notes:

Table A4: Agriculture, Alternative Precipitation Variabilities, and Locus of Control

	(1)	(2)	(3)	(4)	(5)	(6)
CV Precipitation Z × share of subsistence agriculture Z	-0.063***	-0.085***	-0.092***			
	(0.009)	(0.014)	(0.012)			
CV Precipitation Z-score	-0.008	-0.025	-0.053			
	(0.037)	(0.045)	(0.050)			
Precipitation predictability Z × share of subsistence agriculture Z				0.080***	0.060***	0.056***
				(0.014)	(0.014)	(0.015)
Precipitation predictability Z-score				0.052	0.120***	0.110***
				(0.033)	(0.036)	(0.038)
Share of subsistence from agriculture Z-score	-0.015	-0.002	-0.003	-0.042**	-0.024	-0.027
	(0.012)	(0.015)	(0.013)	(0.017)	(0.016)	(0.017)
Mean monthly precipitation	Y	Y	Y	Y	Y	Y
Age quartic, gender, survey wave FE	Y	Y	Y	Y	Y	Y
Year ethnicity sampled	Y	Y	Y	Y	Y	Y
Subnational FE	Y	Y	Y	N	Y	Y
Agriculture geographic Controls	N	Y	Y	N	Y	Y
Trade geographic Controls	N	N	Y	N	N	Y
Observations	65498	65498	65498	64659	64659	64659
Societies	140	140	140	138	138	138
Countries	50	50	50	50	50	50
Subnational regions	340	340	340	340	340	340
R^2	0.122	0.123	0.123	0.122	0.123	0.123

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Caloric Potential, Alternative Precipitation Variabilities, and Locus of Control

	(1)	(2)	(3)	(4)	(5)	(6)
CV Precipitation Z × Pre-1500 caloric potential Z	-0.086***	-0.070***	-0.080***			
	(0.029)	(0.025)	(0.024)			
CV Precipitation Z-score	-0.041	-0.038	-0.084			
	(0.039)	(0.053)	(0.068)			
Precipitation predictability Z × Pre-1500 caloric potential Z				0.053***	0.028	0.024
				(0.014)	(0.019)	(0.020)
Precipitation predictability Z-score				0.003	0.123***	0.113***
				(0.034)	(0.038)	(0.042)
Pre-1500 caloric potential Z-score	-0.022	0.044	0.070*	-0.022	0.023	0.050
	(0.023)	(0.042)	(0.037)	(0.019)	(0.045)	(0.042)
Mean monthly precipitation	Y	Y	Y	Y	Y	Y
Age quartic, gender, survey wave FE	Y	Y	Y	Y	Y	Y
Year ethnicity sampled	Y	Y	Y	Y	Y	Y
Subnational FE	Y	Y	Y	N	Y	Y
Agriculture geographic Controls	N	Y	Y	N	Y	Y
Trade geographic Controls	N	N	Y	N	N	Y
Observations	64925	64925	64925	64383	64383	64383
Societies	138	138	138	135	135	135
Countries	48	48	48	49	49	49
Subnational regions	339	339	339	337	337	337
R^2	0.121	0.122	0.122	0.121	0.122	0.123

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Additional Geographic Controls - Agriculture Reliance and Rainfall Risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rainfall risk Z × share of subsistence agriculture Z	-0.093***	-0.092***	-0.095***	-0.094***	-0.091***	-0.093***	-0.092***
	(0.012)	(0.011)	(0.013)	(0.012)	(0.012)	(0.013)	(0.012)
Rainfall risk Z-score	-0.053	-0.042	-0.066	-0.058	-0.031	-0.054	-0.051
	(0.051)	(0.051)	(0.050)	(0.048)	(0.057)	(0.052)	(0.052)
Share of subsistence from agriculture Z-score	-0.002	0.003	-0.003	-0.016	-0.006	-0.001	-0.002
	(0.014)	(0.013)	(0.014)	(0.017)	(0.013)	(0.015)	(0.014)
Average monthly precipitation (m)	0.881	0.780	0.711	6.055**	0.792	0.889	0.879
	(0.670)	(0.622)	(0.627)	(2.327)	(0.596)	(0.668)	(0.669)
Irrigation suitability		0.187**					
		(0.081)					
Cereal advantage over tubers			-0.062				
			(0.042)				
Prcp. squared				-15.793**			
				(6.245)			
Tmp. squared				0.000			
				(0.001)			
Dist. to Neolithic (1000 km)					0.082***		
					(0.028)		
S.D. temperature						0.120	
						(0.311)	
S.D. temperature^2						-0.049	
						(0.117)	
Plough potential							0.003
							(0.011)
Subnational FE & all controls	Y	Y	Y	Y	Y	Y	Y
Observations	65222	65222	65222	65222	65222	65222	65222
Societies	137	137	137	137	137	137	137
Countries	49	49	49	49	49	49	49
Subnational regions	337	337	337	337	337	337	337
R^2	0.123	0.123	0.123	0.123	0.123	0.123	0.123
Oster δ	-28.14	-30.41	-25.15	-32.98	-35.32	-34.08	-32.15

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: Additional Geographic Controls - Caloric Potential and Rainfall Risk

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rainfall risk Z × Pre-1500 caloric potential Z	-0.084***	-0.084***	-0.080***	-0.088***	-0.065***	-0.080***	-0.082***
	(0.025)	(0.024)	(0.026)	(0.026)	(0.025)	(0.026)	(0.025)
Rainfall risk Z-score	-0.071	-0.050	-0.074	-0.082	-0.040	-0.072	-0.067
	(0.065)	(0.061)	(0.062)	(0.065)	(0.074)	(0.064)	(0.062)
Pre-1500 caloric potential Z-score	0.071*	0.065*	0.074**	0.083**	0.059*	0.075**	0.067*
	(0.036)	(0.035)	(0.036)	(0.037)	(0.034)	(0.037)	(0.040)
Average monthly precipitation (m)	-0.352	-0.305	-0.415	0.715	-0.452	-0.330	-0.342
	(0.976)	(0.891)	(0.893)	(3.164)	(0.906)	(0.980)	(0.974)
Irrigation suitability		0.232*					
		(0.121)					
Cereal advantage over tubers			-0.026				
			(0.072)				
Prcp. squared				-3.241			
				(8.111)			
Tmp. squared				0.001			
				(0.001)			
Dist. to Neolithic (1000 km)					0.090**		
					(0.044)		
S.D. temperature						0.234	
						(0.324)	
S.D. temperature^2						-0.077	
						(0.122)	
Plough potential							0.004
							(0.013)
Subnational FE & all controls	Y	Y	Y	Y	Y	Y	Y
Observations	64925	64925	64925	64925	64925	64925	64925
Societies	138	138	138	138	138	138	138
Countries	48	48	48	48	48	48	48
Subnational regions	339	339	339	339	339	339	339
R^2	0.122	0.122	0.122	0.122	0.122	0.122	0.122
Oster δ	3.97	3.98	3.32	4.03	2.13	3.09	3.44

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Additional Ethnographic Atlas Controls - Agriculture Reliance and Rainfall Risk

	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall risk Z × share of subsistence agriculture Z	-0.108***	-0.107***	-0.108***	-0.097***	-0.104***	-0.094***
	(0.011)	(0.012)	(0.012)	(0.016)	(0.013)	(0.014)
Rainfall risk Z-score	-0.050	-0.050	-0.049	-0.062	-0.054	-0.068
	(0.068)	(0.068)	(0.068)	(0.069)	(0.068)	(0.066)
Share of subsistence from agriculture Z-score	0.002	0.005	0.002	-0.001	0.001	-0.002
	(0.013)	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)
Average monthly precipitation (m)	1.115	1.092	1.104	0.983	1.138	1.263*
	(0.731)	(0.717)	(0.705)	(0.796)	(0.733)	(0.729)
Permanency of settlements		-0.005				
		(0.010)				
Political hierarchies			-0.002			
			(0.017)			
Kinship tightness				-0.019		
				(0.015)		
Polygyny					-0.023	
					(0.028)	
Bride price						-0.055**
						(0.026)
Subnational FE and all controls	Y	Y	Y	Y	Y	Y
Observations	57556	57556	57556	57556	57556	57556
Societies	115	115	115	115	115	115
Countries	45	45	45	45	45	45
Subnational regions	305	305	305	305	305	305
R^2	0.131	0.131	0.131	0.131	0.131	0.131
Oster δ	139.41	24.37	128.73	4.11	7.71	5.16

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Importance of Agriculture and Rainfall Risk - Alternative Specifications

	Ex. Ag Workers		DV: Internal LoC		Ordered Probit	
	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall risk Z × share of subsistence agriculture Z	-0.097***		-0.045***		-0.097***	
	(0.012)		(0.006)		(0.014)	
Rainfall risk Z × Pre-1500 caloric potential Z		-0.098***		-0.041***		-0.097***
		(0.025)		(0.012)		(0.026)
Rainfall risk Z-score	-0.063	-0.092	-0.005	-0.014	-0.052	-0.076
	(0.052)	(0.064)	(0.021)	(0.029)	(0.054)	(0.068)
Share of subsistence from agriculture Z-score	0.002		-0.003		0.001	
	(0.014)		(0.006)		(0.016)	
Pre-1500 caloric potential Z-score		0.077**		0.038**		0.076*
		(0.038)		(0.017)		(0.041)
Subnational FE and all controls	Y	Y	Y	Y	Y	Y
Dep. Var. Mean			0.649	0.657		
Observations	58413	58136	65498	64925	65498	64925
Societies	137	135	140	138	140	138
Countries	50	48	50	48	50	48
Subnational regions	340	339	340	339	340	339
R^2	0.122	0.120	0.114	0.114		
Pseudo R^2					0.029	0.029

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score in columns 1,2,5,6. Dependent variable in columns 3-4 is a dummy variable for answering 6-10 on the 10 point locus of control scale. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A10: Ancestral Control and Movement

Dependent variable	Outside Homeland		Outside Country		Outside Homeland, in Country			
Sample	Full						Inside Home Ctry	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rainfall risk Z × share of subsistence agriculture Z	-0.009		0.027		-0.036		-0.036	
	(0.031)		(0.020)		(0.025)		(0.028)	
Rainfall risk Z × Pre-1500 caloric potential Z		0.158***		0.140***		0.019		0.058
		(0.053)		(0.043)		(0.043)		(0.044)
Dep. var. mean	0.304	0.294	0.067	0.070	0.237	0.224	0.254	0.241
Observations	65498	64925	65498	64925	65498	64925	61079	60391
Societies	140	138	140	138	140	138	121	118
R^2	0.293	0.308	0.113	0.162	0.356	0.346	0.373	0.369

Notes: Dependent variable are dummy variables for residing outside homeland. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A11: Caloric Potential, Rainfall Risk, and Locus of Control
Did not move out of country containing ethnic homeland

	(1)	(2)	(3)	(4)	(5)
Rainfall risk Z × Pre-1500 caloric potential Z	0.066	0.015	-0.132***	-0.068*	-0.066*
	(0.052)	(0.046)	(0.037)	(0.035)	(0.034)
Rainfall risk Z-score	0.164***	0.113**	-0.095	0.001	0.001
	(0.045)	(0.051)	(0.081)	(0.086)	(0.085)
Pre-1500 caloric potential Z-score	-0.010	0.025	-0.006	0.096**	0.097**
	(0.040)	(0.034)	(0.022)	(0.043)	(0.043)
Mover					0.032
					(0.030)
Mean monthly precipitation	Y	Y	Y	Y	Y
Individual controls & survey wave FE	N	Y	Y	Y	Y
Country FE	N	N	Y	Y	Y
Agriculture & trade geographic controls	N	N	N	Y	Y
Observations	56694	56694	56694	56694	56694
Societies	123	123	123	123	123
Countries	34	34	34	34	34
R^2	0.018	0.049	0.095	0.097	0.098

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A12: Control for Moving out of Ethnic Homeland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rainfall risk Z × share of subsistence agriculture Z	-0.090***	-0.092***	-0.091***	-0.096***				
	(0.012)	(0.013)	(0.012)	(0.013)				
Rainfall risk Z × Pre-1500 caloric potential Z					-0.082***	-0.084***	-0.079***	-0.083***
					(0.024)	(0.026)	(0.024)	(0.025)
Moved out of country		0.027		0.010		0.011		0.005
		(0.027)		(0.026)		(0.032)		(0.034)
Mover			-0.037*				-0.015	
			(0.021)				(0.026)	
Moved within country				-0.058**				-0.024
				(0.026)				(0.030)
Subnational FE & all controls	Y	Y	Y	Y	Y	Y	Y	Y
Observations	65498	65498	65498	65498	64925	64925	64925	64925
Societies	140	140	140	140	138	138	138	138
Countries	50	50	50	50	48	48	48	48
Subnational regions	340	340	340	340	339	339	339	339
R^2	0.123	0.123	0.123	0.123	0.122	0.122	0.122	0.122

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A13: Reliance on Agriculture, Rainfall Risk, and Other Traits

Other trait	(1) Prefs. Redist.	(2) Collectivism	(3) Religiosity	(4) Risk	(5) Trust	(6) Tradition	(7) Loss Aversion	(8) LTO	(9) Gender Att.
A. Other traits as outcome									
Rainfall risk Z × share of subsistence agriculture Z	0.011	0.061***	-0.017	-0.044**	-0.035**	0.045**	0.008	0.038***	-0.041***
	(0.023)	(0.020)	(0.016)	(0.021)	(0.017)	(0.023)	(0.016)	(0.013)	(0.012)
R^2	0.099	0.122	0.349	0.180	0.089	0.107	0.078	0.095	0.199
B. LoC as outcome on sample with non-missing other trait									
Rainfall risk Z × share of subsistence agriculture Z	-0.115***	-0.089***	-0.091***	-0.086***	-0.088***	-0.086***	-0.115***	-0.092***	-0.085***
	(0.013)	(0.012)	(0.014)	(0.018)	(0.012)	(0.018)	(0.018)	(0.012)	(0.012)
R^2	0.131	0.123	0.125	0.083	0.119	0.083	0.127	0.123	0.121
C. LoC as outcome, controlling for other traits									
Rainfall risk Z × share of subsistence agriculture Z	-0.114***	-0.088***	-0.090***	-0.082***	-0.089***	-0.088***	-0.115***	-0.091***	-0.083***
	(0.013)	(0.012)	(0.014)	(0.018)	(0.012)	(0.018)	(0.018)	(0.012)	(0.012)
Other trait	-0.091***	-0.022***	0.039***	0.091***	-0.006	0.038***	-0.002	-0.031***	0.034***
	(0.013)	(0.008)	(0.015)	(0.014)	(0.011)	(0.010)	(0.009)	(0.005)	(0.007)
R^2	0.139	0.124	0.126	0.091	0.119	0.084	0.127	0.124	0.122
Observations	43839	59082	43151	29208	60324	29296	40835	65498	61743
Societies	119	137	109	111	140	111	99	140	139
Countries	39	47	40	33	50	33	38	50	50
Subnational regions	268	332	260	185	339	185	243	340	339

Notes:

Table A14: Caloric Potential, Rainfall Risk, and Other Traits

Other trait	(1) Prefs. Redist.	(2) Collectivism	(3) Religiosity	(4) Risk	(5) Trust	(6) Tradition	(7) Loss Aversion	(8) LTO	(9) Gender Att.
A. Other traits as outcome									
Rainfall risk Z × Pre-1500 caloric potential Z	0.077**	0.040	0.018	-0.011	-0.026	-0.026	0.029	0.019	-0.006
	(0.036)	(0.031)	(0.037)	(0.038)	(0.024)	(0.044)	(0.034)	(0.019)	(0.027)
R^2	0.097	0.131	0.352	0.181	0.087	0.107	0.076	0.085	0.188
B. LoC as outcome on sample with non-missing other trait									
Rainfall risk Z × Pre-1500 caloric potential Z	-0.084**	-0.088***	-0.100***	-0.037	-0.081***	-0.045	-0.105**	-0.084***	-0.082***
	(0.035)	(0.024)	(0.022)	(0.035)	(0.025)	(0.034)	(0.049)	(0.025)	(0.024)
R^2	0.127	0.122	0.128	0.082	0.118	0.082	0.126	0.122	0.119
C. LoC as outcome, controlling for other traits									
Rainfall risk Z × Pre-1500 caloric potential Z	-0.076**	-0.087***	-0.101***	-0.036	-0.081***	-0.044	-0.105**	-0.083***	-0.081***
	(0.033)	(0.024)	(0.022)	(0.035)	(0.025)	(0.034)	(0.049)	(0.025)	(0.024)
Other trait	-0.094***	-0.027***	0.043***	0.092***	-0.003	0.036***	-0.003	-0.030***	0.035***
	(0.012)	(0.008)	(0.015)	(0.014)	(0.010)	(0.010)	(0.009)	(0.005)	(0.007)
R^2	0.136	0.123	0.129	0.090	0.118	0.083	0.126	0.123	0.120
Observations	45491	58237	42296	29695	59710	29775	41807	64925	60962
Societies	120	135	109	112	138	112	99	138	137
Countries	38	45	39	32	48	32	38	48	48
Subnational regions	272	330	260	182	338	182	248	339	337

Notes:

Table A15: Δ Maize Relative to Pre-1500 Crops and Locus of Control

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ potential calories from maize	0.002	-0.025	-0.026	-0.031***	-0.019	-0.035***	-0.035***
	(0.024)	(0.019)	(0.020)	(0.010)	(0.012)	(0.012)	(0.012)
Pre-1500 caloric potential	0.007	0.021	0.023	-0.001	-0.005	-0.025*	-0.017
	(0.021)	(0.014)	(0.018)	(0.007)	(0.006)	(0.014)	(0.015)
Age quartic, gender, survey wave FE	N	Y	Y	Y	Y	Y	Y
Population density 1500AD	N	N	Y	Y	Y	Y	Y
Country FE	N	N	N	Y	N	N	N
Subnational FE	N	N	N	N	Y	Y	Y
Agriculture geographic controls	N	N	N	N	N	Y	Y
Trade geographic controls	N	N	N	N	N	N	Y
Observations	61945	61945	61945	61945	61945	61945	61945
Societies	135	135	135	135	135	135	135
Countries	47	47	47	47	47	47	47
Subnational regions	328	328	328	328	328	328	328
R^2	0.000	0.051	0.052	0.097	0.120	0.121	0.121

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A16: Potential Caloric Rate of Return to Maize and Locus of Control
Relative to Other Cereals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Caloric rate of return from maize	0.082	-0.221	-0.227	-0.286***	-0.188*	-0.322***	-0.359***
	(0.180)	(0.159)	(0.178)	(0.076)	(0.104)	(0.110)	(0.111)
Caloric potential of other cereals	0.002	0.018	0.019	-0.004	-0.006	-0.024	-0.009
	(0.021)	(0.014)	(0.019)	(0.007)	(0.006)	(0.016)	(0.015)
Age quartic, gender, survey wave FE	N	Y	Y	Y	Y	Y	Y
Population density 1500AD	N	N	Y	Y	Y	Y	Y
Country FE	N	N	N	Y	N	N	N
Subnational FE	N	N	N	N	Y	Y	Y
Agriculture geographic controls	N	N	N	N	N	Y	Y
Trade geographic controls	N	N	N	N	N	N	Y
Observations	61945	61945	61945	61945	61945	61945	61945
Societies	135	135	135	135	135	135	135
Countries	47	47	47	47	47	47	47
Subnational regions	328	328	328	328	328	328	328
R^2	0.000	0.050	0.050	0.097	0.120	0.121	0.121

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A17: Additional Geographic Controls - RoR Maize over Pre-1500 Crops

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Caloric rate of return from maize	-0.202***	-0.546***	-0.408***	-0.408**	-0.542***	-0.678***	-0.336**	-0.520***	-0.586***
	(0.077)	(0.143)	(0.156)	(0.157)	(0.141)	(0.170)	(0.141)	(0.131)	(0.162)
Pre-1500 caloric potential	-0.019	-0.013	0.010	0.010	-0.013	-0.012	-0.012	-0.018	-0.010
	(0.016)	(0.015)	(0.017)	(0.025)	(0.015)	(0.016)	(0.014)	(0.016)	(0.017)
Caloric rate of return from not maize		0.352***	0.345***	0.345**	0.347**	0.444***	0.117	0.255**	0.381***
		(0.130)	(0.131)	(0.135)	(0.135)	(0.152)	(0.135)	(0.125)	(0.141)
Cereal advantage Z-score			-0.105**						
			(0.050)						
Δ Cereal advantage				-0.034**					
				(0.017)					
Cereal advantage pre-1500				-0.034					
				(0.027)					
Irrigation suitability					0.006				
					(0.096)				
Mean precipitation^2						-0.001			
						(0.001)			
Mean temperature^2						0.001			
						(0.000)			
Dist. to Neolithic (1000 km)							0.101***		
							(0.029)		
S.D. temperature								-0.559**	
								(0.274)	
S.D. temperature^2								0.106	
								(0.102)	
Pre-1500 plough potential									-0.008
									(0.011)
Subnational FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Controls	N	Y	Y	Y	Y	Y	Y	Y	Y
Maize = No Maize p		0.001	0.007	0.008	0.001	0.000	0.092	0.002	0.001
Observations	61945	61945	61945	61945	61945	61945	61945	61945	61945
Societies	135	135	135	135	135	135	135	135	135
Countries	47	47	47	47	47	47	47	47	47
Subnational regions	328	328	328	328	328	328	328	328	328
R^2	0.121	0.121	0.121	0.121	0.121	0.121	0.121	0.121	0.121
Oster δ	-11.56	759.67	4.45	4.32	13.39	-89.75	3.18	52.64	25.95

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A18: Importance of Agriculture and Rainfall Risk - Alternative Individual Outcomes

Dependent Variable	Education		Income		Employed		+ Savings Last Year	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rainfall risk Z × share of subsistence agriculture Z	-0.227***		-0.521***		-0.038***		-0.032***	
	(0.063)		(0.097)		(0.010)		(0.008)	
Rainfall risk Z × Pre-1500 caloric potential Z		0.107		-0.184		-0.034**		-0.016
		(0.125)		(0.164)		(0.015)		(0.015)
Subnational FE and all controls	Y	Y	Y	Y	Y	Y	Y	Y
Dep. Var. Mean	3.626	3.664	4.713	4.712	0.511	0.512	0.220	0.231
(S.D.)	(1.468)	(1.429)	(2.303)	(2.302)	(0.500)	(0.500)	(0.415)	(0.421)
Observations	63651	62940	60424	59830	63705	63123	57212	56479
Societies	140	138	139	137	138	136	137	135
Countries	50	48	50	48	50	48	49	47
Subnational regions	340	339	340	339	339	338	337	336
R^2	0.267	0.257	0.208	0.199	0.278	0.275	0.117	0.118

Notes:

Table A19: Importance of Agriculture and Rainfall Risk - Contemporary and Historical Economic Development

Dependent Variable: Ln of	GDP per Capita 1990		Population Density 1500	
	(1)	(2)	(3)	(4)
Rainfall risk Z × share of subsistence agriculture Z	-0.042*		0.012	
	(0.024)		(0.047)	
Rainfall risk Z × Pre-1500 caloric potential Z		-0.046*		0.050
		(0.028)		(0.053)
Subnational FE and geographic controls	Y	Y	Y	Y
Dep. Var. Mean	10.075	9.997	0.577	0.761
(S.D.)	(1.380)	(1.334)	(2.019)	(1.865)
Observations	1059	1012	1072	1023
R^2	0.786	0.783	0.628	0.549

Notes:

Table A20: Controlling for Other Outcomes

Other Outcome	(1) Baseline	(2) Ag Rel.	(3) Sett. Patt.	(4) Pol. Hier.	(5) Kinship	(6) Polygyny	(7) Bride Price
Rainfall risk Z × Pre-1500 caloric potential Z	-0.120***	-0.077***	-0.089***	-0.117***	-0.102***	-0.117***	-0.120***
	(0.028)	(0.026)	(0.027)	(0.027)	(0.026)	(0.031)	(0.031)
Other outcome		-0.062***	-0.044***	-0.016	-0.077***	-0.133***	-0.139***
		(0.017)	(0.011)	(0.024)	(0.014)	(0.040)	(0.034)
Wald test p for = baseline		0.007	0.019	0.559	0.079	0.889	0.969
R^2	0.146	0.146	0.146	0.146	0.147	0.146	0.146

Other Outcome	(8) Education	(9) Income	(10) Employed	(11) Saved	(12) Mover	(13) Pop. Dens 1500	(14) GDP PC 1990
Rainfall risk Z × Pre-1500 caloric potential Z	-0.126***	-0.104***	-0.114***	-0.115***	-0.114***	-0.109***	-0.136***
	(0.028)	(0.027)	(0.028)	(0.027)	(0.027)	(0.030)	(0.031)
Other outcome	0.062***	0.063***	0.128***	0.193***	-0.047**	-0.025	-0.036
	(0.006)	(0.006)	(0.019)	(0.022)	(0.023)	(0.019)	(0.027)
Wald test p for = baseline	0.508	0.234	0.024	0.185	0.196	0.250	0.205
R^2	0.152	0.164	0.149	0.152	0.146	0.146	0.146
Observations	45917	45917	45917	45917	45917	45917	45917
Societies	112	112	112	112	112	112	112
Countries	47	47	47	47	47	47	47
Subnational regions	335	335	335	335	335	335	335

Notes: Dependent variable is ordinal locus of control on a 10 point scale converted to a z-score. Presents results from an OLS specification. Robust standard errors clustered by ethnicity in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A21: Ancestral Control over Subsistence, Math Locus of Control, and Math Effort
2nd Generation Migrants

Dependent variable	Math LoC			Math Effort		
	(1)	(2)	(3)	(4)	(5)	(6)
Rainfall risk Z × Pre-1500 caloric potential Z	-0.022	-0.032**	-0.025*	-0.022	-0.022	-0.033***
	(0.013)	(0.016)	(0.015)	(0.018)	(0.014)	(0.011)
Pre-1500 caloric potential Z-score (anc. adj.)	0.007	0.042	0.056	0.010	0.011	-0.060
	(0.026)	(0.039)	(0.047)	(0.023)	(0.027)	(0.046)
Rainfall risk Z-score (anc. adj.)	0.014	0.024	0.084	0.031	-0.014	-0.079
	(0.029)	(0.075)	(0.095)	(0.041)	(0.073)	(0.090)
Country FE	Y	Y	Y	Y	Y	Y
Age, gender, native parent, survey FE	Y	Y	Y	Y	Y	Y
Parent continent (anc. adj.)	Y	Y	Y	Y	Y	Y
Agriculture geographic controls (anc. adj.)	N	Y	Y	N	Y	Y
Trade geographic controls (anc. adj.)	N	N	Y	N	N	Y
Observations	8219	8219	8219	8351	8351	8351
Parent birth countries	68	68	68	68	68	68
Respondent birth countries	27	27	27	27	27	27
R^2	0.050	0.051	0.051	0.056	0.057	0.059

Notes: