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ABSTRACT

The Agricultural Origins of Time Preference*

This research explores the origins of the distribution of time preference across regions. It advances the hypothesis and establishes empirically, that geographical variations in natural land productivity and their impact on the return to agricultural investment have had a persistent effect on the distribution of long-term orientation across societies. In particular, exploiting a natural experiment associated with the expansion of suitable crops for cultivation in the course of the Columbian Exchange, the research establishes that agro-climatic characteristics in the pre-industrial era that were conducive to higher return to agricultural investment, triggered selection and learning processes that had a persistent positive effect on the prevalence of long-term orientation in the contemporary era.

JEL Classification: O1, O4, Z1

Keywords: time preference, delayed gratification, economic growth, culture, agriculture, economic development, evolution

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1 Introduction

"Patience is bitter, but its fruit is sweet."

– Aristotle

The rate of time preference has been largely viewed as a pivotal factor in the determination of human behavior. The ability to delay gratification has been associated with a variety of virtuous outcomes, ranging from academic accomplishments to physical and emotional health.[1] Moreover, in light of the importance of long-term orientation for human and physical capital formation, technological advancement, and economic growth, time preference has been widely considered as a fundamental element in the formation of the wealth of nations. Nevertheless, despite the central role attributed to time preference in comparative development, the origins of variations in time preferences across societies have remained obscured.[2]

This research explores the origins of the distribution of time preference across regions. It advances the hypothesis and establishes empirically, that geographical variations in natural land productivity and their impact on the return to agricultural investment have had a persistent effect on the distribution of long-term orientation across societies. In particular, exploiting a natural experiment associated with the expansion of suitable crops for cultivation in the course of the Columbian Exchange, the research establishes that agro-climatic characteristics in the pre-industrial era that were conducive to higher return to agricultural investment, triggered selection and learning processes that had a persistent positive effect on the prevalence of long-term orientation in the contemporary era.[3]

The proposed theory generates several testable predictions regarding the effect of the natural return to agricultural investment on the rate of time preference. The theory suggests that in societies in which the ancestral population was exposed to a higher crop yield, for a given growth cycle, long-term orientation had gradually increased, as the representation of traits for a higher long-term orientation had gradually propagated in the population. In particular, the theory suggests that descendants of individuals who resided in geographical regions in which crop yield was historically higher are characterized by higher long-term orientation. Moreover, the theory further suggests that regions that benefited from the expansion in the spectrum of suitable crops in the post-1500 period experienced further gains in the degree of long-term orientation in society, beyond the initial level triggered by the caloric yield in the pre-1500 period.

The empirical analysis exploits an exogenous source of variation in potential crop yield and

[1]Following the pioneering exploration of the causes and effects of the ability to delay gratification and to exert self-control (Mischel and Ebbesen, 1970), this ability has been shown to be correlated with a wide variety of attributes, ranging from body mass to educational outcomes (Ayduk et al., 2000; Dohmen et al., 2010; Mischel et al., 1988, 1989; Shoda et al., 1990).

[2]The effect of time preference on intertemporal choice has been widely explored (e.g., Frederick et al., 2002; Laibson, 1997; Loewenstein and Elster, 1992). Furthermore, evolutionary biologists have studied the evolutionary forces that underline time-discounting (see e.g. Fawcett et al., 2012; Rosati et al., 2007), and their consequences for human behaviors (Stevens and Hauser, 2004).

[3]Consistent with this predicted decline in time preference in the course of human history, Godoy et al. (2004) find that a forager society (i.e., Tsimane' Amerindians in the Bolivian Amazon) is less long-term oriented than Western Societies.

potential crop growth cycle across the globe to establish a positive, statistically and economically significant effect of higher pre-industrial crop yields on various measures of long-term orientation at the country, region, and individual levels. Moreover, it exploits a natural experiment associated with the Columbian Exchange (i.e., the changes in the spectrum of potential crops in the post-1500 period) to identify the persistent historical effect of crop yield on long-term orientation independent of potential selection of high time preference individuals into regions with high agricultural returns.

The study constructs a novel measure of potential caloric yield across regions of the world using the Food and Agriculture Organization‘s global estimates of yield and growth cycle for 48 crops in grids with cells size of $5' \times 5'$ and the US Department of Agriculture's measure of food's caloric content. In particular, in order to capture the conditions that were prevalent during the pre-industrial era, while mitigating possible endogeneity concerns, this research constructs estimates of the potential (rather than the actual) caloric yield per hectare per year, under low level of inputs and rain-fed agriculture – cultivation methods that presumably characterized early stages of development. Moreover, the employed estimates of each crop yield are based on agro-climatic constraints that are largely orthogonal to human intervention. These restrictions remove potential concerns that the estimates of caloric yield reflect endogenous choices that could be potentially correlated with long-term orientation.

Since crops' caloric yield is correlated with other geographical, institutional, cultural, and human factors that might have directly and independently affected the reward for a longer planning horizon and hence the formation of time preferences, the analysis accounts for a wide range of potential confounding factors. In particular, it controls for the effects of absolute latitude, average elevation, terrain roughness, distance to navigable water, as well as islands and landlocked regions. These factors may capture the effect of climatic variability, the sources and fluctuations in food supply, and the feasibility and type of trade on the planning horizon. Furthermore, unobserved continent-specific geographical, cultural, and historical characteristics may have codetermined the global distribution of time preference. Hence, the analysis accounts for these characteristics by the inclusion of a complete set of continental fixed effects, and when the sample permits country fixed-effects.

Moreover, the empirical analysis considers the confounding effect of the advent of sedentary agriculture, as captured by the years elapsed since the onset of the Neolithic Revolution, on the evolution of the rate of time preference. The onset of agriculture could have generated various conflicting effects on the evolution of time preference. In particular, the rise of institutionalized statehood in the aftermath of the transition to agriculture was associated with the taxation of crop yield and thus in a reduction in the incentive to invest (Mayshar et al., 2013; Olsson and Paik, 2013). In contrast, the effect of the Neolithic Revolution on technological advancements (Ashraf and Galor, 2011; Diamond, 1997) and public investment in agricultural infrastructure may have countered this adverse effect on the net crop yield. Thus, the effect of the agricultural revolution on the rate of time preference appears a priori ambiguous.

Consistent with the predictions of the theory, the empirical analysis establishes that indeed higher potential crop yield experienced during the pre-industrial era increased the long-term orientation of individuals in the modern period. The analysis establishes this result in five layers: (i) a cross-country analysis of variations in time preference, that accounts for the confounding effects of a large number of geographical controls, the onset of the Neolithic Revolution, as well as continental fixed effects; (ii) within-country analysis across second-generation migrants, that accounts for host country fixed effects, the sending country's geographical characteristics as well as migrants' individual characteristics, such as gender, age, and education, (iii) a cross-country individual level analysis that accounts for the country's geographical characteristics as well as individuals' characteristics, such as income and education; (iv) cross-regional individual level analysis that accounts for the region's geographical characteristics, individuals' characteristics, such as income and education, and country fixed-effects; and (v) cross-regional analysis that accounts for the confounding effects of a large number of geographical controls, as well as country fixed-effects.

The first part of the empirical analysis examines the effect of crop yield on the rate of time preference across countries. Using the average level of long-term orientation of individuals living in a country during the late XXth century, as proxy for the country's rate of time preference (Hofstede, 1991), the analysis establishes that, conditional on crop growth cycles, higher pre-industrial caloric yield has a positive effect on the levels of long-term orientation in the modern period. The findings are robust to the inclusion of continental fixed-effects, a wide range of confounding geographical characteristics, and the years elapsed since the country transitioned to agriculture. In particular, the estimates suggest that a one-standard deviation increase in potential crop yield increases a country's long-term orientation by about half a standard deviation.

Importantly, the analysis establishes the historical nature of the effects of these geographical characteristics as opposed to a potential contemporary link between geographical attributes, development outcomes and the rate of time preference. In particular, restricting the attention to crops that were available for cultivation in pre-1500CE era, or to regions where crops used in the pre-1500 period were dominated by new crops in the post-1500 period does not affect the qualitative results either. Furthermore, accounting for the potential effect of higher crop yield on population density and urbanization in the past and thus on contemporary economic development, does not affect the qualitative results, suggesting that indeed crop yield had a direct effect on time preferences rather than an indirect one via the effect of geographical factors on the process of development. The results are additionally robust to pre-industrial trade, economies of scale, and climatic variability and therefore the risk associated with agricultural investment.

Reassuringly, the estimated effect of crop yield on the rate of time preference is stronger if rather than estimating the effect of crop yield in the contemporary geographical location, one accounts for migration flows in the post-1500 period and thus estimates the effect on the contemporary rate of time preference of the potential crop yield to which the ancestors of contemporary populations were exposed. These results suggest that indeed the portable, culturally-embodied, components of potential crop yield, rather than the persistent geographical attributes correlated with crop yield, are the ones that have a long-lasting effect on the rate of time preference.

Additionally, this research establishes that long-term orientation is the main cultural characteristic of countries that is determined by potential crop yield. In particular, it establishes that crop yield has largely insignificant effects on country-level measures of generalized levels of trust; individualism or collectivism; internal cooperation or competition; tolerance and rigidness; and hierarchy and inequality of power. This suggests that the effect of crop yield on long-term orientation is not mediated by these other cultural characteristics. In particular, these additional cultural characteristics do not have a statistically significant effect on long-term orientation, nor do they alter the effect of crop yield on it.

Furthermore, the research demonstrates the significance of these findings for the understanding of comparative development. In particular, it demonstrates that crop yield, as well as long-term orientation, is positively correlated with the contemporary level of education across countries. In particular, the estimates imply that a one standard deviation increase in the pre-1500 crop yield experienced by ancestors of a country is associated with one additional year of schooling in the country in the year 2005.

The second part of the empirical analysis exploits the European Social Survey, to examine the effect on the long-term orientation of second-generation migrants in Europe of the crop yield in their parental country of origin. This analysis accounts for host country fixed-effects and thus overcomes a possible concern about the effect of country-specific characteristics on the estimated effects in the first part of the analysis (e.g., institutions, such as the social security system, that mitigate individuals' concern about their future well-being). Furthermore, this setting assures that the effect of crop yield on long-term orientation captures cultural elements that have been transmitted across generations, rather than a direct effect of a possibly omitted characteristic of the country of immigration (Fernández, 2012).

In line with the theory, the findings suggests that higher crop yields in the parental country of origin have a positive, statistically and economically significant effect on the long-term orientation of second-generation migrants. This effect is robust to host country fixed effects, individual characteristics, a wide range of geographical characteristics of the parental country of origin, as well as the number of years since the country of origin transitioned to agriculture. Furthermore, restricting attention to crops that were available for cultivation in the pre-1500CE era, or to regions where crops used in the pre-1500 period were dominated by new crops in the post-1500 period, does not affect the qualitative results. These results further indicate that indeed the portable, culturally-embodied, components of potential crop yield, rather than the persistent geographical attributes correlated with crop yield, are the ones that have a long-lasting effect on long-term orientation.

The third part of the empirical analysis explores the effect of crop yield on individual's long-term orientation based on the World Values Survey, both across countries as well as across regions within a country. The results lend further support for the proposed theory. In particular, they show that the probability of having long-term orientation increases for individuals who live in a region with higher crop yields. This result is robust to the inclusion of continental or country fixed effects, a wide range of confounding regional geographical characteristics as well as individual characteristics.

Furthermore, restricting attention to potential crops that were available for cultivation in pre-1500CE era, or to regions where crops used in the pre-1500 period were dominated by new crops in the post-1500 period, does not affect the qualitative results. Moreover, the estimated effect of crop yield on the rate of time preference is stronger if rather than estimating the effect of crop yield in the contemporary geographical location, one accounts for migration flows in the post-1500 period, and thus estimates the effect on the contemporary rate of time preference of crop yields to which the ancestors of contemporary populations were exposed. These results suggest that indeed the portable, culturally-embodied, components of potential crop yield, rather than the persistent geographical attributes correlated with crop yield, are the ones that have a long-lasting effect on the rate of time preference. Moreover, the qualitative results are not affected by the inclusion of country fixed-effects, despite potential internal migration.

This research constitutes the first attempt to decipher the bio-geographical origins of regional variations in the rate of time preference across the globe. Moreover, it sheds additional light on the geographical and bio-cultural origins of comparative economic development (e.g., Ashraf and Galor, 2013; Diamond, 1997; Spolaore and Wacziarg, 2013), and the persistence of cultural characteristics (e.g., Belloc and Bowles, 2013; Bisin and Verdier, 2000; Fernández, 2012; Guiso et al., 2006).

The remainder of the paper is organized as follows. Section 2 presents a basic model that predicts a positive relation between crop yield and long-term orientation. Section 3 presents the data and empirical strategy. Sections 4, 5, and 6 present the empirical findings. Section 7 concludes. Additional results and supporting material are presented in the appendix.

2 The Model

This section develops a dynamic model that captures the evolution of time preference during the agricultural stage of development – a Malthusian era in which individuals that generated more resources had a larger reproductive success.[4] The model establishes that, in the absence of financial markets, higher crop yields reduced the threshold level of the discount factor above which engagement in agricultural practices that permit higher but delayed return is optimal. Nevertheless, the adoption of crops with higher yields and their effect on resources and thus on reproductive success, gradually increased the representation of high long-term orientation individuals in the population. Moreover, the engagement in profitable investment mitigated the tendency to discount the future. Thus, societies characterized by greater return on agricultural investment are also characterized by higher long-term orientation in the long-run.

Consider an overlapping-generations economy in an agricultural stage of development. In every time period the economy consists of three-period lived individuals who are identical in all respects except for their rate of time preference. In the first period of life - childhood - agents are economically passive and their consumption is provided by their parents. In the second and third periods of life, individuals have access to identical land-intensive production technologies that allow them to

[4]See Ashraf and Galor (2011), Dalgaard and Strulik (2013) and Vollrath (2011).

generate income by hunting, fishing, herding, and land cultivation. Some of the available modes of production require investment (e.g., planting) and delayed consumption, and thus, in the absence of financial markets, individuals' choices regarding their preferred mode of production reflect their rate of time preference.

The composition of the population in terms of the rate of time preference evolves endogenously. Time preference is transmitted from parents to children and it is enhanced by rewarding investment decisions during the individual's life time.[5] Differences in reproductive success across households, therefore, affect the evolution of the average rate of time preference in the economy and its long-run level. In particular, given the positive effect of resources on reproductive success in the agricultural (Malthusian) stage of development, a low rate of time preference and its effect on the undertaking of profitable investment decisions, increases income and thus reproductive success, leading to the propagation of this trait in the population.

2.1 Production

Adult individuals face the choice between two modes of agricultural production: a endowment mode and an investment mode. The endowment mode exploits the existing land for hunting, gathering, fishing, herding, and subsistence agriculture. It provides a constant level of output, $R^0 > 1$, in each of the two working periods of life. The investment production mode, in contrast, is associated with the planting and harvesting of crops. It requires an investment of I_0 in the first period of life, leaving the individuals with 1 unit of output (generated by e.g., hunting, gathering, fishing, herding, or horticulture), but it provides a higher level of resources, R^1, in the second working period of life.

Hence, depending on the choice of production mode, the income stream of member i of generation t (born in period $t-1$) in the two working periods of life, $(y_{i,t}, y_{i,t+1})$, is[6]

$$(y_{i,t}, y_{i,t+1}) = \begin{cases} (R^0, R^0) & \text{under endowment mode} \\ \\ (1, R^1) & \text{under investment mode,} \end{cases} \tag{1}$$

where $\ln(R^1) > 2\ln(R^0)$.[7]

[5] Bowles (1998), Bisin and Verdier (2000), Galor and Moav (2002), Rapoport and Vidal (2007), Doepke and Zilibotti (2008), and Galor and Michalopoulos (2012) explore additional mechanisms behind the evolution of preferences. In particular, Dohmen et al. (2012) establish empirically the presence of intergenerational transmission of cultural traits and the importance of socialization in this transmission process.

[6] This constant average productivity of labor reflects a Malthusian-Boserupian economy in which the adverse effect of an increase in population on the average productivity of labor is mitigated by the advancement in technology that is generated by the scale of the population. These characteristics are consistent with the positive growth of population in the world economy throughout human history.

[7] As will become apparent this assumption assures that the investment mode is profitable for some but not all individuals. Nevertheless, the qualitative analysis will not be altered if all individuals choose the investment mode.

2.2 Preferences and Budget Constraints

In each period t, a generation consisting of L_t individuals becomes economically active. Each member of generation t is born in period $t-1$ to a single parent and lives for three periods.

Individuals generate utility from consumption in each period of their working life and from the number of their children. In particular, the preference of a member i of generation t is represented by the utility function:

$$u^{i,t} = \ln c_{i,t} + \beta_t^i[\gamma \ln n_{i,t+1} + (1-\gamma)\ln c_{i,t+1}]; \qquad \gamma \in (0,1), \tag{2}$$

where $c_{i,t}$ and $c_{i,t+1}$ are the levels of consumption in the first and the second period of the working life of member i of generation t and $n_{i,t+1}$ is the individual's number of children. Furthermore, $\beta_t^i \in [0,1]$ is individual i's discount factor, i.e., $\beta_t^i \equiv 1/(1+\rho_t^i)$, where $\rho_t^i \geq 0$ is the rate of time preference of member i of generation t.

In the first working period, in the absence of financial markets and storage technologies, member i of generation t consumes the entire income, $y_{i,t}$. Hence, consumption of member i of generation t in the first working period, $c_{i,t}$, is

$$c_{i,t} \leq y_{i,t} = \begin{cases} R^0 & \text{under endowment mode} \\ 1 & \text{under investment mode.} \end{cases} \tag{3}$$

In the last period, member i of generation t allocates her income, $y_{i,t+1}$, between consumption, $c_{i,t+1}$, and expenditure on children, $\tau n_{i,t+1}$, where τ is the resource cost of raising a child. Hence, the budget constraint of individual i of generation t in the last period of life is

$$\tau n_{i,t+1} + c_{i,t+1} \leq y_{i,t+1} = \begin{cases} R^0 & \text{under endowment mode} \\ R^1 & \text{under investment mode.} \end{cases} \tag{4}$$

2.3 Allocation of Resources between Consumption and Children

Members of generation t allocate their last period income between consumption and child rearing so as to maximize their utility function (2) subject to the budget constraint (4). Given the homotheticity of preferences, individuals devote a fraction $(1-\gamma)$ of their last period income to consumption and a fraction γ to child rearing. Hence, the level of last period consumption and the number of children of member i of generation t, $c_{i,t+1}$ and $n_{i,t+1}$, are

$$\begin{aligned} c_{i,t+1} &= (1-\gamma)y_{i,t+1}; \\ n_{i,t+1} &= \gamma y_{i,t+1}/\tau. \end{aligned} \tag{5}$$

Given these optimal choices, the level of utility generated by member i of generation t is therefore,

$$v^{i,t} = \ln y_{i,t} + \beta_t^i[\ln y_{i,t+1} + \xi], \tag{6}$$

where $\xi \equiv \gamma \ln(\gamma/\tau) + (1-\gamma)\ln(1-\gamma)]$.

2.4 Choice of Production Mode

Each member i of generation t chooses the desirable mode of production that maximizes life time utility, $v^{i,t}$. Differences in the desirable mode of production across individuals reflect variations in their rate of time preference.

As follows from (1) and (6), given the discount factor, β^i, the life time utility of a member i of generation t, $v^{i,t}$, under each of the two modes of production is

$$v^{i,t} = \begin{cases} \ln R^0 + \beta_t^i[\ln R^0 + \xi] & \text{under endowment mode} \\ \\ \ln 1 + \beta_t^i[\ln R^1 + \xi] & \text{under investment mode.} \end{cases} \tag{7}$$

Hence, there exists an interior level of the discount factor, $\hat{\beta}(R^1)$, such that an individual who possesses this discount factor is indifferent between the endowment and the investment modes of production. In particular,

$$\ln R^0 + \hat{\beta}(R^1)[\ln R^0 + \xi] = \hat{\beta}(R^1)[\ln R^1 + \xi], \tag{8}$$

and therefore

$$\hat{\beta}(R^1) = \frac{\ln R^0}{\ln R^1 - \ln R^0} \in (0,1). \tag{9}$$

The segmentation of the population between the investment and the endowment mode of production is determined by $\hat{\beta}(R^1)$. In particular, the production mode of a member i of generation t would be

$$\text{Production mode} = \begin{cases} \text{endowment} & \text{if} \quad \beta_t^i \leq \hat{\beta}(R^1) \\ \\ \text{investment} & \text{if} \quad \beta_t^i \geq \hat{\beta}(R^1). \end{cases} \tag{10}$$

Thus, in an environment in which the investment mode generates a higher return, R^1, individuals with a higher rate of time preference would be engaged in this production mode. Also, the threshold level of the discount factor above which individuals are engaged in the investment mode is lower if the return on agricultural investment, R^1, is higher, i.e.,

$$\frac{\partial \hat{\beta}(R^1)}{\partial R^1} = \frac{-\ln R^0}{R^1[\ln R^1 - \ln R^0]^2} < 0. \tag{11}$$

2.5 Time Preference, Income and Fertility

The income stream of member i of generation t in the two working periods of life, $(y_{i,t}, y_{i,t+1})$, is determined by the threshold level of $\hat{\beta}(R^1)$ of the discount factor. In particular,

$$(y_{i,t}, y_{i,t+1}) = \begin{cases} (R^0, R^0) & \text{if} \quad \beta_t^i \leq \hat{\beta}(R^1) \\ \\ (1, R^1) & \text{if} \quad \beta_t^i > \hat{\beta}(R^1). \end{cases} \tag{12}$$

Consequently, as follows from (5), the number of children of member i of generation t is determined by the threshold level of future discount factor, $\hat{\beta}(R^1)$.

$$n_{i,t+1} = \frac{\gamma y_{i,t+1}}{\tau} = \begin{cases} \frac{\gamma}{\tau} R^0 \equiv n^E & \text{if} \quad \beta_t^i \leq \hat{\beta}(R^1); \\ \\ \frac{\gamma}{\tau} R^1 \equiv n^I & \text{if} \quad \beta_t^i > \hat{\beta}(R^1). \end{cases} \tag{13}$$

Hence, since $R^1 > R^0$, the number of children of individuals that are engaged in the investment mode of production, n^I, is larger than that of individuals that are engaged in the endowment mode, n^E, i.e.,

$$n^I > n^E. \tag{14}$$

2.6 The Evolution of Time Preference

2.6.1 Evolution of Time Preference within a Dynasty

Suppose that time preference is transmitted across generations. Suppose further that the rate of time preference is affected by the experience of individuals over their life time. In particular, individuals who are engaged in the endowment mode of production maintain their inherited time preference, β_t^i, and transmit it to their offspring, whereas those who are engaged in the investment mode learn to tolerate delayed gratification and transmit to their offspring this acquired tolerance, $\phi(\beta_t^i; R^1)$ that is an increasing, strictly concave function of their inherited time preference, β_t^i. Unlike the experience of individuals who are engaged in the endowment mode of production that has no positive reinforcement on their rate of time preference, the experience of individuals who are engaged in investment provides a positive reinforcement to their patience, enhancing their ability to delay gratification. The discount factor (i.e., the patience) that they transmit to their offspring increases to $\phi(\beta_t^i, R^1)$, reflecting their inherited rate of time preference, β_t^i, as well as their acquired patience due to the reward on their investment in the last period of life, R^1.[8] The higher is the reward to their investment, the better is their experience with delayed gratification (as reflected by higher income and higher reproductive success), and the larger is the increase in their patience.

[8] Bowles (1998) provides an overview of the evidence that preferences may change by individual's experiences. Bandura and Mischel (1965) show in an experimental setting that children become more long-term oriented when observing a long-term oriented adult.

Hence, the rate of time preference that is inherited by a member i of generation $t+1$, β^i_{t+1}, is

$$\beta^i_{t+1} = \begin{cases} \beta^i_t & \text{if} \quad \beta^i_t \le \hat{\beta}(R^1) \\ \\ \phi(\beta^i_t; R^1) & \text{if} \quad \beta^i_t \ge \hat{\beta}(R^1), \end{cases} \tag{15}$$

where for $\beta^i_t \ge \hat{\beta}(R^1)$,

$$\begin{aligned} \beta^i_t \le \phi(\beta^i_t; R^1) \le & 1; \qquad \phi_R(\beta^i_t; R^1) > 0; \\ \phi_\beta(\beta^i_t; R^1) > & 0; \qquad \phi_{\beta\beta}(\beta^i_t; v) < 0. \end{aligned} \tag{16}$$

As depicted in Figure 1, given the evolution of the time preference among individuals who are engaged in the investment mode of production, there exist a unique level of time preference, $\bar{\beta}^I(R^1) > \hat{\beta}(R^1)$, such that

$$\bar{\beta}^I = \phi(\bar{\beta}^I; R^1). \tag{17}$$

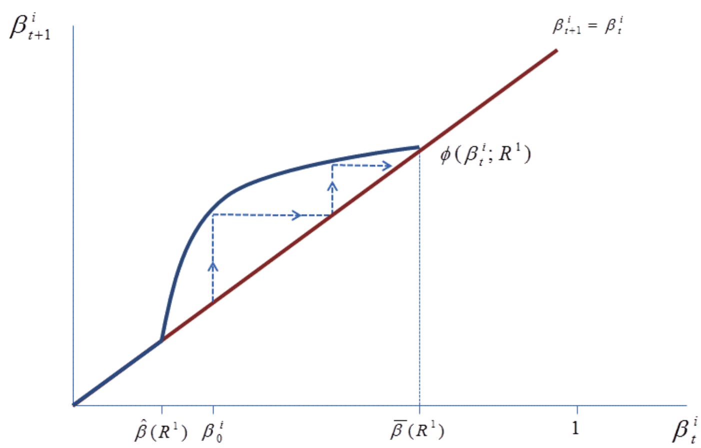


Figure 1: The Evolution of Time Preference within a Dynasty

Moreover, as depicted in Figure 1, as long as the steady-state equilibrium is locally stable (i.e., $\phi_\beta(\bar{\beta}^I; R^1) < 1$), every member i of generation t who is engaged in the investment mode of production converges to the same steady-state equilibrium, i.e., if $\beta^i_0 > \hat{\beta}(R^1)$ then

$$\lim_{t\to\infty} \beta^i_t = \bar{\beta}^I(R^1). \tag{18}$$

The discount factor (i.e. the degree of patience) in the steady-state is higher if the investment mode generates a higher rate of return,[9] i.e.,

$$\frac{\partial \bar{\beta}^I(R^1)}{\partial R^1} = \frac{\phi_R(\beta^i_t; R^1)}{1 - \phi_\beta(\beta^i_t; R^1)} > 0. \tag{19}$$

[9] It is assumed here that $\bar{\beta}^I(R^{1max}) \le 1$.

2.6.2 Evolution of Time Preference Across Generations

Suppose that, as depicted in Figure 1, in period 0, individuals' discount factors in the economy, β_0^i, are distributed over the interval $[0, \tilde{\beta}]$, where $\tilde{\beta} \in (\hat{\beta}(R^1), \bar{\beta}^I(R^1))$.[10] Suppose further that the initial size of the population of generation 0 is $L_0 = 1$, i.e.,

$$L_0 = \int_0^{\tilde{\beta}} \nu(\beta_0^i) d\beta_0^i = 1, \tag{20}$$

where $\nu(\beta_0^i)$ is a continuous distribution function.

Given the threshold level of the discount factor, $\hat{\beta}(R^1)$, above which the investment mode of production is beneficial, the size of the population of generation 0 that is engaged in the endowment mode of production, L_0^E, and the size of the population of generation 0 that is engaged in the investment mode of production, L_0^I, are:

$$\begin{aligned} L_0^E &= \textstyle\int_0^{\hat{\beta}(R^1)} \nu(\beta_0^i) d\beta_0^i; \\ L_0^I &= \textstyle\int_{\hat{\beta}(R^1)}^{\tilde{\beta}} \nu(\beta_0^i) d\beta_0^i. \end{aligned} \tag{21}$$

Since the critical level, $\hat{\beta}(R^1)$, is stationary over time, it follows from (15), that the distribution of β^i across individuals with a discount factor below $\hat{\beta}(R^1)$ is unchanged over time. Additionally, income and therefore the number of children of individuals who are engaged in the endowment mode of production and of those engaged in the investment mode is constant over time.

Thus, in generation t the size of the population of each group (i.e., the endowment type, S, and the investment type, I) is determined by its initial size and the number of children per adult. Specifically,

$$\begin{aligned} L_t^E &= (n^E)^t L_0^E = (\tfrac{\gamma}{\gamma} R^0)^t L_0^E, \\ L_t^I &= (n^I)^t L_0^I = (\tfrac{\gamma}{\gamma} R^1)^t L_0^I, \end{aligned} \tag{22}$$

where

$$L_t^E + L_t^I = L_t. \tag{23}$$

The average rate of time preference of generation t, $\bar{\beta}_t$, is therefore the weighted average of the average time preference of the endowment type, $\bar{\beta}_t^E$, and of the investment type, $\bar{\beta}_t^I$, in this generation.[11] The weights are determined by the relative size of two types of individuals in generation t.

Hence, the average rate of time preference in society in period t, $\bar{\beta}_t$, is

$$\bar{\beta}_t = \theta_t^E \bar{\beta}_t^E + (1 - \theta_t^E)\bar{\beta}_t^I, \tag{24}$$

[10] This initial condition assures that some individuals will be engaged in each mode of production. Moreover, it assures that for individuals who are engaged in the investment mode of production there are learning opportunities about the virtues of patience.

[11] Note that since there is no learning among the endowment type, $\bar{\beta}_t^E = \bar{\beta}_0^E$.

where θ_t^E is the fraction of offsprings in generation t born to individuals who were engaged in the endowment mode of production in generation 0, i.e.,

$$\theta_t^E \equiv \frac{L_t^E}{L_t^E + L_t^I} = \frac{(R^0)^t}{(R^0)^t + (R^1)^t(L_0^I/L_0^E)} = \theta_t^E(R^1). \tag{25}$$

The fraction of the subsidence type in generation t, θ_t^E, decreases as the return to agricultural investment, R^1, increases, i.e.,

$$\partial\theta_t^E(R^1)/\partial R^1 < 0. \tag{26}$$

Moreover, for a given rate of return, R^1,the fraction of the endowment type declines asymptotically to zero, reflecting their lower reproductive success;

$$\lim_{t\to\infty} \theta_t^E(R^1) = 0. \tag{27}$$

2.7 Steady-State Equilibrium

As the economy approaches a steady-state equilibrium, the fraction of the endowment type in each generation declines asymptotically to zero. Hence, it follows from (18) and (24) that the steady-state level of average time preference in the economy, $\bar{\beta}$, is equal to steady-state level of time preference among individuals who are engaged in the investment mode of production, i.e.

$$\bar{\beta} = \bar{\beta}^I(R^1), \tag{28}$$

where as established in (19), $\partial\bar{\beta}(R^1)/\partial R^1 > 0$.

Thus, while an increase in the rate of return to investment lowers the threshold level of the discount factor above which individuals will chose the investment mode of production, the gradual increase in the ability to delay gratification among individuals engaged in the investment mode of production, and the increase in the relative share of individuals engaged in the investment mode of production, due to their higher resources and thus reproductive success, brings about an increase in the average discount factor, and thus lowers the average rate of time preference in society as a whole in the steady-state.

Furthermore, if after the economy reaches the steady-state equilibrium, $\bar{\beta}^I(R^1)$, new potential crops are introduced into the economy and the return on the investment mode of production increases from R^1 to $R^1 + \Delta R$, then the economy's average rate of time preference will fall. This is depicted in Figure 2, where this increment increases the steady-state level of $\bar{\beta}^I(R^1 + \Delta R)$ and the economy gradually transitions to this new steady state.

Moreover, consider two countries, A and B, that are identical in all respects except for the return to the investment mode of production. Suppose that $R^A < R^B$. Then, as depicted in Figure 3, the high return country, B, would have a higher discount factor in the steady-state (and thus a lower rate of time preference), i.e., $\bar{\beta}(R^B) > \bar{\beta}(R^B)$.

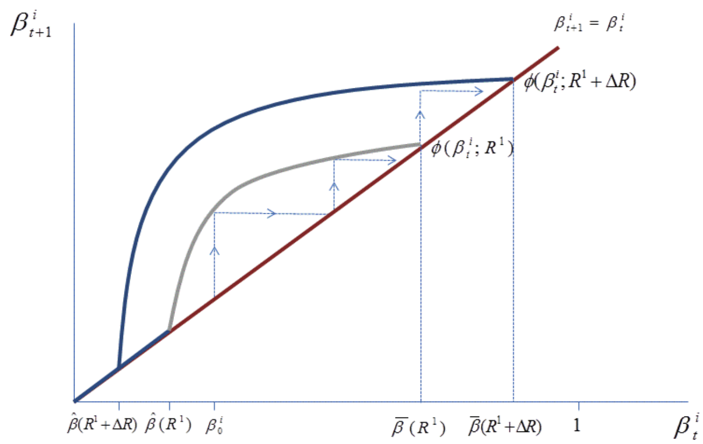


Figure 2: The Effect of the Introduction of New Potential Crops on the Long-Run Rate Steady-State of Time Preference

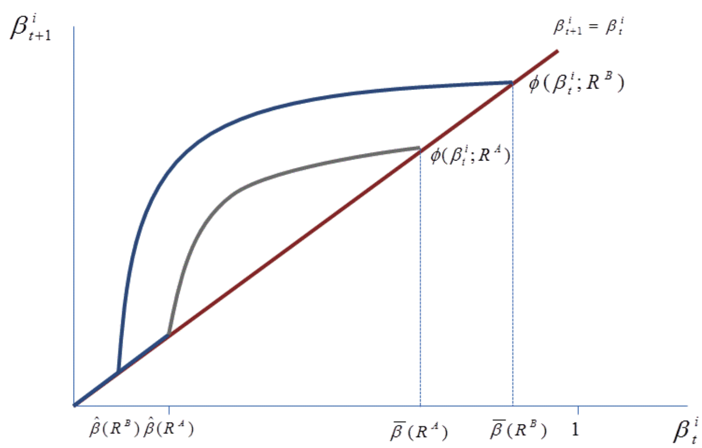


Figure 3: Time Preference Across Countries $R^B > R^A$

2.8 Testable Predictions

The model generates several testable predictions regarding the relationship between crop yield and the rate of time preference. First, the theory suggests that across economies identical in all respects except for their return on agricultural crops, the higher the crop yield is, the lower will be the rate of time preference in the long-run. In particular, given the crop growth cycle, the higher the crop yield, the lower is the average rate of time preference and thus the higher is the average level of long-term orientation.[12]

Second, the theory suggest that expansion in the spectrum of crops in the post-1500 period, (i.e., due to the adoption of new crops), generated an additional increase in the degree of patience

[12]It should be noted that the return to the endowment mode R^0 does not affect the steady-state cross-country variation in time-preference.

in society, beyond the initial level generated by the pre-1500 crops.

Third the theory suggest that an increase in the crop growth cycle generates conflicting effects on the rate of time preference. On the one hand, an increase in the crop growth cycle, holding the crop yield constant, is equivalent to a reduction in the return on investment, and hence it reduces the effect of the rewarding investment experience on the mitigating time preference. However, the increase in the duration of the investment could also operate towards the mitigation of the aversion of delayed consumption. Thus, the overall effect is ambiguous.

3 Data and Empirical Strategy

This section develops the empirical strategy and describes the data used to establish the persistent effect of agricultural productivity – crop yield conditional on its growth cycle – on contemporary variations in the rate of time preference across individuals, regions, and countries.

As hypothesized and established theoretically, the inherent rate of return associated with crop yield, conditional on the crop growth cycle, might have had a persistent positive effect on the rate time preference. In particular, the theory predicts that the rate of time preference had gradually declined in societies in which the ancestral population was exposed to a higher crop yield (conditional on the crop growth cycle), as the representation of individuals with higher long-term orientation had gradually increased in the population.

In order to test the proposed hypothesis, this research constructs measures of historical potential crop yield and crop growth cycles across the globe and examines their persistent effect on a range of existing proxies for time preference, at the individual, regional, and national levels, accounting for continental as well country fixed effects.

3.1 Identification Strategy

The analysis surmounts significant hurdles in the identification of the causal effect of historical crop yield on long-term orientation. First, long-term orientation may affect the choice of technologies and therefore the actual level of crop yield. In order to overcome this potential concern about reverse causality, this research exploits variations in potential (rather than actual) crop yields and growth cycles, which reflect agro-climatic conditions orthogonal to human intervention.

Second, geographical attributes that had contributed to crop yield in the past are likely to be conducive to higher crop yield in the present. In particular, the correlation between past crop yield and contemporary time preference may therefore reflect the direct effect of invariant geographical attributes on contemporary economic outcomes that may be correlated with the rate of time preference. In order to overcome this potential concern, this research exploits the spectrum of potential crops in the pre-1500 period (i.e., prior to the Columbian Exchange) to identify the persistent effect of historical crop yield on long-term orientation, lending credence to the hypothesis that it is the portable, culturally-embodied, components of potential crop yield, rather than persistent geographical attributes that affect time preference.

Third, the natural experiment associated with the Columbian Exchange and the random differential assignment of superior crops to different regions of the world further permits to overcome the potential concern about selection of high time preference individuals into geographical regions characterized by higher agricultural return. While this selection process would not affect the nature of the results, i.e. that variations in the return to agricultural investment across the globe is the origin of the differences in time preferences, it reinforces the viewpoint that these geographical conditions had a direct effect on the evolution of time preference independent of the potential initial selection.

Fourth, nevertheless, superior historical crop-yield could have affected positively past economic outcomes (e.g., population density and urbanization), which persisted over time and may have directly affected the observed rate of time preference. Hence, accounting for historical population density as well as urbanization, permits the analysis to isolate the portable, culturally-embodied, components of potential crop yield, from the potential effect of the persistence of past economic prosperity.

Finally, the results may be biased by omitted geographical, institutional, cultural, or human characteristics that might have determined long-term orientation and are correlated with potential crop yield. In order to overcome this concern, this research employs various strategies. First, the analysis accounts for a large set of possible confounding geographical characteristics (e.g., absolute latitude, elevation, roughness, distance to the sea or navigable rivers, average precipitation, percentages of a country's area in tropical, subtropical or temperate zones, and average suitability for agriculture). Second, it employs continental fixed effects in order to capture unobserved time-invariant heterogeneity at the continental level. Third, it accounts for possible confounding individual characteristics (e.g., age, gender, education, religiosity, marital status, and income). Fourth, the research conducts regional-level analyses of the effect of potential crop yield on long-term orientation, accounting for country fixed effects and thus unobserved time-invariant country-specific factors. Fifth, the research explores the determinants of time-preference in second-generation migrants, accounting for the host country fixed effects, and thus time-invariant country-of-birth-specific factors, (e.g., geography, institutions culture), and permitting the identification of the effect of the portable, culturally-embodied, component of geography.

3.2 Independent Variables: Potential Crop Yield and Growth Cycle

The main independent variables in this research are potential crop yield and potential crop growth cycle in the pre-industrial era. These historical measures are constructed using data from the Global Agro-Ecological Zones (GAEZ) project of the Food and Agriculture Organization (FAO).[13] The GAEZ project supplies global estimates of crop yield and crop growth cycle for 48 crops in grids with cells size of $5' \times 5'$ (i.e., approximately 100 km^2).[14] For each crop, GAEZ provides

[13]The data can be obtained from `http://http://gaez.fao.org/`. Data accessed on August 14, 2013.

[14]The crops available are alfalfa, banana, barley, buckwheat, cabbage, cacao, carrot, cassava, chickpea, citrus, coconut, coffee, cotton, cowpea, dry pea, flax, foxtail millet, greengram, groundnuts, indigo rice, maize, oat, oilpalm, olive, onion, palm heart, pearl millet, phaseolus bean, pigeon pea, rye, sorghum, soybean, sunflower, sweet potato,

estimates for crop yield based on three alternative levels of inputs – high, medium, and low - and two possible categories of sources of water supply – rain-fed and irrigation. Additionally, for each input-water source category, it provides two separate estimates for crop yield, based on agro-climatic conditions, that are arguably unaffected by human intervention, and agro-ecological constraints, that could potentially reflect human intervention.

In order to capture the conditions that were prevalent during the pre-industrial era, while mitigating potential endogeneity concerns, this research uses the estimates of potential crop yield and potential crop growth cycle, under low level of inputs and rain-fed agriculture – cultivation methods that characterized early stages of development. Moreover, the estimates of potential crop yield are based on agro-climatic constraints that are largely orthogonal to human intervention. Thus, these restrictions remove the potential concern that the level of agricultural inputs, the irrigation method, and soil quality, reflect endogenous choices that could be potentially correlated with the rate of time preference.[15]

The FAO data set provides for each cell in the agro-climatic grid the potential yield for each crop (measured in tons, per year, per hectare). These estimates account for the effect of temperature and moisture on the growth of the crop, the impact of pests, diseases and weeds on the yield, as well as climatic related "workability constraints". In addition, each cell provides estimates for the growth cycle for each crop, capturing the days elapsed from the planting to full maturity.[16]

In order to better capture the nutritional differences across crops, and thus to ensure comparability in the measure of crop yield, the yield of each crop in the GAEZ data (measured in tons, per hectare, per year) is converted into caloric return (measured in tens of millions of kilo calories, per hectare, per year). This conversion is based on the caloric content of crops, as provided by the United States Department of Agriculture Nutrient Database for Standard Reference.[17] In particular, Table A.1 shows the caloric content for each crop in the GAEZ data (measured in kilo calories per 100g). Using these estimates, a comparable measure of crop yield (in tens of millions of kilo calories, per hectare, per year) is constructed for each crop. Based on these estimates, the analysis assigns to each cell the crop with the highest potential yield. Thus, this comparable measure of crop yield, facilitates the construction of estimates for the average regional crop yield and the average regional crop growth cycle (over grid cells in a region), that reflect the average regional levels of these two variables among crops that maximize the caloric yield in each cell. In particular, since sedentary populations require agricultural outputs in order to support themselves, the analysis uses regional level averages across cells where the maximum potential crop yield is positive.[18] Based on

tea, tomato, wetland rice, wheat, spring wheat, winter wheat, white potato, yams, giant yams, subtropical sorghum, tropical highland sorghum, tropical lowland, sorghum, white yams.

[15]The choice of rain-fed conditions is further justified by the fact that, although some societies had access to irrigation prior to the industrial revolution, GAEZ's data only provides estimates based on irrigation infrastructure available during the late twentieth century.

[16]In case of hibernating crops, the growth cycle captures the days elapsed from onset of post-dormancy period to full maturity.

[17]This paper uses revision 25 accessed on October 29, 2013. Data can be accessed at `http://www.ars.usda.gov/Services/docs.htm?docid=23635`.

[18]The analysis is robust to the inclusion of cells with no potential yield as shown in table B.6 in the appendix.

the crops available pre- and post-1500CE the analysis constructs measures of pre-1500 potential yield, its change post-1500 and contemporary potential yield.

Figure 4 depicts the distribution of potential crop yield and growth cycle across global $5' \times 5'$ grids for crops available pre-1500CE in each continent.[19] Each cell in Figure 4(a) depicts the potential yield (measured in tens of thousands of kilo calories, per hectare, per year) generated by the crop with the highest potential yield in that cell. Higher crop yields are marked by darker cells, while lower ones are marked by lighter ones. Similarly, Figure 4(b) shows in each cell the potential crop growth cycle for the crop with the highest potential yield in that cell. Longer growth cycles are marked by darker cells and shorter ones by lighter cells. Finally, Figure 4(c) shows the ratio of crop yield to growth cycle, which measures the yield per day of crop growth. Higher yields per day of growth cycle are marked by darker cells and lower ones by lighter cells.

As is evident from Figure 4(a), there are large regional and cross country variations in crop yields. The regions with the highest potential pre-1500CE crop yield (i.e., those with above 16,500 tens of millions kilo calories, per year, per hectare) are located in the frontier between Argentina, Brazil and Uruguay, and the south east of the United States. Similarly, as is evident from Figure 4(b), there are large regional and cross country variations in potential pre-1500CE crop growth cycles. The regions with the longest growth cycles (i.e., those that requires more than 180 days) are concentrated in Africa and regions of India.

Figure 5 shows the correlation between the contemporary potential crop yield and growth cycles across countries. As can be seen, there is a strong positive correlation between these country level averages with a Pearson correlation coefficient of 0.78 ($p < 0.01$). This figure epitomizes that *"Trees that are slow to grow, bear the best fruit"* (Molière).

Importantly, potential crop yield is positively correlated with actual crop yield (Figure 6) and thus potential crop yield serves as a proxy for actual crop yield without subjecting the analysis to the concern of reverse causality.[20]

Figure 7 shows for each cell in the world the highest yield producing crop pre- and post-1500CE. Additionally, figure 8 shows for the whole world the set of crops selected and the cells where the selected crop changed after the Columbian Exchange. As can be seen there, (i) few crops dominated each continent pre-1500CE, (ii) post-1500 the number of crops expands dramatically, and (iii) the expansion in available crops changes the highest yield producing crop in most regions around the world.[21]

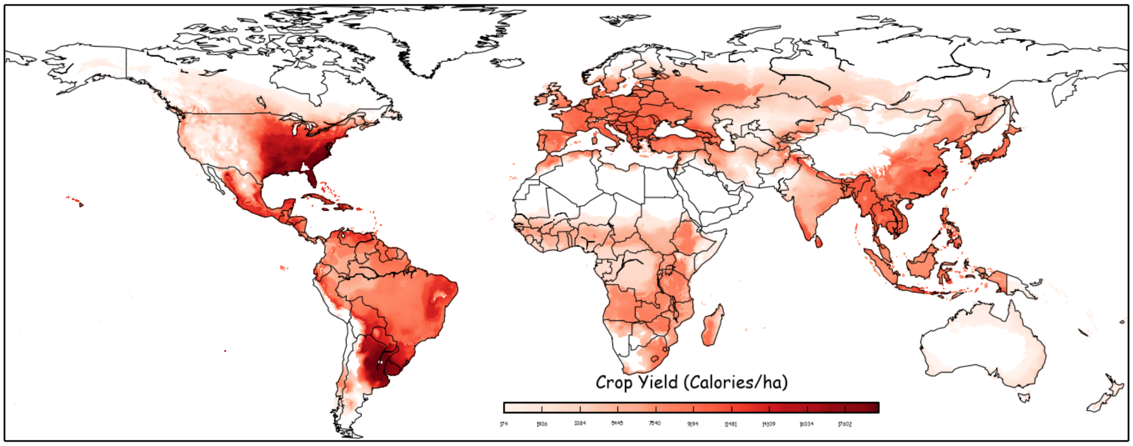
3.3 Additional Controls

The analysis of the effect of crop yield on the rate of time preference highlights its central role in the cross-cultural variation of these preferences. Clearly, crop yield might be only one of many

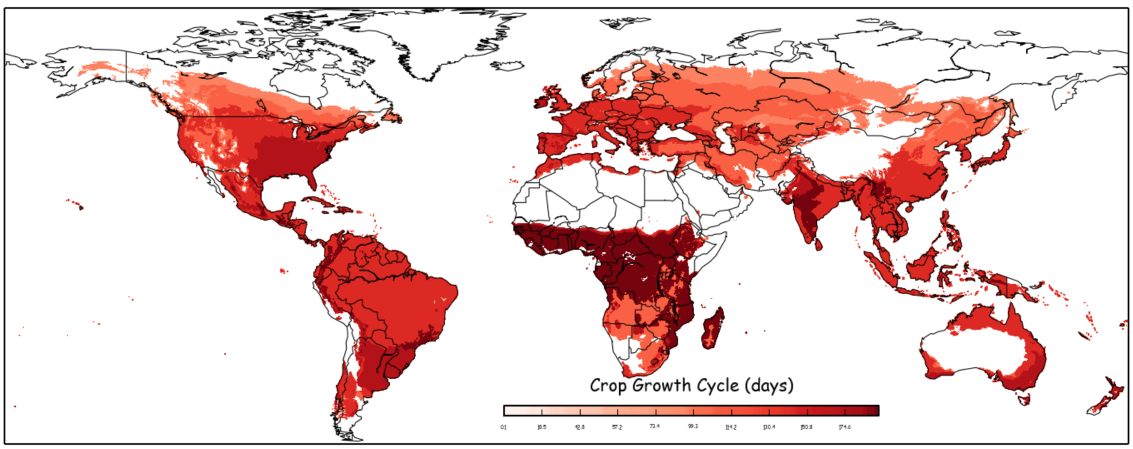
[19] Table A.2 in the appendix shows the global distribution of crops pre-1500CE.

[20] The GAEZ data has actual crop yields for only a few crops, which precludes a meaningful two-stage least-squares analysis.

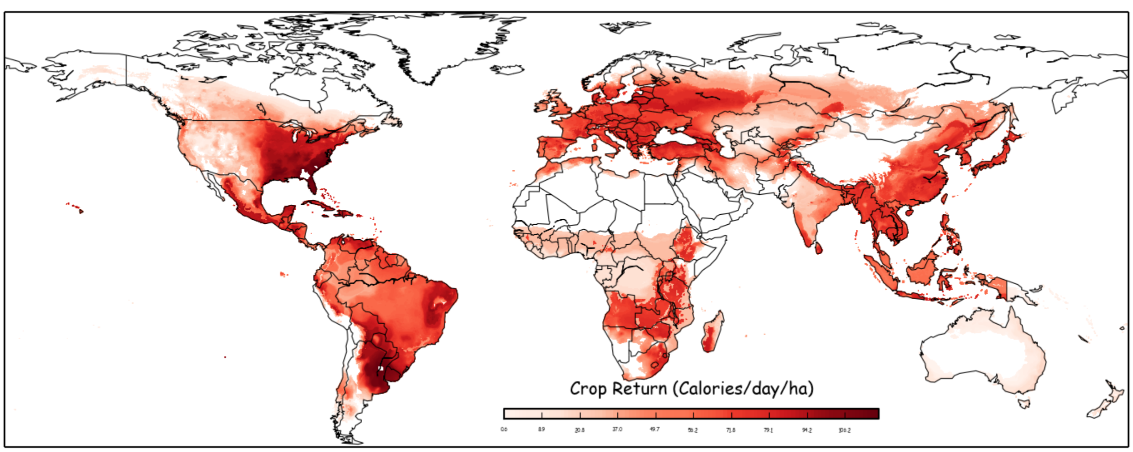
[21] Figure A.1 in the appendix shows the cells that changed crop for each continent. Additionally, figure B.2 shows that selecting the highest yielding or highest return crop generates essentially the same crop selection.



(a) Potential Crop Yield ($5' \times 5'$ Grid)



(b) Potential Crop Growth Cycle ($5' \times 5'$ Grid)



(c) Potential Crop Return ($5' \times 5'$ Grid)

Figure 4: Potential Crop Yield, Growth Cycle, and Returns with pre-1500CE Crops

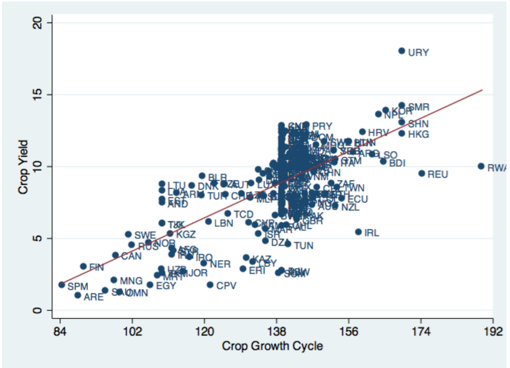
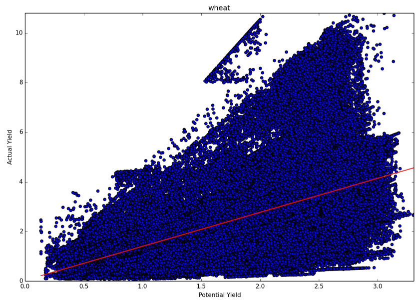
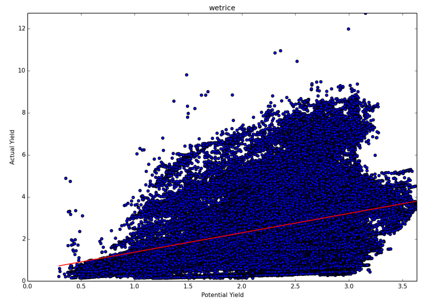


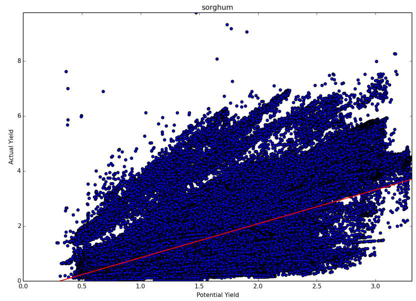
Figure 5: Potential Crop Yield and Potential Crop Growth Cycle



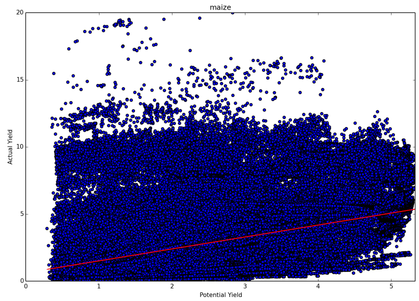
(a) Wheat



(b) Wetland Rice



(c) Sorghum

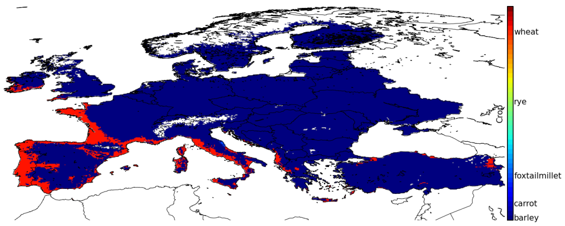


(d) Maize

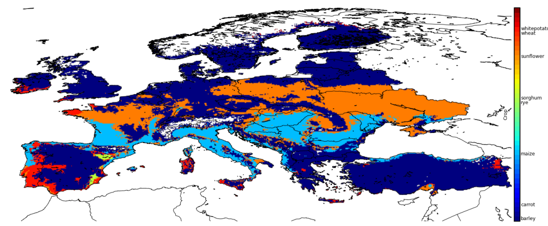
Figure 6: Correlation between Potential and Actual Crop Yields.

geographical determinants, which might also affect the reward of a longer planning horizon and hence the formation of time preferences. Since crop yield is correlated with these other geographical characteristics of a region, it is important to control for these confounders. In particular, absolute latitude, average elevation, terrain roughness, distance to sea or navigable rivers, as well as islands and landlocked regions may capture the effect of climatic variability, fluctuations in food supply, and feasibility of trade on the planing horizon.

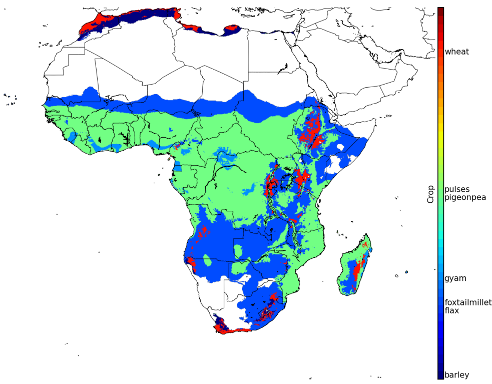
Furthermore, unobserved continent-specific geographical and historical characteristics may have codetermined the global distributions of time preference. For this reason, the analysis accounts for



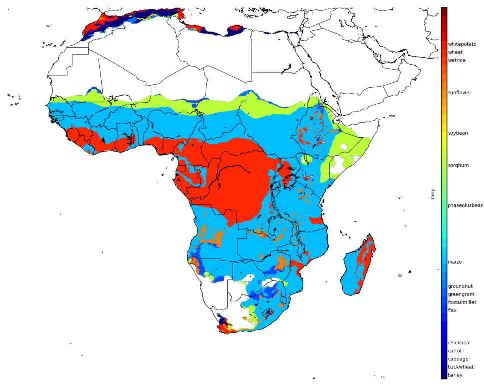
(a) Europe pre-1500CE Crops



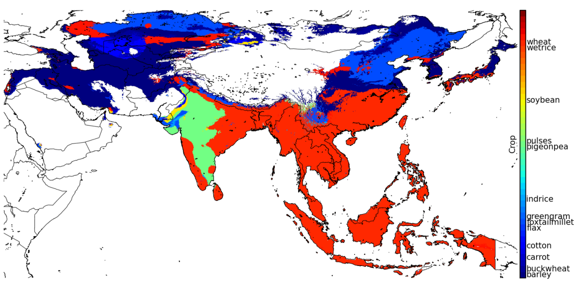
(b) Europe post-1500CE Crops



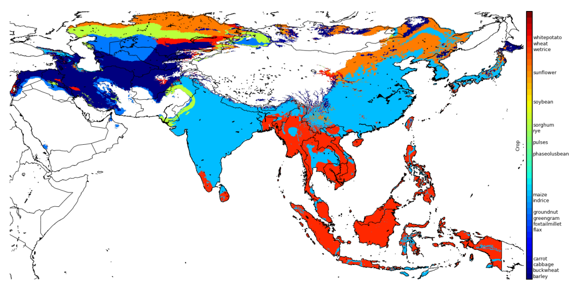
(c) Africa pre-1500CE Crops



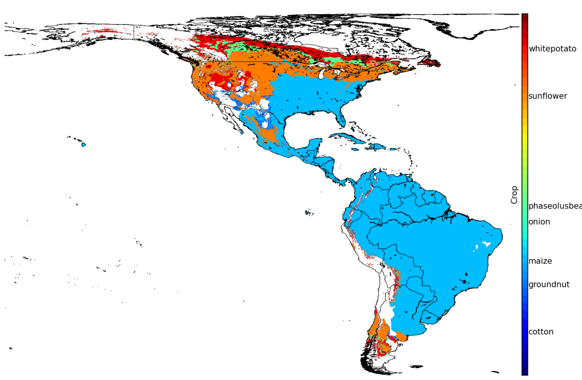
(d) Africa post-1500CE Crops



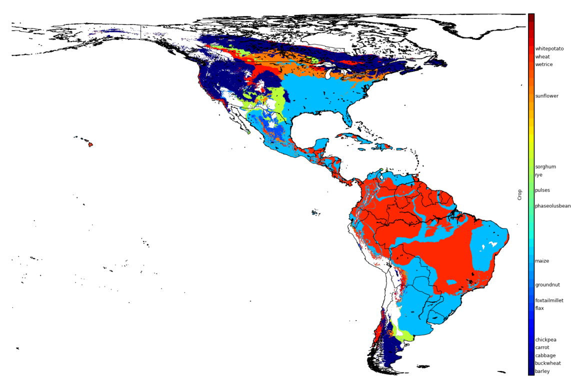
(e) Asia pre-1500CE Crops



(f) Asia post-1500CE Crops

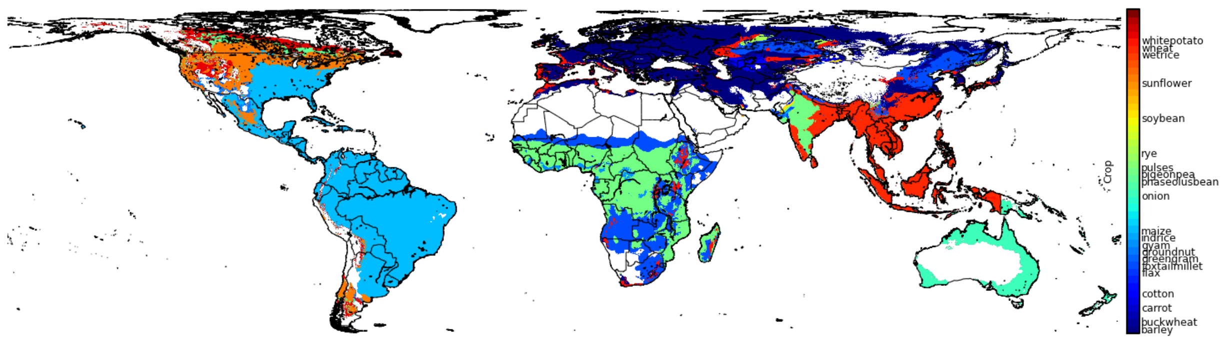


(g) America pre-1500CE Crops

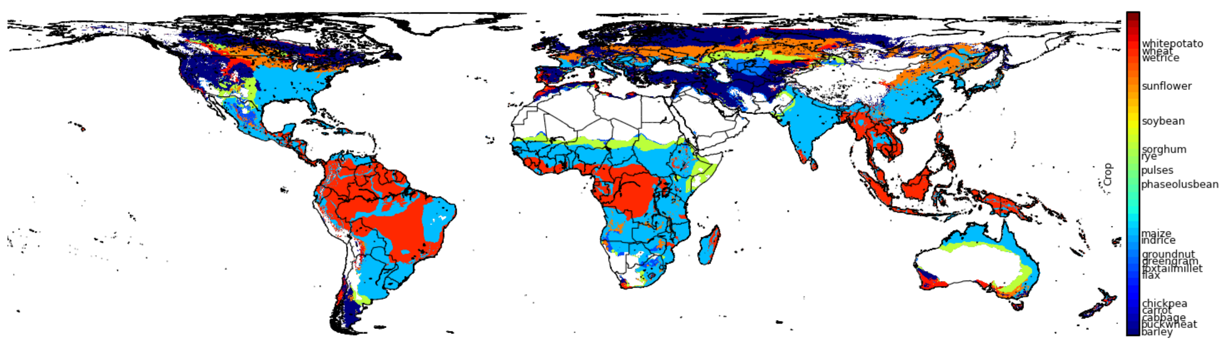


(h) America post-1500CE Crops

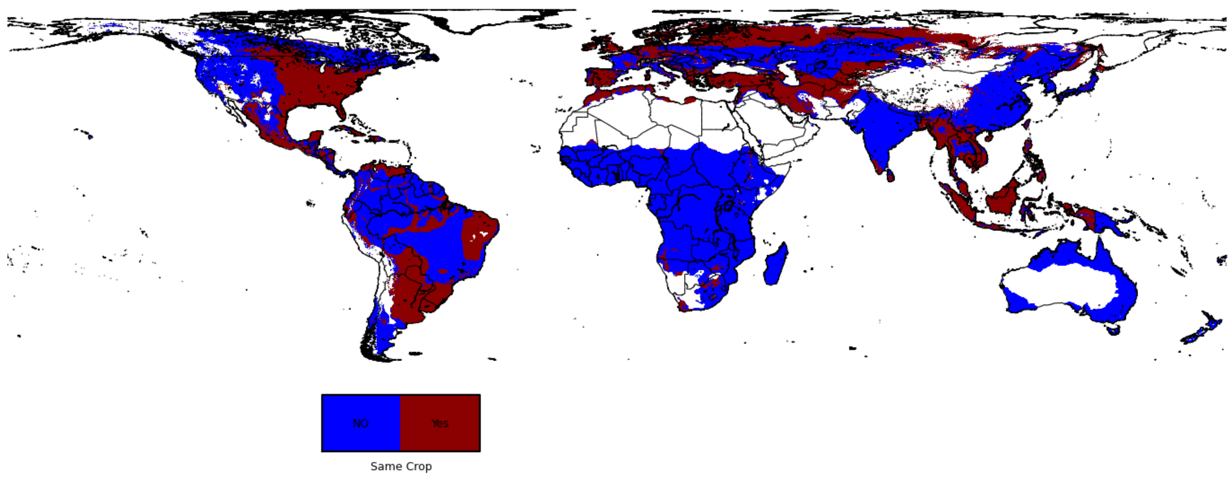
Figure 7: Potential Crop by Region and Period.



(a) World pre-1500CE Crops



(b) World post-1500CE Crops



(c) Same Crop pre- and post1500CE

Figure 8: Potential Crop pre- and post-1500CE.

these characteristics by the inclusion of a complete set of continental fixed effects.

Moreover, the empirical analysis considers the confounding effect of the advent of sedentary agriculture, as captured by the years elapsed since the onset of the Neolithic Revolution, on the evolution of the rate of time preference. The onset of agriculture generated various conflicting effects on the evolution of time preference. The rise of institutionalized statehood in the aftermath of the transition to agriculture was associated with the taxation of crop yield. However, the effect of the Neolithic Revolution on technological advancements and public investment in agricultural infrastructure may have countered this adverse effect on the net crop yield. Thus, for a given crop yield, an earlier onset of the agricultural revolution could be associated with either a lower or higher rate of time preference.

It should be noted that since the proposed theory suggests that higher crop yield had gradually reduced the rate of time preference, the effect of crop yield, conditional on crop growth cycle, would be stronger in regions that experienced the transition to agriculture earlier, provided that this evolutionary process had not matured. However, all countries in the analysis experienced the Neolithic Revolution at least 400 years ago, and the vast majority more than 3000 thousand years ago, this effect is unlikely to be present in a rapid, culturally driven, evolutionary process.

4 Potential Crop Yield and Long-Term Orientation (Cross-Country Analysis)

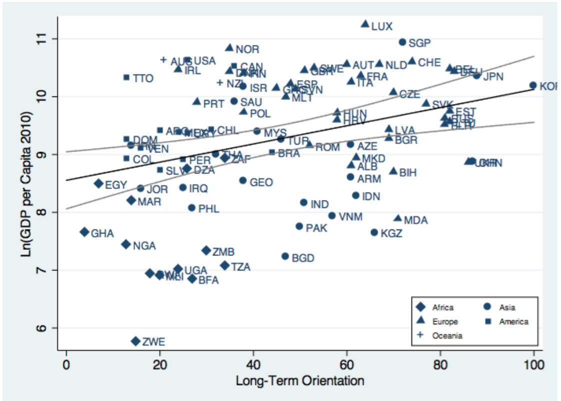
4.1 Baseline Analysis

This section analyzes the empirical relation between crop yield, crop growth cycle, and a country level measure of long-term orientation. In particular, it examines the effect of crop yield on the rate of time preference, where the dependent variable is the cultural dimension identified by Hofstede (1991) as Long-Term Orientation.[22]

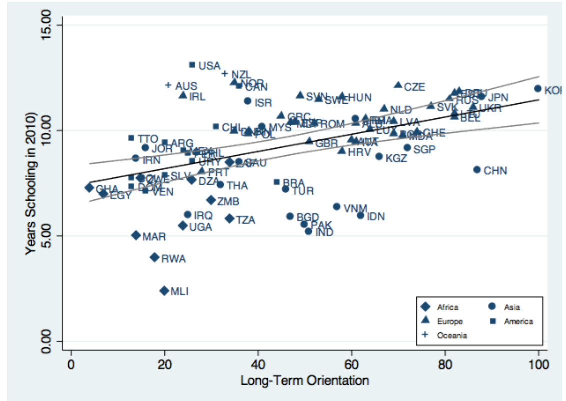
Hofstede (1991) is a major source of cultural dimensions and values, which have been widely used in cross-cultural studies, management, and economics, among others. In the latest version of these cultural dimensions dataset, Hofstede et al. (2010) define Long-Term Orientation as the cultural value that "stands for the fostering of virtues oriented toward future rewards, in particular, perseverance and thrift" (Hofstede et al., 2010, p.239-251). Hofstede and his collaborators have shown that this measure is positively correlated with the importance ascribed to receiving profits in the future, marginal savings rates, investment in real estate, math and science scores, etc. (Hofstede et al., 2010, p.245, 266). Indeed, Figure 9 confirms the positive relation between this measure of Long-Term Orientation and income per capita, education, and growth.

The Long-Term Orientation (LTO) measure varies between 0 (short-term orientation) and 100 (long-term orientation). The geographical distribution of Long-Term Orientation and crop yield for Europe and Africa, continents that did not experience large migration and population replacements

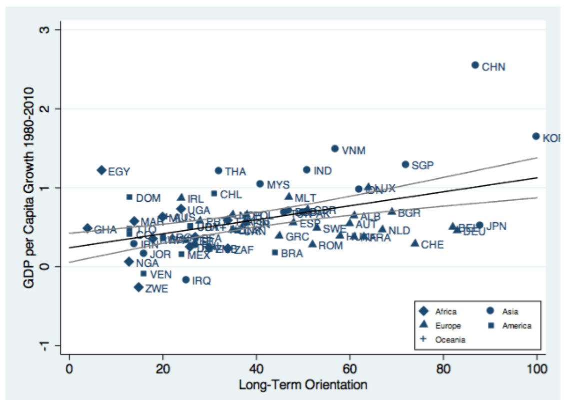
[22] The most current version of the data is available at `http://www.geerthofstede.nl/dimension-data-matrix`.



(a) GDP per capita in 2010 and LTO



(b) Schooling in 2010 and LTO



(c) GDP per capita growth between 1980 and 2010 and LTO

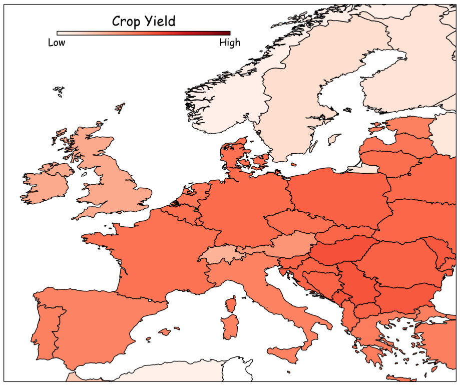
Figure 9: Hofstede's Long-Term Orientation and Development

in the last 500 years, is depicted in Figure 10. Darker tones denote high levels of Long-Term Orientation and of crop yield, while lighter tones denote lower levels of both variables. Table 1 shows supporting evidence at the continental level in the Old World of the relation between Long-Term Orientation, crop yield and growth cycle pre-1500CE. Furthermore, for the sample of countries in the Old World, the correlation between potential crop yield and Long-Term Orientation is 0.6 ($p < 0.01$), and the partial correlation between LTO and potential crop yield and growth cycle is 0.7 ($p < 0.01$) and -0.5 ($p < 0.01$) respectively.

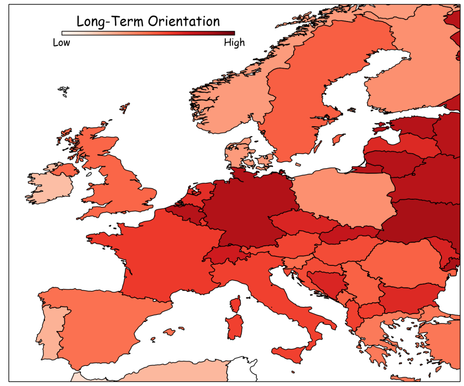
In order to explore the relation between both variables more systematically variations of the following empirical specification are estimated via ordinary least squares (OLS):

$$LTO_i = \beta_0 + \beta_1 \text{crop yield}_i + \beta_2 \text{crop growth cycle}_i + \sum_j \gamma_{0j} X_{ij} + \gamma_1 \text{YST}_i + \sum_c \gamma_c \delta_c + \epsilon_i, \quad (29)$$

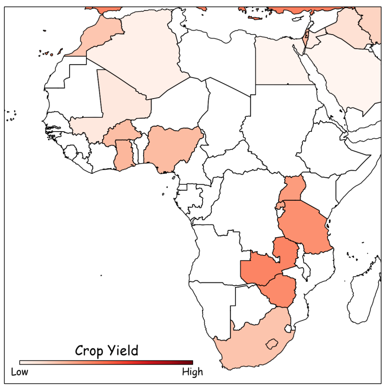
where LTO_i is the level of Long-Term Orientation in country i as identified by Hofstede et al. (2010), crop yield and crop growth cycle of country i are the two measures constructed in the



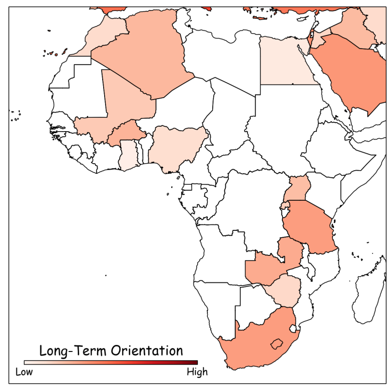
(a) Potential Crop Yield



(b) Long-Term Orientation



(c) Potential Crop Yield



(d) Long-Term Orientation

Figure 10: Potential Crop Yield and Long-Term Orientation

Table 1: Pre-1500CE Crop Yield, Growth Cycle, and Long-Term Orientation - Old World

	Top Crop				All Crops	
Continent	Crop	Yield	Cycle	Return	Yield	Cycle
Europe	Barley	8371.1	124.8	67.5	6116.6	111.9
Asia	Rice	8708.5	139.3	62.5	5972.6	127.1
North Africa	Wheat	5957.7	139.5	42.7	4645.7	133.0
SSA	Pea	4495.3	190.2	23.4	4180.3	189.4

Notes: Yield measured in tens of thousands of kilo calories per hectare per year, cycle in days, and return in tens of thousands of kilo calories p

previous section, X_{ij} are additional geographical characteristics of country i, YST_i are the number of years since country i transitioned to agriculture, δ_c are a complete set of continental fixed effects, and ϵ_i is the error term. The theory proposed in this paper implies that $\beta_1 > 0$. In order to increase comparability across specifications and variables, all independent variables have been normalized by subtracting their mean and dividing them by their standard deviation, and the sample is chosen to include all countries for which all information was available across specifications.

The results of these OLS regressions using the potential crop yield and growth cycle measures based on the full set of available crops in the contemporary era are shown in Table 2. Column (1) shows the effect of crop yield on Long-Term Orientation after controlling for continental fixed effects, that capture the effect of any unobserved time-invariant omitted variable at the continental level. The estimated coefficient is statistically significant at the 1% and implies an economically significant effect of crop yield. In particular, an increase of one standard deviation in crop yield (approximately 2758 tens of millions of kilo calories per hectare per year) increases Long-Term Orientation by 0.3 standard deviations, i.e. 7.4 percentage points. Thus, crop yield has a positive effect on Long-Term Orientation as suggested by the theory.

Column (2) controls for other confounding geographical characteristics of the country. In particular, a country's absolute latitude, mean elevation above sea level, its terrain roughness, its mean distance to the sea or a navigable river, and dummies for being landlocked or an island. The statistical and economic significance of crop yield remains, and the point estimate is higher by 2.4 units. This implies that after controlling for the effects of geography and unobserved continental heterogeneity, one additional standard deviation in crop yield increases Long-Term Orientation by 9.8 percentage points or equivalently 0.4 standard deviations. This is the largest effect of any of the variables included in the analysis. Furthermore, most geographical characteristics of a country have an effect on Long-Term Orientation that is not statistically different from zero at traditional significance levels.

Column (3) adds years since a country experienced the Neolithic Revolution to the previous controls. The coefficient on crop yield remains statistically significant at the 1% level and implies that an additional standard deviation in crop yield increases Long-Term Orientation by 9.1 percentage points. The effect of other geographical characteristics remains smaller than the effect of crop yield. Additionally, the effect of the timing of transition to the Neolithic is negative and statistically significant at the 5%. Thus, one additional standard deviation in the number of years since the transition to the Neolithic (approximately 2348 years) lowers Long-Term Orientation by 6.5 percentage points.

Column (4) adds crop growth cycle to the set of controls. As suggested by the theory the coefficient on crop yield remains positive and statistically significant at the 1%, while crop growth cycle's coefficient is negative, though not statistically different from zero. The estimated coefficient on crop yield implies that a one standard deviation increase on crop yield increases Long-Term Orientation by 9.5 percentage points. Although the point estimates in columns (1)-(4) vary a little, their values are not statistically different and imply an economically significant effect of crop yield on Long-Term Orientation.

While these results are reassuring, the proposed hypothesis suggests that it is a population's historical exposure to higher crop yields which generates higher Long-Term Orientation. In this case, as this trait is intergenerationally transmitted, the yields experienced by individual's ancestors in their place of origin should affect the individual's Long-Term Orientation, making the effect of crop yield "portable" across space. But, this implies that migration and population replacement

Table 2: Crop Yield, Crop Growth Cycle, and Long-Term Orientation (Hofstede)

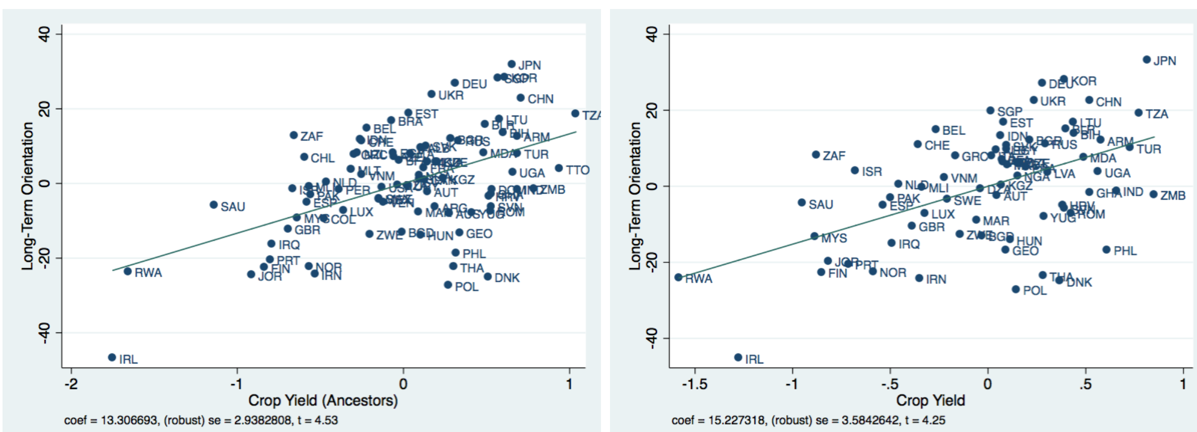
	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	7.43***	9.84***	9.06***	9.46***			13.26***	15.23***
	(2.48)	(2.88)	(2.62)	(3.41)			(2.55)	(3.58)
Crop Growth Cycle				-0.70				-3.18
				(3.96)				(4.03)
Crop Yield (Ancestors)					11.58***	13.31***		
					(2.15)	(2.94)		
Crop Growth Cycle (Ancestors)						-3.15		
						(3.52)		
Absolute latitude		2.85	1.88	1.68	4.72	3.99	4.76	3.87
		(4.05)	(3.85)	(4.33)	(3.29)	(3.63)	(4.15)	(4.71)
Mean elevation		4.98*	5.97**	6.09**	5.56**	5.96**	4.58	4.87
		(2.87)	(2.96)	(3.03)	(2.48)	(2.46)	(2.99)	(3.03)
Terrain Roughness		-6.24**	-5.72**	-5.72**	-6.74***	-6.72***	-6.40**	-6.29**
		(2.51)	(2.75)	(2.75)	(2.53)	(2.49)	(2.83)	(2.82)
Neolithic Transition Timing			-6.46**	-6.31**			-4.75*	-4.08
			(2.87)	(3.06)			(2.60)	(2.66)
Neolithic Transition Timing (Ancestors)					-4.77**	-4.31*		
					(2.24)	(2.30)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.54	0.60	0.62	0.61	0.66	0.66	0.61	0.61
Observations	87	87	87	87	87	87	72	72

Notes: This table establishes the positive, statistically, and economically significant effect of a country's potential crop yield, measured in calories per hectare per year, on its level of Long-Term Orientation measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's crop growth cycle has a negative and not-statistically significant effect on its Long-Term Orientation. In particular, columns (1)-(3) show the effect of potential crop yield after controlling for the country's absolute latitude, mean elevation above sea level, terrain roughness, distance to a coast or river, of it being landlocked or an island, and the time since it transitioned to agriculture. Columns (4)-(6) show that the effect remains after controlling for potential crop growth cycle and the effects of migration. Columns (7)-(8) show that restraining the analysis to the Old World, where intercontinental migration played a smaller role, does not alter the results. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

introduce measurement error in the measure of crop yield. Furthermore, the theory suggests that crop yields experienced during the pre-industrial era should determine Long-Term Orientation, independently of any modern effect of geography or the effect of crop yields on pre-industrial development.

To analyze the effect that migration and population replacement might have had, columns (5) and (6) repeat the analysis of columns (3) and (4), but ancestry adjust the crop yield, the crop growth cycle, and the timing of transition to agriculture measures using the population migration matrix constructed by Putterman and Weil (2010). So, for example, for each country the adjusted crop yield is given by the weighted average of crop yield in the countries from which the ancestors of the current population migrated from, where the weights are given by the share of population coming from each ancestor country. This correction should mitigate the measurement error created by cross country migrations and population replacements that have occurred in the past 500 years. Additionally, by construction, the share of the ancestry adjusted measure determined by non-native ancestors captures the effect of crop yield that is not determined by the country's geographical characteristics, but is culturally embodied.

As can be seen in the table, the results after ancestry adjustment are similar to the previous ones, although the point estimates are larger, suggesting the presence of measurement error in the previous estimates. In particular, the result shown in column (6) implies that after controlling for continental fixed effects, other geographical characteristics, the ancestry adjusted timing of transition to the Neolithic, and the ancestry adjusted crop growth cycle, an additional standard deviation in the crop yield experienced by the ancestors of current countries increased current levels of Long-Term Orientation by 0.53 standard deviations, i.e. 13.3 percentage points. Figure 11(a) shows the partial correlation plot for the specification in column (6).



(a) Ancestry Adjusted (b) Old World

Figure 11: Long-Term Orientation and Potential Crop Yield

Additionally, columns (7) and (8) show the results for the sample of countries in the Old World, where intercontinental migration and population replacement were less prevalent. Reassuringly, the estimated effect of crop yield on Long-Term Orientation is even larger in these cases, with each additional standard deviation in crop yield increasing Long-Term Orientation by 13.3 and 15.2 percentage points in columns (7) and (8) respectively, which are equivalent to 0.52 and 0.60 standard deviations respectively. Figure 11(b) shows the partial correlation between crop yield and

Long-Term Orientation for the specification in column (8).

Table 3: Natural Experiment: Pre-1500CE Potential Crop Yield, Growth Cycle, and Long-Term Orientation (Hofstede)

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	5.67**	5.98***	7.28***	8.82***			12.23***	15.21***
	(2.40)	(2.09)	(2.29)	(3.13)			(2.84)	(3.51)
Crop Yield Change (post-1500)		7.88**	8.77***	9.83***			7.95***	10.53***
		(3.08)	(2.69)	(3.11)			(2.56)	(3.30)
Crop Growth Cycle (pre-1500)				-3.77				-7.65
				(4.17)				(4.80)
Crop Growth Cycle Change (post-1500)				0.16				0.31
				(1.90)				(1.73)
Crop Yield (Ancestors, pre-1500)					8.62***	10.56***		
					(2.01)	(2.35)		
Crop Yield Change (Anc., post-1500)					8.03***	9.86***		
					(2.03)	(2.28)		
Crop Growth Cycle (Ancestors, pre-1500)						-7.31**		
						(3.59)		
Crop Growth Cycle Change (Anc., post-1500)						0.77		
						(1.60)		
Absolute latitude			1.87	0.62	4.51	2.37	4.51	1.37
			(3.67)	(3.88)	(3.27)	(3.03)	(4.09)	(4.26)
Mean elevation			5.83**	5.42*	5.71**	4.46*	4.62	3.19
			(2.75)	(2.99)	(2.41)	(2.32)	(2.97)	(3.12)
Terrain Roughness			-5.61**	-5.36*	-6.55**	-5.48**	-6.28**	-5.44*
			(2.74)	(2.76)	(2.53)	(2.39)	(2.90)	(2.86)
Neolithic Transition Timing			-7.05**	-6.15**			-5.06*	-3.46
			(2.90)	(2.96)			(2.73)	(2.77)
Neolithic Transition Timing (Ancestors)					-5.23**	-4.27*		
					(2.25)	(2.23)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.50	0.55	0.63	0.63	0.66	0.68	0.61	0.62
Observations	87	87	87	87	87	87	72	72

Notes: This table establishes the positive, statistically, and economically significant effect of a country's potential crop yield, measured in calories per hectare per year, on its level of Long-Term Orientation measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's potential crop growth cycle has a negative and not-statistically significant effect on its Long-Term Orientation. In particular, columns (1)-(3) show the effect of crop yield after controlling for the country's absolute latitude, mean elevation above sea level, terrain roughness, distance to a coast or river, of it being landlocked or an island, and the time since it transitioned to agriculture. Columns (4)-(6) show that the effect remains after controlling for potential crop growth cycle and the effects of migration. Columns (7)-(8) show that restraining the analysis to the Old World, where intercontinental migration played a smaller role, does not alter the results. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

These results mitigate concerns that the positive effect of crop yield on Long-Term Orientation is generated by measurement error, or simply captures a country's geographical characteristics, and suggest that as proposed by the theory, the effect of crop yield is culturally embodied. Thus, descendants of migrant populations, who came from countries that have higher crop yields also have higher Long-Term Orientation.

4.2 Natural Experiment

The geographical attributes that had contributed to crop yield in the past are likely to be conducive to higher crop yield in the present. In particular, the correlation between past crop yield and contemporary time preference may therefore reflect the direct effect of invariant geographical attributes on contemporary economic outcomes that may be correlated with the rate of time preference. In order to overcome this potential concern, this research exploits a natural experiment associated with the Columbian Exchange. In particular, it exploits the changes in the spectrum of potential crops in the post-1500 period to identify the persistent effect of historical crop yield on long-term orientation, lending credence to the hypothesis that it is the portable, culturally-embodied, components of potential crop yield, rather than persistent geographical attributes that affect time preference.

The natural experiment associated with the Columbian Exchange and the random differential assignment of superior crops to different regions of the world further permits to overcome the potential concern about selection of high time preference individuals into geographical regions characterized by higher agricultural return. While this selection process would not affect the nature of the results, i.e. that variations in the return to agricultural investment across the globe is the origin of the differences in time preferences, it reinforces the viewpoint that these geographical conditions had a direct effect on the evolution of time preference independent of the potential initial selection.

In order to implement this natural experiment, for each country the analysis constructs potential crop yield and growth cycle measures based on crops available before and after 1500CE, i.e. before and after the Columbian Exchange. Table 3 shows the effect of pre-Columbian crop yields and growth cycles and of the change in yields and cycles caused by the introduction of new crops on Long-Term Orientation. Column (1) shows that conditional on the effect of continent-specific unobserved heterogeneity, an additional standard deviation in the crop yield of crops available pre-1500CE resulted in a 5.7 percentage points increase in Long-Term Orientation in the XXth century. Column (2) shows that the introduction of new crops, which allowed the attainment of higher yields, also increased Long-Term Orientation. In particular, the effect of a one standard deviation increase in pre-1500 crop yield is to increase Long-Term Orientation by 6 percentage points, while the change in crop yield increases it by 7.9 percentage points. Column (3) additionally controls for the confounding effects of a country's other geographical characteristics and its timing of transition to agriculture, which causes both point estimates to increase.

Column (4) additionally controls for the effect of growth cycle for crops available pre-1500 and its change caused by the Columbian Exchange. Reassuringly, the effect of pre-1500CE crop yield and its change are higher than before and thus remain statistically and economically significant. Columns (5) and (6) repeat the analysis by adjusting for the ancestry of current populations, while columns (7) and (8) constrain the sample to the countries in the Old World. These corrections, which lower measurement errors caused by intercontinental migration and population replacement, raise the coefficient on both pre-1500CE yield and its change. In particular, column (8) implies that an increase in one standard deviation in pre-1500CE crop yield increased Long-Term Orientation by 15.2 percentage points, while an increase in one standard deviation in the change in yield caused by the introduction of new crops increased Long-Term Orientation by 10.5 percentage points.

The results in table 3 are reassuring, since they show that both the crop yield before 1500 and its change post-1500 have a positive effect on Long-Term Orientation as posited by the theory. In particular, since the coefficients on crop yield pre-1500 and its change are statistically equivalent, it suggests that there is no selection of high time preference individuals into high return regions. Furthermore, the historical experience with high yields remains in effect even after migration, suggesting again that this trait is culturally-embodied and does not capture other geographical characteristics of a country.[23]

The results of this section support the theory proposed in this paper. The coefficient on potential crop yield, for crops available pre-1500CE and for the crops introduced during the post-1500 exploration period, is positive, statistically and economically significant. It suggests that increasing crop yield by one standard deviation increases Long-Term Orientation by 0.5 standard deviations. Furthermore, neither other geographical characteristics of a country nor its timing of the transition to the Neolithic have a similar impact on Long-Term Orientation. Additionally, the effect of crop yield on Long-Term Orientation is based on both its pre-1500 level and its post-1500 change as suggested by the theory. Correction for migration suggests that crop yield's effect is based on the portable, culturally-embodied, components of potential crop yield.

A possible concern of the previous results is that superior historical crop-yield could have affected positively past economic outcomes (e.g., population density and urbanization), which persisted over time and may have directly affected the observed rate of time preference. Moreover, the effect of changes in crops might be associated with changes in productivity and therefore in population density and urbanization (Nunn and Qian, 2011). Hence, accounting for historical population density as well as urbanization, permits the analysis to isolate the portable, culturally-embodied, components of potential crop yield, from the potential effect of the persistence of past economic prosperity.

In order to test for this possibility, Table 4 controls for population density and urbanization. Column (1) shows the effect of ancestry adjusted crop yields and growth cycles pre-1500 and their changes on Long-Term Orientation after controlling for geographical characteristics, years since transition to agriculture, and continental fixed effects. Column (2) includes population density in 1500 CE. The results are similar and show that pre-1500 crop yield and its change have an

[23]Section B.1 in the appendix constrains the analysis to include only the crop data for cells in each country where the crop used before and after 1500 changed. Reassuringly, the results remain qualitatively unchanged.

Table 4: Potential Crop Yield, Long-Term Orientation, and Pre-Industrial Development

	Long-Term Orientation						
	1500CE					1800CE	
	Population Density		Urbanization		Both	Urbanization	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (Ancestors, pre-1500)	11.05***	11.52***	10.01***	11.08***	9.85***	11.54***	11.54***
	(2.53)	(2.33)	(3.68)	(3.68)	(3.63)	(3.18)	(3.22)
Crop Yield Change (post-1500)	10.76***	10.40***	8.77**	9.96***	6.54*	10.05***	10.22***
	(2.89)	(2.78)	(3.35)	(3.35)	(3.60)	(3.23)	(3.37)
Crop Growth Cycle (Ancestors, pre-1500)	-8.06*	-10.43***	-5.06	-7.30	-5.63	-8.60*	-8.75*
	(4.06)	(3.63)	(5.28)	(5.37)	(5.39)	(4.68)	(4.84)
Crop Growth Cycle Change (post-1500)	-0.46	-1.06	1.06	0.55	1.35	0.07	0.03
	(1.72)	(1.84)	(2.91)	(2.95)	(2.60)	(2.37)	(2.41)
Population density in 1500 CE		3.76**			5.84		
		(1.86)			(3.62)		
Urbanization rate in 1500 CE				1.90	-1.06		
				(2.24)	(2.67)		
Urbanization rate in 1800 CE							-0.57
							(1.22)
	Partial R^2						
Crop Yield (Ancestors, pre-1500)	0.23***	0.25***	0.11***	0.12***	0.11***	0.20***	0.20***
Crop Yield Change (post-1500)	0.16***	0.16***	0.08**	0.09***	0.04*	0.12***	0.12***
Crop Growth Cycle (Anc., pre-1500)	0.06*	0.09***	0.02	0.03	0.02	0.06*	0.06*
Crop Growth Cycle Ch. (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Population density in 1500 CE		0.05**			0.06		
Urbanization rate in 1500 CE				0.01	0.00		
Urbanization rate in 1800 CE							0.00
	Semi-Partial R^2						
Crop Yield (Ancestors, pre-1500)	0.08***	0.09***	0.04***	0.04***	0.03***	0.07***	0.07***
Crop Yield Change (post-1500)	0.05***	0.05***	0.03**	0.03***	0.01*	0.04***	0.04***
Crop Growth Cycle (Anc., pre-1500)	0.02*	0.03***	0.00	0.01	0.00	0.02*	0.02*
Crop Growth Cycle Ch. (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Population density in 1500 CE		0.01**			0.02		
Urbanization rate in 1500 CE				0.00	0.00		
Urbanization rate in 1800 CE							0.00
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.65	0.67	0.60	0.60	0.63	0.63	0.62
Observations	87	87	65	65	64	79	79

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield and potential crop growth cycle on its level of Long-Term Orientation, while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's level of pre-industrial development as measured by its population density or urbanization rates in 1500 CE have economically smaller and not always statistically significant effects. In particular, columns (1)-(2) compare the effects of potential crop yields and population densities in 1500CE, while columns (3)-(4) use urbanization rates in 1500 CE instead. Column (5) controls for both urbanization rates and population densities in 1500CE. Finally, columns (6)-(7) compare the effects of crop yield pre-1500CE and its change and urbanization in 1800CE. In all columns crop yield and its change remain positive, statistically and economically significant, and have a higher explanatory power than any of the alternative channels. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, mean temperature, precipitation, and shares of land in tropical, subtropical and in temperate climate zones. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

economically and statistically significant effect on Long-Term Orientation, while population density has an economically smaller and less statistically significant effect. The semi-partial R^2 shows that population density's adds 1% to the explanatory power of the other variables, while crop yield and its change add a joint 14%.

Columns (3)-(4) repeat the analysis using urbanization rates in 1500 CE, while column (5) includes both urbanization rates and population densities in 1500. The results are qualitatively identical, although urbanization is not found to have an effect statistically different from zero, either individually, nor when controlling for population densities. The semi-partial R^2 suggests that in this smaller sample, crop yield and its change add up to 5% to the explanatory power of the other variables, while urbanization rates and population density have no added explanatory power.

Finally, columns (6) and (7) compare the effect of crop yield pre-1500CE and its change while accounting for urbanization rates in 1800CE. This controls for the possible effect of changes in yields generated by the introduction of new crops on urbanization. Reassuringly, crop yield and its change remain positive, statistically and economically significant, and have a higher explanatory power as shown by the partial and semi-partial R^2. These results provide support to the theory presented in this paper against an alternative one where higher agricultural productivity fostered urbanization rates and population densities in the past, which themselves generated higher levels of Long-Term Orientation, without any direct effect of crop yield.[24]

Finally, the effective crop yield might be affected by climatic risks, spatial diversification, and trade. In particular, the extent of pre-industrial trade and land might allow individuals to smooth consumption without requiring them to delay gratification. Similarly, if agricultural investment is risky the actual return to agricultural investment is lower. Thus, accounting for the existence of pre-industrial media of exchange or transportation technologies, the location of pre-industrial trade routes, land area, and climatic risk factors does not affect the results as shown in Appendix B.[25]

Having established the positive, robust, and statistically and economically significant effect of crop yield on Long-Term Orientation, it is important to note that crop yields are also positively correlated with economic outcomes that ought to be positively affected by Long-Term Orientation. Table 5 shows the effect of pre-1500 crop yield and its change on a country's average years of schooling, as measured by Barro and Lee (2013), after controlling for a country's geographical characteristics, the number of years since the Neolithic transition, pre-1500 crop growth cycle and its change, and time-invariant continental heterogeneity. The results show that increasing the crop yield experienced by a country's ancestors before 1500CE by one standard deviation increases a country's education level in 2005 by almost one year. This implies that if the ancestors of the country with lowest pre-1500 crop yield had instead experienced the crop yield of the country with the highest pre-1500 yield, its population would have about 5 more years of schooling on average.[26]

[24] As established in Table B.12, the qualitative results are unchanged, if the analysis uses only grids that experienced a change in the crop used post-1500CE.

[25] Appendix B establishes the robustness of the results to other agricultural, cultural, and trade channels, as well as to spatial autocorrelation, selection on unobservables, religious composition, among others.

[26] Table B.22 in the appendix shows that similar results hold if one only considers the pre-1500 crop yield over cells that experienced a change in crop. Table B.23 in the appendix shows that a country's income per capita and its gross

Table 5: Crop Yield, Long-Term Orientation, and Education

	Years of Schooling in 2005					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Ancestors, pre-1500)	0.93***	0.90***	0.90***	0.90***	0.84***	0.88***
	(0.24)	(0.30)	(0.24)	(0.29)	(0.23)	(0.28)
Crop Growth Cycle (Ancestors, pre-1500)	-0.08	-0.05	-0.04	-0.04	0.03	0.03
	(0.20)	(0.23)	(0.19)	(0.23)	(0.24)	(0.32)
Crop Yield Change (post-1500)		-0.05		0.02		0.09
		(0.27)		(0.26)		(0.34)
Crop Growth Cycle Change (post-1500)		0.00		0.02		0.08
		(0.16)		(0.16)		(0.17)
Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes
Timing of Neolithic	No	No	Yes	Yes	Yes	Yes
Continental FE	No	No	No	No	Yes	Yes
Adjusted-R^2	0.52	0.51	0.53	0.52	0.59	0.58
Observations	129	129	129	129	129	129

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield and potential crop growth cycle on its average number of years of schooling as measured by Barro and Lee (2013), while controlling for continental fixed effects and other geographical characteristics. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, mean temperature, precipitation, shares of land in tropical, subtropical and in temperate climate zones, average precipitation, average suitability for agriculture. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

5 Potential Crop Yield and Long-Term Orientation (Second-Generation Migrant Analysis)

This section analyses the effect of crop yield and crop growth cycle on the Long-Term Orientation of second-generation migrants as reported in the European Social Survey.[27] The analysis of second-generation migrants accounts for time invariant unobserved heterogeneity in the host country (e.g., geographical and institutional characteristics). Moreover, since crop yield in the parental country of origin is distinct from the crop yield in the country of residence, the estimated effect of crop yield in the country of origin captures the culturally embodied, intergenerationally transmitted effect of crop yield on long-term orientation, rather than the direct effect of geography.

The sample of second-generation migrants is composed by all respondents who were born in the country where the interview was conducted, and whose parents were not born in that country. Tables B.32 and B.33 in the appendix show the correlation between this measure and the respon-

domestic savings rate are positively correlated with the pre-1500 crop yield measure. The expected positive relation between crop yield in the past and current economic outcomes is confounded by the direct negative correlation that current agriculture has with development. Since a more complete analysis of this relation is outside the scope of this paper it will not be investigated further at this time.

[27]The Long-Term Orientation measure used in this section is based on the answer to the question "Do you generally plan for your future or do you just take each day as it comes?" taken from the "Timing of Life" module in the third wave of the European Social Survey, and is again measured between 0 (short term-orientation) and 100 (Long-Term Orientation). The original answers were normalized to ensure comparability with the analysis of the previous section.

dent's completed number of years of schooling and total household income in wave 3 of the survey. Reassuringly, both income and education are strongly positively correlated with this measure of Long-Term Orientation, which suggests it is indeed capturing elements of time preference.

The following empirical specification is estimated via ordinary least squares (OLS),

$$\begin{aligned} LTO_{ic} =& \beta_0 + \beta_1 \text{crop yield}_{ip} + \beta_2 \text{crop growth cycle}_{ip} \\ &+ \sum_j \gamma_{0j} X_{ipj} + \gamma_1 \text{YST}_{ip} + \sum_j \gamma_{2j} Y_{ij} + \sum_c \gamma_c \delta_c + \epsilon_i, \end{aligned} \tag{30}$$

where LTO_{ic} is the Long-Term Orientation measure of second-generation migrant i in country c, crop yield$_{ip}$ and crop growth cycle$_{ip}$ are the measures in the country of origin of parent p of individual i, X_{ipj} are other geographical characteristics of the country of origin of parent p of individual i, YST$_{ip}$ are the years since the country of origin of parent p of individual i transitioned to agriculture, Y_{ij} are characteristics of individual i (sex, age, education, marital status, health status, religiosity),[28] δ_c is a complete set of host country of agent i fixed effects, and ϵ_i is the error term. The theory proposed in this paper implies that the estimates of the coefficient on crop yield should satisfy $\beta_1 > 0$. As before, all independent variables have been normalized by subtracting their mean and dividing them by their standard deviation, and the sample is chosen to include all individuals for whom all information was available across specifications.

The OLS estimates from this analysis are presented in Table 6. All columns control for an individual's sex and age and its squared, and include host country fixed effects. Columns (1)-(5) use the values of crop yield, crop growth cycle, all additional geographical controls, and the timing of transition to agriculture of the individual's mother's country of origin.[29] Columns (6)-(8) use only the sample of individuals whose parents come from the same country. Heteroskedasticity robust standard errors are clustered at the parent's country of origin and shown in parenthesis.

Column (1) shows that after controlling for an individual's sex and age, and any time-invariant unobservable host country factors, an additional standard deviation crop yield in the individual's mother's country of origin, increases the individual's Long-Term Orientation by 3.1 percentage points. Column (2) shows that controlling for an individual's level of education, marital and health status, and religiosity, does not alter the results. The coefficient on crop yield remains statistically significant at the 1% level and increasing crop yield by one standard deviation increases Long-Term Orientation by 3.3 percentage points.

Column (3) additionally controls for other geographical characteristics of the country of origin of the mother and for its years since the transition to the Neolithic. The geographical controls included are the country's absolute latitude, mean elevation above sea level, its terrain roughness, its mean distance to the sea or navigable river, and dummies for being landlocked or an island. The coefficient on crop yield doubles in size and remains statistically significant at the 1% level. As in the analysis of the previous section, crop yield has the largest effect on Long-Term Orientation

[28] Inclusion of individuals' incomes in the regression does not alter the results, but reduces the sample size by almost 50%.

[29] Using the father's country of origin generates similar results.

among all geographical controls. In particular, increasing crop yield by one standard deviation in the country of origin of the mother increases an individual's Long-Term Orientation by 6.1 percentage points.

Column (4) includes crop growth cycle in the specification of column (3). The effect of crop growth cycle is again negative, but not statistically different from zero. On the other hand, crop yield remains statistically significant at the 1% level and its point estimate increases by 1 unit. Thus, after controlling for individual's characteristics, host country fixed effects, other geographical characteristics of the mother's country of origin and its crop growth cycle, an increase in one standard deviation in crop yield generates an increase of 7.2 percentage points on an individuals Long-Term Orientation. Column (5) repeats the analysis of column (4), but uses the mother's ancestry adjusted crop return, crop growth cycle, and years since transition to agriculture. As can be seen there, the results remain qualitatively unchanged, and the coefficient on crop yield increases to 8 and is statistically significant at the 1% level.

In order to avoid the difference between fathers and mothers, columns (6)-(8) focus on individuals whose parents came from the same country of origin. Column (6) repeats the analysis of columns (4) using only this restricted sample. The coefficient on crop yield is 6 and is close to being significant at the 1% level. On the other hand, none of the other geographical controls, the timing of transition to the Neolithic, nor crop growth cycle are statistically significant.

Column (7) adjusts crop yield, crop growth cycle, and the timing of the transition to the Neolithic for the ancestry of the current inhabitants of the parents country of origin. Again, this should correct for any mismeasurement caused by migration and population replacement that occurred during the last 500 years. Reassuringly, the results remain qualitatively unchanged. None of the geographical characteristics of parents' country of origin nor its ancestry adjusted timing of the transition to the Neolithic have an effect that is statistically different from zero. On the other hand, the crop yield of the ancestors of the parents' country of origin has a statistically and economically significant effect. The results imply that increasing the ancestry adjusted crop yield of an individual's parents' country of origin increases their Long-Term Orientation by 7.1 percentage points.

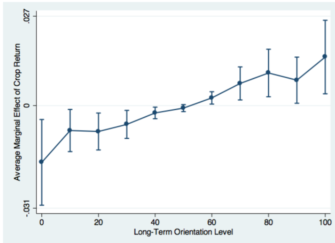
Finally, column (8) restricts the sample to the individuals whose parents came from the same country in the Old World. This minimizes any measurement error generated by migration and population replacement. Reassuringly, the coefficient on crop yield remains statistically significant at the 5% level and implies that an increase of one standard deviation in the crop yield in the country of origin of an individual's parents increases her Long-Term Orientation by 8.2 percentage points. On the other hand, as before the effect of all other geographical characteristics, the timing of the Neolithic, and crop growth cycle remains not statistically different from zero.

The Long-Term Orientation measure is constructed based on a survey question where individuals answered on a scale from 0 to 100 in intervals of 10. The OLS estimates presented in table 6 assume that the distance between those intervals is meaningful and that the length of all intervals represents the same difference in Long-Term Orientation. Since this cardinality assumption might

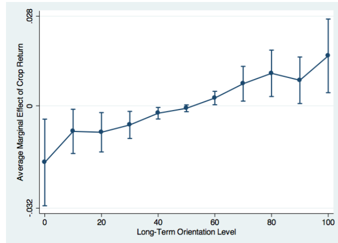
Table 6: Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation in Second-Generation Migrants

	Long-Term Orientation (OLS)							
	Country of Origin							
	Mother					Parents		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	3.12***	3.27***	6.07***	7.16***		5.97**		8.22***
	(1.17)	(1.23)	(2.10)	(2.23)		(2.65)		(3.05)
Crop Growth Cycle				-3.26		-2.05		-2.23
				(2.12)		(2.21)		(2.56)
Crop Yield (Ancestors)					7.95***		7.12**	
					(2.24)		(2.72)	
Crop Growth Cycle (Ancestors)					-3.50		-2.39	
					(2.20)		(2.38)	
Absolute latitude			3.46**	2.77*	3.03*	3.70	4.13*	3.84*
			(1.57)	(1.63)	(1.60)	(2.23)	(2.20)	(2.22)
Mean elevation			-0.07	-0.55	-0.47	-0.06	0.17	0.95
			(1.40)	(1.29)	(1.32)	(1.54)	(1.54)	(1.46)
Terrain Roughness			3.87**	4.16**	4.25**	2.65*	2.77*	3.60**
			(1.73)	(1.67)	(1.67)	(1.39)	(1.43)	(1.35)
Neolithic Transition Timing			-1.66	-1.23		0.09		-1.74
			(1.66)	(1.57)		(1.69)		(1.78)
Neolithic Transition Timing (Ancestors)					-1.76		-0.67	
					(1.63)		(1.77)	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sex & Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Ind. Chars.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	No	Yes
R^2	0.06	0.10	0.12	0.12	0.12	0.15	0.15	0.15
Observations	705	705	705	705	705	566	566	557

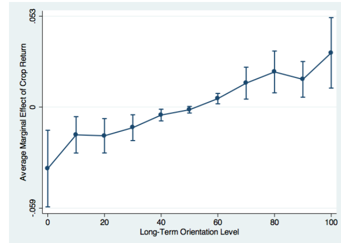
Notes: This table establishes that the potential crop yield in the country of origin of first generation migrants in Europe has a positive, statistically, and economically significant effect on the Long-Term Orientation of their foreign born children. Long-term orientation is measured on a scale of 0 to 100 by the answer to the question "Do you generally plan for your future or do you just take each day as it comes?".The data is taken from the third wave of the European Social Survey (2006). The analysis is restricted to second-generation migrants, i.e. individuals who were born in the country where the interview was done, but whose parents were born overseas and migrated to that country. All columns include fixed effects for the country where the interview was conducted, and individual characteristics (sex, age, education, marital status, health status, religiosity). Additional geographical controls include distance to coast or river, and landlocked and island dummies. In columns (1)-(4) the potential crop yield, potential crop growth cycle, and geographical characteristics of the country of origin of the mother are used as controls. Column (5) uses the data of the father's country of origin, while columns (6)-(7) restricts the sample to individuals whose parents come from the same country of origin. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the country of origin level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.



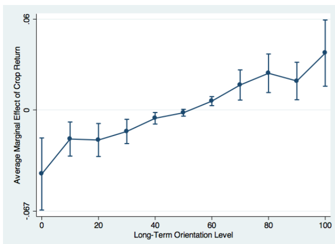
(a) Column (1)



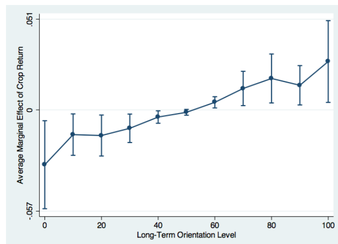
(b) Column (2)



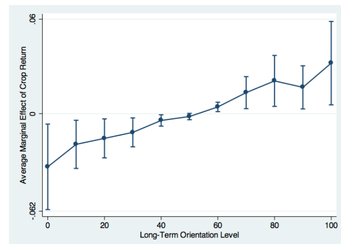
(c) Column (3)



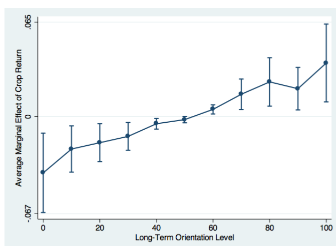
(d) Column (4)



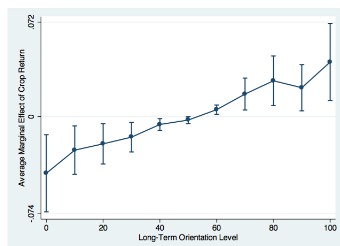
(e) Column (5)



(f) Column (6)



(g) Column (7)



(h) Column (8)

Figure 12: Average Marginal Effects of Potential Crop Yield on Long-Term Orientation of Second-Generation Migrants

not be adequate, since the scale might only capture the qualitative order of preferences, table B.34 in the appendix replicates the analysis and estimates the effect of the different variables using an ordered probit regression.

Ordered probit estimates the probability of observing each level of Long-Term Orientation given the values of the independent variables. The estimated parameters, presented in table B.34, have the same sign and significance pattern found with OLS. Although this is reassuring, the interpretation of the coefficients is not straightforward. In order to better understand the implications of these parameters, figure 12 presents the average marginal effects of crop yield for each level of the Long-Term Orientation for all the specifications in table B.34. Each figure measures Long-Term Orientation on the horizontal axis and the average marginal effect of crop yield with its 95% confidence interval on the vertical axis. As can be seen there, the average marginal effect of crop yield is negative for low values of Long-Term Orientation and increases monotonically until it becomes positive for high values of Long-Term Orientation. This implies that increasing crop yield decreases the probability of observing low values of Long-Term Orientation and increases the probability of observing high values of Long-Term Orientation. Thus, as crop yield increases, the probability distribution of Long-Term Orientation shifts rightwards. This is equivalent to saying that the probability distribution of Long-Term Orientation with crop yield r is first order stochastically dominated by the probability distribution of Long-Term Orientation with crop yield $r+1$.

Following the methodology of section 4, tables B.35 and B.36 in the appendix show the effect of crop yield pre-1500 and its post-1500 change on Long-Term Orientation. As can be seen there, the coefficient of crop yield pre-1500 is highly statistically and economically significant. Furthermore, it is the only geographical characteristic of the parents' country of origin that has an effect that is statistically significantly different from zero. In particular, a one standard deviation increase in the pre-1500 crop yield experienced by ancestors of the mother's country of origin increases a second-generation migrant's Long-Term Orientation by about 7.3 percentage points. This highlights the fact that as suggested by the theory, the effect of crop yield is the culturally embodied and rooted in the historical experience during the pre-1500CE period that matters for Long-Term Orientation. Additionally, table B.37 shows that using the survey design weights in the analysis does not alter the results. Furthermore, as can be seen in that table, weighing the regression to ensure that each country of origin is equally represented, increases the coefficients on crop yield, increasing the economic significance of the result.

6 Potential Crop Yield and Long-Term Orientation (Individual-Level Analysis)

This section uses the World Values Survey (WVS) to analyze the effect of crop yield and crop growth cycle on (i) individuals' Long-Term Orientation, and (ii) on the share of individuals in a region who are long-term oriented.[30] Given that the dependent variable in the individual analysis is binary, the empirical analysis estimates the effect of crop yield and crop growth cycle using both the linear probability and probit models. In particular, the general empirical specification is

$$\begin{aligned} LTO_{ircw} =& \beta_0 + \beta_1 \text{crop yield}_{rc} + \beta_2 \text{crop growth cycle}_{rc} \\ &+ \sum_j \gamma_{0j} X_{rc} + \gamma_1 \text{YST}_{rc} + \sum_j \gamma_{2j} Y_{ircwj} + \sum_{cw} \gamma_{cw} \delta_{cw} + \epsilon_{ircw}, \end{aligned} \tag{31}$$

where $LTO_{ircw} \in \{0,1\}$ denotes the Long-Term Orientation of individual i of region r in country c during wave w of the WVS; crop yield$_{rc}$ and crop growth cycle$_{rc}$ are the measures in region r of country c; X_{rc} are other geographical characteristics of region r in country c; YST$_{rc}$ are the years since the region r in country c transitioned to agriculture; Y_{ircwj} are characteristics of individual i (sex, age, education, income) in region r of country c during wave w; δ_{cw} is a complete set of continent or country, and wave fixed effects; and ϵ_{ircw} is the error term. The theory proposed in this

[30] The measure of Long-Term Orientation is based on the following question of the WVS: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important?" An individual is considered to have Long-Term Orientation if she answered "Thrift, saving money and things" as an especially important quality children should learn at home.

paper implies that the estimate of the coefficient on crop yield should satisfy $\beta_1 > 0$. As before, all independent variables have been normalized by subtracting their mean and dividing them by their standard deviation, and the sample is chosen to include all individuals for which all information was available across specifications. Additionally, heteroskedasticity robust standard errors clustered by wave-region and individual characteristics are employed.

The results of estimating equation (31) using OLS at the country level is shown in Table 7. That is, every variable for region r in country c is given the country level value of the variable. Thus, no country-subregional level differences are exploited in the identification of the effect. All columns include fixed effects for the WVS wave in which the interview was conducted.

Column (1) shows that after controlling for wave fixed effects, increasing the country's crop yield by one standard deviation increases the probability of having Long-Term Orientation by 3.6 percentage points. Column (2) shows that controlling for any unobserved continental level heterogeneity does not alter the result. Even more, it increases the estimate of the effect of crop yield so that one standard deviation increase in crop yield increases the probability of having Long-Term Orientation to 4.1 percentage points.

Accounting for a country's absolute latitude, mean elevation above sea level, terrain roughness, distance to the sea or navigable river, and it being landlocked or an island, column (3), and its years since transition to agriculture, column (4), increases further the coefficient on crop yield, which remains statistically and economically significant. In particular, increasing crop yield by one standard deviation increases the probability of having Long-Term Orientation by 5.5 and 5.1 percentage points in columns (3) and (4) respectively.

Column (5) additionally controls for the individual's gender, age, income, and education levels. Reassuringly, the result is robust to controlling for individual characteristics. Thus, after controlling for wave and continental fixed effects, country's geographical characteristics, and individual's characteristics, increasing crop yield by one standard deviation increases the probability of having Long-Term Orientation by 4.8 percentage points.

The inclusion of crop growth cycle as a control, column (6), lowers the effect of crop yield on the probability of having Long-Term Orientation to 2.7 percentage points per additional standard deviation in return. At the same time, the estimated effect of crop growth cycle is positive, and statistically and economically significant. In particular, it implies that a one standard deviation increase in crop growth cycle increases the probability of having Long-Term Orientation by 3 percentage points. As explained before, the counterintuitive positive effect of crop growth cycle on individual's long-term orientation could be generated by the positive correlation between potential yields and growth cycles or by the mitigating effect of growth cycles on long-term orientation.

Clearly, the migration and population replacements that occurred in the last 500 years cause measurement error. Columns (7) and (8) deal with this possibility by using ancestry adjustments for crop yield, crop growth cycle, and years since transition, column (7); and constraining the sample to include only individuals interviewed in the countries in the Old World, column (8). The results show a higher effect of crop yield, namely every additional standard deviation in crop yield increases

Table 7: Potential Crop Yield, Growth Cycle, and Long-Term Orientation (WVS Country Analysis)

	Long-Term Orientation (OLS)							
	Whole World							Old World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	0.036***	0.041***	0.055***	0.051***	0.048***	0.027***		0.055***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)		(0.003)
Crop Growth Cycle						0.030***		0.024***
						(0.003)		(0.003)
Crop Yield (Ancestors)							0.048***	
							(0.003)	
Crop Growth Cycle (Ancestors)							0.017***	
							(0.003)	
Absolute latitude			-0.014***	-0.021***	-0.024***	-0.013***	-0.004*	0.003
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Mean elevation			0.003	0.012***	0.008***	0.002	0.007***	0.002
			(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Terrain Roughness			-0.021***	-0.021***	-0.016***	-0.017***	-0.024***	-0.028***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Neolithic Transition Timing				-0.032***	-0.039***	-0.041***		-0.029***
				(0.002)	(0.002)	(0.002)		(0.002)
Neolithic Transition Timing (Ancestors)							-0.035***	
							(0.002)	
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	No	No	No	No	Yes	Yes	Yes	Yes
Old World Subsample	No	No	No	No	No	No	No	Yes
Adjusted-R^2	0.01	0.02	0.03	0.03	0.04	0.04	0.04	0.05
Observations	217953	217953	217953	217953	217953	217953	217953	176489

Notes: This table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the country where the interview was conducted. Additional geographical controls include distance to coast or river, and landlocked and island dummies. Individual Characteristics include age, sex, education, and income. Columns (1)-(7) show the results for the whole world sample, while column (8) shows the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

the probability of having Long-Term Orientation by 4.8 and 5.5 percentage points respectively in columns (7) and (8). At the same time, the coefficient on crop growth cycle falls, to 0.017 and 0.24 respectively, but remains statistically significant at the 1% level. These results as well as the ones based on second-generation migrants suggest that the effect of crop yield is culturally-embodied and that the crop yield faced by individuals ancestors plays a crucial role in the determination of an individuals preferences.[31]

These same empirical specifications, estimated using a probit model, are shown in Table B.38 in the appendix. The table shows the average marginal effects of all controls. The results remain unchanged and suggest that after controlling for wave and continental fixed effects, individual's characteristics, country's geographical characteristics, and ancestry adjusted crop growth cycle and years since transition to the Neolithic, an increase of one standard deviation in the crop yield faced by their ancestors increases the probability of an individual having Long-Term Orientation by 4.8 percentage points.

Following the methodology of section 4, tables 8 and B.39 show that using the pre-1500 crop yield and its change does not affect the results. As can be seen there, the effect of the yield of crops available pre-1500 and its change is positive , statistically and economically significant. In particular, after controlling for continent specific unobservables, country's geographical characteristics and timing of the transition to the Neolithic, and individual characteristics, an increase of one standard deviation in ancient crop yield increases the probability of having Long-Term Orientation between 3 and 7 percentage points, while one additional standard deviation in the change in crop yield raises it between 3 and 6 percentage points. Additionally, table B.40 in the appendix also shows that the results are robust to the weighting scheme used.

The rest of this section analyzes Long-Term Orientation at the sub-regional level. It is important to highlight some issues present in this analysis due to missing data and the possibility of measurement error. First, not all regions in all countries can be identified with the data in the WVS. This implies that within country variation might be small for some countries, so that the inclusion of country fixed effects might not leave any unexplained variation. Second, for the identified regions, not all variables can be constructed for that level of aggregation. In particular, there is no regional measure of the years since a region transitioned to agriculture. Third, given that the population migration matrix of Putterman and Weil (2010) is constructed at the country level, ancestry adjusting the regional measures of crop yield and crop growth cycle cannot be done at the regional level or can be done only imperfectly. Namely, it would have to be assumed that all immigrants from overseas are allocated to all regions in a country uniformly. Furthermore, all emigrants from a specific country would need to be assumed to come uniformly from the regions in that country. Thus, the ancestry adjusted measures in regions within a country would differ only by the fraction of the population that is native and the difference in the regions' measures. Fourth, besides overseas migration, one cannot account for internal migration within a country. Thus,

[31] Clearly, this type of measurement error biases the coefficient on crop yield downwards and lowers its size by almost 50%. See also appendix B.12.

Table 8: Pre-1500 Potential Crop Yield, Growth Cycle, and Long-Term Orientation (WVS Country Analysis)

	Long-Term Orientation (OLS)							
	Whole World							Old World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	0.025***	0.040***	0.036***	0.032***	0.032***	0.031***		0.066***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)		(0.003)
Crop Yield Change (post-1500)					0.053***	0.054***		0.055***
					(0.002)	(0.002)		(0.003)
Crop Growth Cycle (pre-1500)						-0.007**		-0.018***
						(0.003)		(0.003)
Crop Growth Cycle Change (post-1500)						0.025***		0.026***
						(0.002)		(0.002)
Crop Yield (Ancestors, pre-1500)							0.043***	
							(0.002)	
Crop Yield Change (Anc., post-1500)							0.041***	
							(0.002)	
Crop Growth Cycle (Ancestors, pre-1500)							-0.005*	
							(0.003)	
Crop Growth Cycle Change (Anc., post-1500)							0.018***	
							(0.002)	
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Subsample	No	No	No	No	No	No	No	Yes
Adjusted-R^2	0.02	0.02	0.02	0.04	0.04	0.04	0.05	0.05
Observations	217953	217953	217953	217953	217953	217953	217953	176489

Notes: This table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the country where the interview was conducted. Additional geographical controls include distance to coast or river, and landlocked and island dummies. Individual Characteristics include age, sex, education, and income. Columns (1)-(7) show the results for the whole world sample, while column (8) shows the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

individuals born in a different region, who migrated to the region of interview will be erroneously assigned the measure for the region of interview. As shown in appendix B.12 the measurement error generated by internal migration biases the estimated coefficient towards zero and increases its standard error. This issue is present even at low internal migration rates. Fifth, the size of regions varies a lot within and across countries. Since crop yields and growth cycles do not vary across too small areas, within country variation might again be small. These issues suggest that once country fixed effects are included in the analysis, the coefficient might be downward biased and its statistical significance might be small.

Taking these caveats into account, table 9 shows the results of using regional level data to perform the same analysis of table 7. In particular, columns (1)-(4) control for wave and continental time invariant unobservable characteristics, region's geographical characteristics, and individual characteristics. The results imply that increasing regional crop yield by one standard deviation increases the probability of having Long-Term Orientation by around 4 percentage points. This is similar to the results in tables 7 and B.41 when country level measures are used. Column (5) additionally controls for crop growth cycles in the specification of column (4). The results remain qualitatively unchanged with the coefficient on crop yield remaining statistically significant at the 1% level.

Column (6) shows that after controlling for time invariant country specific unobservable factors, wave fixed effects, regional geographical characteristics, and individual characteristics the effect of crop yield and crop growth cycle remain statistically significant. In particular, the coefficient on crop growth cycle becomes negative and statistically significant at the 1% level, while the coefficient on crop yield remains positive and statistically significant at the 5% level. Still, the size of the coefficient on crop yield falls by about 80%, which was expected given the various sources of measurement error highlighted above. The estimated coefficient implies that an additional standard deviation in the region's crop yield would increase the probability of having Long-Term Orientation by 0.7 percentage points. This small effect can be considered a lower bound generated by measurement error. If the changes in the size of the coefficient caused by ancestry adjustments and the Monte Carlo simulation in appendix B.12 are any guide, one can expect the true effect to be many times larger.

Column (7) repeats the analysis of column (5), but constrains the sample to include only regions in the Old World in order to decrease the measurement error caused by intercontinental migration and population replacement. Doing so increases the size of the coefficient on crop yield by almost 100%, while the coefficient on crop growth cycle becomes zero. Thus, increasing a region's crop yield by one standard deviation increases the probability of having Long-Term Orientation by 5.9 percentage points.

Column (8) presents the results of the same exercise as column (6) constrained to the Old World. The results show that the point estimates for both crop yield and crop growth cycle increase. This might again be driven by the fact that by constraining the set, some the measurement error is lowered. Still, the coefficient on crop yield in columns (7) is about 7 times the size of the one in

Table 9: Potential Crop Yield, Growth Cycle, and Long-Term Orientation (WVS Regional Analysis)

	Long-Term Orientation (OLS)							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	0.036***	0.040***	0.041***	0.039***	0.036***	0.007**	0.060***	0.008**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	(0.003)
Crop Growth Cycle					0.006**	-0.008**	0.001	-0.007
					(0.003)	(0.004)	(0.003)	(0.004)
Absolute Latitude			0.007***	0.006**	0.008***	0.031***	0.013***	0.036***
			(0.002)	(0.002)	(0.003)	(0.006)	(0.003)	(0.008)
Mean Elevation			-0.013***	-0.012***	-0.012***	0.003	-0.002	0.011***
			(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)
Terrain Roughness			0.011***	0.012***	0.010***	-0.009***	-0.020***	-0.017***
			(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	No	Yes	Yes	Yes	Yes	No	Yes	No
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	No	No	No	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	No	No	Yes	No	Yes
Old World Subsample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.01	0.02	0.03	0.04	0.04	0.08	0.05	0.08
Observations	185659	185659	185659	185659	185659	185659	151299	151299

Notes: This table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation across regions, accounting of country fixed effects. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the region where the interview was conducted. Additional geographical controls include percentage of land within 100 kms. of sea, landlocked dummy, and area suitable for agriculture. Individual Characteristics include age, sex, education, and income. Columns (1)-(6) show the results for the whole world sample, while columns (7)-(8) show the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

column (8), which suggests that most of the measurement error is still present, or that there is not enough within country variation to identify the effect. In effect, since internal migration has been experienced by countries all over the world, it is not surprising to find that the estimated coefficient and the fall in its size is similar for the Old World and full samples.

The results are robust to the estimation method, since using a probit model for the same specifications of table 9 does not alter the results. Table B.43 presents the average marginal effects of crop yield, crop growth cycle, and the regional geographical characteristics. As can be seen, the results remain qualitatively unchanged. The average marginal effect of crop yield is positive, statistically significant at the 1% level, and economically significant after controlling for other geographical characteristics, individual characteristics, crop growth cycle, and continental and wave fixed effects. In particular, the results for the Old World sample presented in column (7) imply that an additional standard deviation of crop yield increases the probability of having Long-Term Orientation by 5.9 percentage points. Also, once country fixed effect are included, the estimated effect of crop yield remains positive and statistically significant at the 5% level, although its size falls to about 1/7 of its size without country fixed effects. As before, this could be caused by measurement error caused by internal migration.

In addition to the previous analysis of the effect of crop yield on individual's preferences, this section also analyzes its effect on the regional level of Long-Term Orientation. In particular, using the answers for each individual, a regional level of Long-Term Orientation is created, by assigning to each region the share of respondents that have Long-Term Orientation. This overcomes possible concerns that the previous results are driven by omitted individual characteristics or idiosyncratic shocks.

The results of this analysis are shown in Table 10. Column (1) shows that after controlling for continental fixed effects, increasing a regions crop yield by one standard deviation increases its share of population with Long-Term Orientation by 4.9 percentage points. Additionally controlling for the effect of a region's other geographical characteristics, column (2), does not alter the results, and the coefficient on crop yield remains statistically significant at the 1% level. Column (3) adds a region's crop growth cycle as a control. Doing so increases the estimated effect of crop yield implying that a one standard deviation increase in a region's crop yield increases its share of population with Long-Term Orientation by 5.3 percentage points. Additionally, the coefficient on crop growth cycle is negative, but not statistically different from zero. Similarly, no other regional geographical characteristic has an effect on a region's Long-Term Orientation that is statistically different from zero.

Column (4) corrects the crop yield and crop growth cycle measures for intercontinental migration and population replacements. As explained above, this is done by assuming that all immigrants into a country are uniformly distributed across regions in the receiving country, and come uniformly from the regions of the country of origin. As before, this ancestry adjustment increases the absolute size of both coefficients, although the coefficient on crop growth cycle remains not statistically different from zero. The ancestry adjusted effect of crop yield implies that an increase of one standard

Table 10: Potential Crop Yield, Growth Cycle, and Long-Term Orientation in WVS Regions

	Share of Individuals in WVS Region with Long-Term Orientation											
	Whole World										Old World	
	Unweighted				Weighted: Area				Weighted: Area Share		Area	Share
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Crop Yield	0.049***	0.046***	0.053***		0.097***		0.032**		0.031**		0.039***	0.032**
	(0.012)	(0.013)	(0.017)		(0.033)		(0.012)		(0.013)		(0.015)	(0.013)
Crop Growth Cycle			-0.010		-0.047**		-0.024**		-0.036***		-0.027***	-0.036***
			(0.012)		(0.021)		(0.010)		(0.009)		(0.009)	(0.008)
Crop Yield (Ancestors)				0.077***		0.133***		0.043**		0.041**		
				(0.020)		(0.032)		(0.017)		(0.017)		
Crop Growth Cycle (Ancestors)				-0.012		-0.050***		-0.027***		-0.037***		
				(0.013)		(0.018)		(0.009)		(0.009)		
Absolute Latitude		-0.015	-0.018	-0.003	-0.017	0.010	-0.047	-0.047	-0.005	-0.006	-0.047	-0.055
		(0.020)	(0.020)	(0.020)	(0.043)	(0.043)	(0.057)	(0.056)	(0.037)	(0.036)	(0.063)	(0.036)
Mean Elevation		-0.012	-0.012	-0.013	-0.002	-0.014	0.014	0.015	-0.007	-0.006	0.019	-0.008
		(0.013)	(0.013)	(0.013)	(0.026)	(0.027)	(0.024)	(0.024)	(0.005)	(0.005)	(0.032)	(0.008)
Terrain Roughness		0.016	0.018*	0.006	0.019	0.010	-0.020	-0.021	0.001	0.000	-0.023	0.006
		(0.010)	(0.011)	(0.011)	(0.023)	(0.025)	(0.031)	(0.031)	(0.010)	(0.010)	(0.039)	(0.015)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Country FE	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	No	No	No	No	Yes	Yes
Weighted by Region Area	No	No	No	No	Yes	Yes	Yes	Yes	No	No	Yes	No
Weighted by Region's Share of Area	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes
Adjusted-R^2	0.22	0.25	0.25	0.28	0.28	0.37	0.72	0.72	0.86	0.86	0.72	0.86
Observations	1356	1356	1356	1356	1356	1356	1356	1356	1356	1356	1143	1143

deviation in the crop yield experienced by the ancestors of the population of a region increases its share of population that has Long-Term Orientation by 7.7 percentage points.

Columns (5) and (6) repeat the analysis of columns (3) and (4), but weigh regions importance in the regression according to their area. Thus, larger regions are given more weight in the regression than smaller ones. This helps to take into account that larger regions are easier to identify and thus their crop measures might be more accurate. Also, since migration out of a larger region is more difficult than from smaller ones, it might lower the measurement error caused by internal migration. As can be seen there, by assigning more importance to regions with larger areas, the size of the coefficient on crop yield doubles in size and the coefficient on crop growth cycle increases almost five-fold. In particular, the results in column (6) imply that an additional standard deviation in crop yield increases a region's share of population with Long-Term Orientation by 13.3 percentage points, while an additional standard deviation in crop growth cycle decreases it by 5 percentage points. Interestingly, the effect of all other geographical characteristics remains statistically insignificant at traditional significance levels.

Columns (7) and (8) control for time invariant country level unobservable heterogeneity in the specifications of columns (5) and (6). As before, the coefficients fall by more then 50% on both crop yield and crop growth cycle. Still, the effect of both variables remains statistically and economically significant, with the share of population with Long-Term Orientation in column (8) changing by 4.3 and -2.7 percentage points for each additional standard deviation in crop yield and crop growth cycle respectively.

Columns (9) and (10) repeat the analysis of columns (7) and (8), but weigh regions according to the share of their area within the country. As can be seen there, the results are qualitatively unchanged by this different weighting scheme. Finally, columns (11) and (12) show the results for both weighting schemes when the sample is constrained to countries in the Old World. Again, the effect of both crop yield and crop growth cycle have the expected signs, are statistically significant at the 5% level, and also economically significant with effects similar to the ones found previously.

7 Concluding Remarks

This research explores the origins of the distribution of time preference across regions. It advances the hypothesis and establishes empirically, that geographical variations in natural land productivity and their impact on the return to agricultural investment have had a persistent effect on the distribution of long-term orientation across societies. In particular, exploiting a natural experiment associated with the expansion of suitable crops for cultivation in the course of the Columbian Exchange, the research establishes that agro-climatic characteristics in the pre-industrial era that were conducive to higher return to agricultural investment, triggered selection and learning processes that had a persistent positive effect on the prevalence of long-term orientation in the contemporary era.

The empirical analysis exploits an exogenous source of variation in potential crop yield and potential crop growth cycle across the globe to establish a positive, statistically and economically significant effect of higher pre-industrial crop yields on various measures of long-term orientation at the country, region, and individual levels. Moreover, it exploits the changes in the spectrum of potential crops in the post-1500 period to identify the persistent historical effect of crop yield on long-term orientation.

Consistent with the predictions of the theory, the empirical analysis establishes that indeed higher potential crop yields in the pre-industrial era increased the long-term orientation of individuals in the modern period. The analysis establishes this result in four layers: (i) a cross-country analysis of variations in time preference, that accounts for the confounding effects of a large number of geographical controls, the onset of the Neolithic Revolution, as well as continental fixed effects; (ii) within-country analysis across second-generation migrants, that accounts for the host country fixed effects, the sending country's geographical characteristics as well as migrants' individual characteristics, such as gender, age, and education, (iii) a cross-country individual level analysis that accounts for the country's geographical characteristics as well as individuals' characteristics, such as income and education; (iv) cross-regional individual level analysis that accounts for the region's geographical characteristics, individuals' characteristics, such as income and education, and country fixed-effects; and (v) cross-regional analysis that accounts for the confounding effects of a large number of geographical controls, as well as country fixed-effects.

A Supporting Material

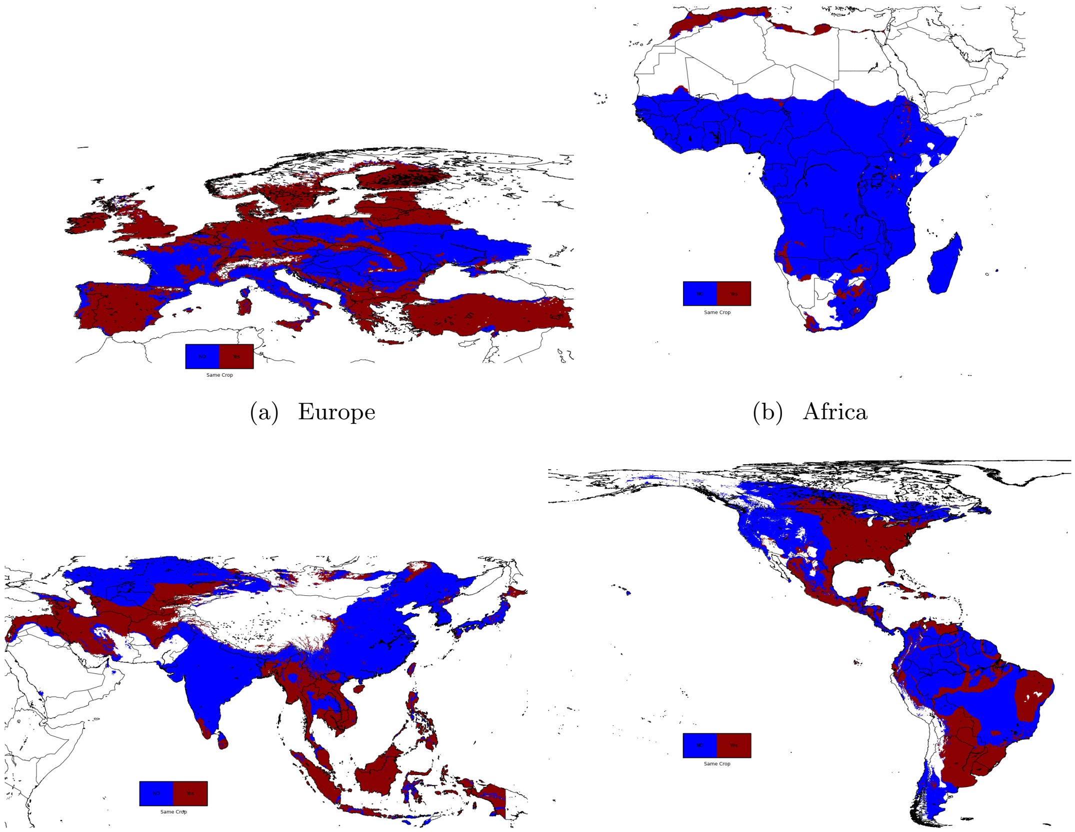
Table A.1: Caloric content of 48 crops (and their variants)

Crop	Energy†	Crop	Energy†
Alfalfa	0.23	Palm Heart	1.15
Banana	0.89	Pearl Millet	3.78
Barley	3.52	Phaseolus Bean	3.41
Buckwheat	3.43	Pigeon Pea	3.43
Cabbage	0.25	Rye	3.38
Cacao	5.98	Sorghum	3.39
Carrot	0.41	Soybean	4.46
Cassava	1.6	Sunflower	5.84
Chick Pea	3.64	Sweet Potato	0.86
Citrus	0.47	Tea	0.01
Coconut	3.54	Tomato	0.18
Coffee	0.01	Wetland Rice	3.7
Cotton	5.06	Wheat	3.42
Cowpea	1.17	Wheat Hard Red Spring	3.29
Dry Pea	0.81	Wheat Hard Red Winter	3.27
Flax	5.34	Wheat Hard White	3.42
Foxtail Millet	3.78	Wheat Soft Red Winter	3.31
Greengram	3.47	Wheat Soft White	3.4
Groundnuts	5.67	White Potato	0.77
Indigo Rice	3.7	Yams	1.18
Maize	3.65	Giant Yams	1.18
Oat	2.46	Sorghum (Subtropical)	3.39
Oilpalm	8.84	Sorghum (Tropical Highland)	3.39
Olive	1.45	Sorghum (Tropical Lowland)	3.39
Onion	0.4	White Yams	1.18

Source: USDA Nutrient Database for Standard Reference (R25). † kilo calories per 100g.

Table A.2: Continental Distribution of 48 crops (and their variants) pre-1500CE

Crop	Continent	Crop	Continent
Alfalfa	Asia, Europe	Palm Heart	North Africa, Subsahara
Banana	Asia, Oceania, North Africa	Pearl Millet	Asia, North Africa, Subsahara
Barley	Asia, Europe, North Africa	Phaseolus Bean	America
Buckwheat	Asia	Pigeon Pea	Asia, Subsahara
Cabbage	Europe	Rye	Europe
Cacao	America	Sorghum	North Africa, Subsahara
Carrot	Asia, Europe	Soybean	Asia
Cassava	America	Sunflower	America
Chick Pea	Europe	Sweet Potato	America
Citrus	Asia, Europe	Tea	Asia
Coconut	America, Oceania	Tomato	America
Coffee	North Africa	Wetland Rice	Asia, Subsahara
Cotton	America, Asia, Europe, North Africa, Subsahara	Wheat	Asia, Europe, North Africa
Cowpea	Asia, North Africa, Subsahara	Wheat Hard Red Spring	Asia, Europe, North Africa
Dry Pea	Europe, North Africa	Wheat Hard Red Winter	Asia, Europe, North Africa
Flax	Asia, Europe, North Africa	Wheat Hard White	Asia, Europe, North Africa
Foxtail Millet	Asia, Europe, North Africa	Wheat Soft Red Winter	Asia, Europe, North Africa
Greengram	Asia, Subsahara	Wheat Soft White	Asia, Europe, North Africa
Groundnuts	America	White Potato	America
Indigo Rice	Asia, Subsahara	Yams	Asia, Subsahara
Maize	America	Giant Yams	Asia, Subsahara
Oat	Europe, North Africa	Sorghum (Subtropical)	North Africa, Subsahara
Oilpalm	North Africa, Subsahara	Sorghum (Tropical Highland)	North Africa, Subsahara
Olive	Europe, North Africa	Sorghum (Tropical Lowland)	North Africa, Subsahara
Onion	America, Asia, Europe, North Africa, Subsahara, Oceania	White Yams	North Africa, Subsahara



(a) Europe (b) Africa

(c) Asia (d) America

Figure A.1: Change in Potential Crop after Columbian Exchange.

B Additional Results

This section presents additional results that were omitted in the main body of the paper. Some of them are referenced there and are presented here in order to avoid unnecessary repetition and due to space limitations.

B.1 Natural Experiment: Country-Level Results on Grids that Experienced a Change in Crops

This section replicates the analysis of the natural experiment associated with the Columbian Exchange using only crops available pre-1500CE and grids that experienced changes in the best crop post-1500CE. Thus, taking into account only locations where the treatment by this natural experiment caused a strictly positive increase in yields. Reassuringly, the results of the main body of the paper remain unaltered qualitatively. In particular, there is a positive, statistically and economically significant effect of pre-1500CE crop yield and its change on Long-Term Orientation.

In particular, a possible concern with the approach in the main body of the paper is that by construction at least some part of the effect is generated by locations within a country for which the best crop did not change, potentially confounding the difference between the pre- and post-1500 experience. The analysis in table 3 should not be affected by this concern since it accounts for the pre-1500CE conditions, ensuring that the change in yield and growth cycle capture only the effect of the treatment in the natural experiment. Still, in order to show robustness to this potential concern, table B.3 constrains the analysis to include only the crop data for cells in each country where the crop used before and after 1500 changed. In particular, for each cell in each country the best crop in use before and after 1500 are compared. If a new crop is used, then the crop yield pre-1500 and the change in crop yield due to the change in crop in that cell should capture better the pre-1500 and post-1500 effects. The new crop yield measure is the average across all cells for which crop use changed in a country.

Additionally, table B.3 expands the set of geographical controls by including precipitation and the shares of land in tropical, subtropical, and temperate climate zones. By controlling for this larger set of geographical controls and using only data for locations that changed crop use, the analysis increases the confidence that the effect of crop yield pre-1500 and its change post-1500 on Long-Term Orientation is in fact capturing the effects proposed by the theory, and is not generated by selection of high time preference individuals into regions with high yields, by unchanging or contemporary geographical characteristics or by some omitted variable that correlates with these.

Reassuringly, the estimates on crop yield pre-1500 and crop yield change post-1500 in all columns of table B.3 are positive, and statistically and economically significant. The estimates imply that conditional on a country's geographical characteristics, its timing of transition to the Neolithic, and its crop growth cycle pre-1500 and its change post-1500, an increase of one standard deviation in crop yield pre-1500 increased Long-Term Orientation by 7.9 percentage points. Similarly, an increase of one standard deviation in crop yield change post-1500 increased Long-Term Orientation by 7.3 percentage points.

Table B.3: Natural Experiment: Pre-1500CE Potential Crop Yield, Growth Cycle, and Long-Term Orientation, for Grids that Experienced Change in Crop post-1500.

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	4.97**	8.52***	7.40***	6.65**			7.75***	7.97**
	(2.28)	(2.46)	(2.58)	(2.98)			(2.81)	(3.66)
Crop Yield Change (post-1500)			4.36*	5.81**			5.58*	7.59**
			(2.46)	(2.55)			(2.83)	(2.93)
Crop Growth Cycle (pre-1500)				0.06				-1.55
				(2.58)				(3.97)
Crop Growth Cycle Change (post-1500)				-4.50**				-4.87**
				(2.18)				(2.36)
Crop Yield (Ancestors, pre-1500)					8.21***	7.85**		
					(2.34)	(3.26)		
Crop Yield Change (Ancestors, post-1500)					6.09***	7.31***		
					(2.13)	(2.25)		
Crop Growth Cycle (Ancestors, pre-1500)						-0.95		
						(3.16)		
Crop Growth Cycle Ch. (Anc., post-1500)						-3.44		
						(2.27)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls & Neolithic	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.51	0.64	0.64	0.66	0.67	0.69	0.58	0.61
Observations	87	87	87	87	87	87	72	72

Notes: This table establishes the positive, statistically, and economically significant effect of a country's potential crop yield, measured in calories per hectare per year, on its level of Long-Term Orientation measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's crop growth cycle has a negative and not-statistically significant effect on its Long-Term Orientation. In particular, columns (1)-(3) show the effect of potential crop yield after controlling for the country's absolute latitude, mean elevation above sea level, terrain roughness, distance to a coast or river, of it being landlocked or an island, the time since it transitioned to agriculture, percentage of land in temperate, tropical and subtropical climate, and average precipitation. Columns (4)-(6) show that the effect remains after controlling for potential crop growth cycle and the effects of migration. Columns (7)-(8) show that restraining the analysis to the Old World, where intercontinental migration played a smaller role, does not alter the results. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, mean temperature, precipitation, and shares of land in tropical, subtropical and in temperate climate zones. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.2 Robustness

This subsection shows that the results in the main body of the paper are robust to spatial autocorrelation, selection by unobservables or omitted variables, inclusion of cells with zero yields, exclusion of individual continents, controlling for religion, or division of the sample into Muslim and non-Muslim countries.

Table B.4 shows that the main results of the paper are not affected by spatial correlation. In particular, it presents two versions of the standard errors corrected for spatial autocorrelation. In square brackets it presents the correction for autocorrelation suggested by Conley (1999) and in curly brackets the maximum likelihood estimates suggested by Cliff and Ord (1973, 1981). As can be seen, the results remain unchanged when the standard errors are corrected for spatial autocorrelation, and crop yield remains statistically and economically significant.

Additionally, this table shows that it is very improbable that omitted variables generate the results. In particular, it presents the statistics for selection on unobservables suggested by Altonji et al. (2005), Bellows and Miguel (2009) and Oster (2014). To compute these, columns (1), (3), and (5) are taken as the baseline specifications for various measures and samples. In these columns, the main specification controls for potential crop yield and growth cycle, and includes continental fixed effects. The expanded specification includes a full set of geographical controls (absolute latitude, roughness, mean elevation above sea level, distance to navigable water, landlocked and island dummies, precipitation, shares of land in tropical, subtropical and temperate climates) and the years since transition to agriculture. Both the AET (Altonji et al., 2005; Bellows and Miguel, 2009) and δ (Oster, 2014) measure how strongly correlated any unobservables would have to be in order to account for the full size of the coefficient on crop yield. As can be seen, in all columns these statistics are different from the critical value of 1. Furthermore, Oster's β^* statistic, which gives the estimated value of the coefficient on crop yield, if unobservables where as correlated as the observables. Oster (2014) shows that one can reject the hypothesis that the value of the coefficient is driven exclusively by unobservables, if zero does not belong to the interval created by the estimated value on crop yield and her β^* statistic. This is precisely the case in all columns in this table. Table B.5 shows similar results hold if instead the pre-1500CE crops yields and their changes are used. Thus, these results suggest that the results in the main body of the paper are not driven by unobservables.

Table B.6 replicates the analysis of table 2, but includes all cells in the analysis, including those that are not suitable for producing any calories. Reassuringly, as can be seen there, the effect is a little weaker economically, but still statistically significant at the 1% level. This lower estimate is to be expected, since ancestral populations most likely did not inhabit locations where crop yields were zero. Thus, inclusion of cells with zero caloric yield should generate measurement error and bias the estimate towards zero.

Finally, table B.7 shows the robustness of the results to the inclusion of the share of population of each religious denomination in a country, to splitting the sample between Muslim and Non-Muslim countries, and to the exclusion of Africa or Sub-Saharan Africa. Reassuringly, the results

Table B.4: Potential Crop Yield, Potential Crop Growth Cycle and Long-Term Orientation

	Long-Term Orientation					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield	9.67***	10.14***			13.58***	16.57***
	(2.60)	(3.02)			(3.01)	(3.37)
	[3.03]	[3.38]			[3.01]	[2.57]
	{2.46}	{2.65}			{2.88}	{2.95}
Crop Growth Cycle	-3.78	-2.92			-5.26**	-4.07
	(2.47)	(2.95)			(2.61)	(2.90)
	[2.39]	[2.67]			[2.38]	[2.45]
	{2.34}	{2.59}			{2.50}	{2.54}
Crop Yield (Ancestors)			11.35***	14.50***		
			(2.56)	(2.75)		
			[2.60]	[2.46]		
			{2.43}	{2.41}		
Crop Growth Cycle (Ancestors)			-5.05**	-4.65*		
			(2.41)	(2.59)		
			[2.15]	[2.24]		
			{2.28}	{2.27}		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
All Geography & Neolithic	No	Yes	No	Yes	No	Yes
Old World Subsample	No	No	No	No	Yes	Yes
AET		-21.58		-3.00		-5.53
δ		-4.72		-0.35		-0.66
β^*		11.38		22.02		21.67
R^2	0.59	0.70	0.61	0.75	0.56	0.72
Adjusted-R^2	0.55	0.62	0.57	0.68	0.52	0.64
Observations	87	87	87	87	72	72

This table shows the robustness of the results to selection by unobservables. It presents the Altonji et al. (2005) AET ratio as extended by Bellows and Miguel (2009). Additionally, it presents the δ and $\beta^*(1,1)$ statistics suggested by Oster (2014). All statistics suggest that the results are not driven by unobservables. Heteroskedasticity robust standard errors in round parenthesis. Spatial auto-correlation corrected standard errors (Conley, 1999) in squared parenthesis and Cliff-Ord ML in curly brackets. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.5: Potential Crop Yield, Potential Crop Growth Cycle and Long-Term Orientation

	Long-Term Orientation					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Ancestors, pre-1500)	7.84***	9.28***	9.21***	11.93***	9.73***	13.26***
	(2.20)	(2.63)	(2.14)	(2.53)	(2.26)	(2.78)
	[2.42]	[2.30]	[1.69]	[2.01]	[1.74]	[1.87]
	{2.09}	{2.31}	{2.00}	{2.18}	{2.13}	{2.39}
Crop Yield Change (Anc., post-1500)			10.20***	9.91***	11.25***	9.99***
			(2.50)	(2.40)	(2.72)	(2.87)
			[2.78]	[2.00]	[2.98]	[2.27]
			{2.33}	{2.07}	{2.56}	{2.46}
Crop Growth Cycle (Ancestors, pre-1500)	-4.40**	-1.48	-8.33***	-6.61**	-8.82***	-6.31**
	(2.18)	(2.56)	(2.32)	(2.62)	(2.43)	(2.97)
	[2.16]	[2.69]	[2.35]	[2.05]	[2.31]	[2.46]
	{2.07}	{2.25}	{2.17}	{2.27}	{2.29}	{2.55}
Crop Growth Cycle Change (Anc., post-1500)			0.79	-0.37	0.16	-0.90
			(1.75)	(1.84)	(1.87)	(1.98)
			[1.56]	[1.13]	[1.47]	[1.26]
			{1.64}	{1.59}	{1.76}	{1.70}
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
All Geography & Neolithic	No	Yes	No	Yes	No	Yes
Old World Subsample	No	No	No	No	Yes	Yes
AET		-6.47		-4.38		-3.76
δ		-1.45		-0.44		-0.34
β^*		12.79		18.65		21.32
R^2	0.58	0.70	0.67	0.76	0.62	0.74
Adjusted-R^2	0.53	0.61	0.62	0.69	0.58	0.65
Observations	87	87	87	87	72	72

This table shows the robustness of the results to selection by unobservables. It presents the Altonji et al. (2005) AET ratio as extended by Bellows and Miguel (2009). Additionally, it presents the δ and $\beta^*(1,1)$ statistics suggested by Oster (2014). All statistics suggest that the results are not driven by unobservables. Heteroskedasticity robust standard errors in round parenthesis. Spatial auto-correlation corrected standard errors (Conley, 1999) in squared parenthesis and Cliff-Ord ML in curly brackets. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.6: Potential Crop Yield, Crop Growth Cycle, and Long-Term Orientation (Hofstede) Including Grids Not-Suitable for Production

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	5.26**	9.01***	8.21***	7.11**			11.59***	10.79***
	(2.43)	(2.86)	(2.61)	(3.06)			(2.84)	(3.51)
Crop Growth Cycle				2.18				1.47
				(4.00)				(4.25)
Crop Yield (Ancestors)					9.38***	8.62***		
					(2.43)	(3.11)		
Crop Growth Cycle (Ancestors)						1.52		
						(4.23)		
Absolute Latitude		3.56	2.46	3.01	3.66	4.05	4.98	5.37
		(4.21)	(3.94)	(4.35)	(3.79)	(4.16)	(4.62)	(5.14)
Mean Elevation		6.20*	7.14**	6.63*	6.73**	6.44*	5.86	5.64
		(3.26)	(3.41)	(3.44)	(3.35)	(3.25)	(3.92)	(3.84)
Terrain Roughness		-6.76**	-6.16**	-6.09**	-7.29**	-7.24**	-6.55**	-6.59**
		(2.68)	(2.95)	(2.98)	(3.00)	(3.00)	(3.25)	(3.28)
Neolithic Transition Timing			-6.81**	-7.21**			-5.58*	-5.84*
			(3.05)	(3.20)			(2.84)	(2.94)
Neolithic Transition Timing (Ancestors)					-5.20**	-5.41**		
					(2.53)	(2.63)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.50	0.57	0.60	0.59	0.60	0.60	0.56	0.56
Observations	87	87	87	87	87	87	72	72

Notes: This table replicates the results of table 2 when using the country's average crop measures on all cells, including those which do not produce any calories. It establishes the positive, statistically, and economically significant effect of a country's potential crop yield, measured in calories per hectare per year, on its level of Long-Term Orientation measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's crop growth cycle has a negative and not-statistically significant effect on its Long-Term Orientation. In particular, columns (1)-(3) show the effect of potential crop yield after controlling for the country's absolute latitude, mean elevation above sea level, terrain roughness, distance to a coast or river, of it being landlocked or an island, and the time since it transitioned to agriculture. Columns (4)-(6) show that the effect remains after controlling for potential crop growth cycle and the effects of migration. Columns (7)-(8) show that restraining the analysis to the Old World, where intercontinental migration played a smaller role, does not alter the results. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

remain qualitatively unchanged. The coefficient on crop yield is statistically the same across specifications and is economically significant in all specifications. Additionally, the estimated coefficient is statistically significant at the 1% in all but columns (3) and (4). In these two columns the statistical significance falls, but this is due to the much smaller sample size, which increases the standard error, though the estimated coefficient is not statistically different from the ones estimated in other columns.

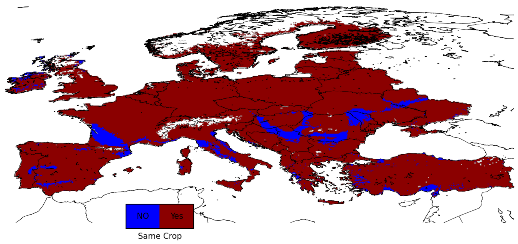
Table B.7: Potential Crop yield, Growth Cycle and Time Preference

	Long-Term Orientation					
	Religion Shares		Muslim - Non-Muslim		Excluding Africa	
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Ancestors)	13.31***	10.76***	9.29**	12.09*	14.62***	14.70***
	(2.94)	(3.11)	(3.77)	(6.60)	(3.74)	(3.67)
Crop Growth Cycle (Ancestors)	-3.15	-2.58	-1.39	-6.33	-4.00	-4.71
	(3.52)	(3.43)	(3.26)	(6.79)	(5.15)	(4.86)
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes
Religious Shares	No	Yes	Yes	Yes	No	No
Only Sub-Saharan Excluded	No	No	No	No	No	Yes
Adjusted-R^2	0.66	0.67	0.67	0.64	0.60	0.63
Observations	87	87	49	38	74	77

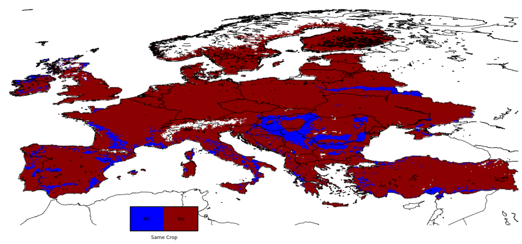
Notes: This table shows the robustness to religious composition and exclusion of Africa of the positive, statistically, and economically significant effect of a country's potential crop return, measured in calories per hectare per day, on its level of Long-Term Orientation measured. All columns control for geographical characteristics, year since transitioning to agriculture, and continental fixed effects. In particular, columns (1)-(2) compare results with and without accounting for the shares of major religions. Columns (3)-(4) split the sample into Muslim and Non-Muslim countries. Columns (5)-(6) show the results of excluding Africa or the Sub-Saharan region. Geographical controls include absolute latitude, average elevation above sea level, terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.3 Crop Return and Long-Term Orientation

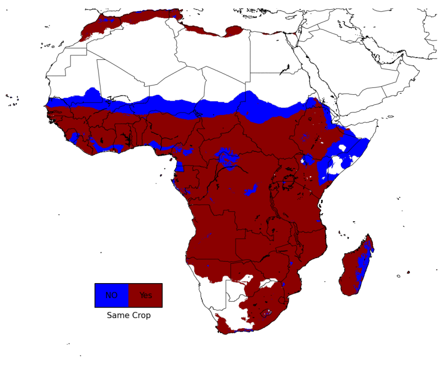
The analysis of section 4 used crop yield as the main independent variable. This captured the insight from the model and directly identified the effect of yield on preferences. But individuals' preferences might have instead reacted to the crop return per day, where the return is given by the ratio of crop yield to crop growth cycle. Figure B.2 shows the cells where the same potential crop generates the highest total yield or highest return. Additionally, table B.8 presents the results of using crop return as the main independent variable. As can be seen, the results are very similar and tell the same story, namely higher yield, which conditional on the growth cycle are reflected in higher returns, generate a higher Long-Term Orientation.



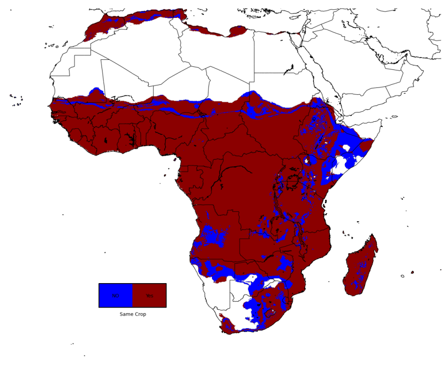
(a) Europe pre-1500CE Crops



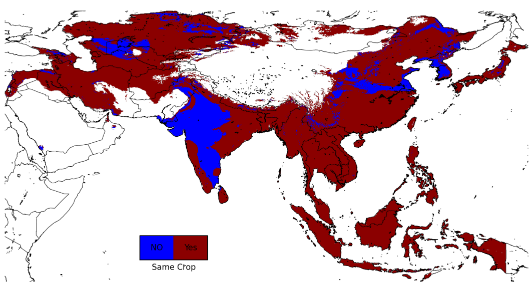
(b) Europe post-1500CE Crops



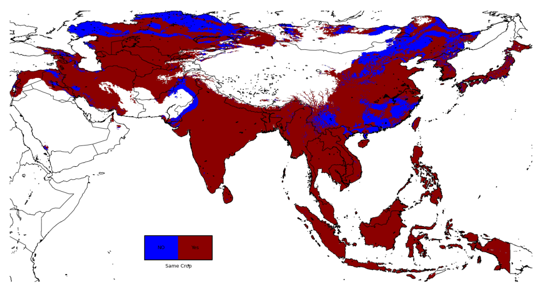
(c) Africa pre-1500CE Crops



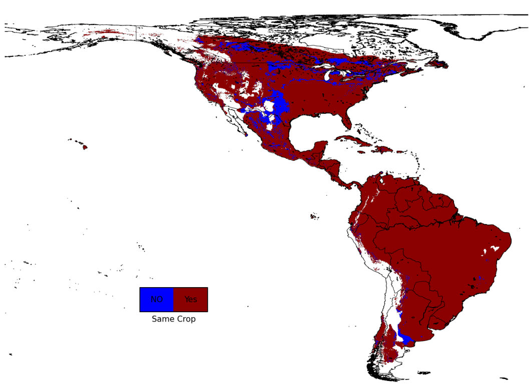
(d) Africa post-1500CE Crops



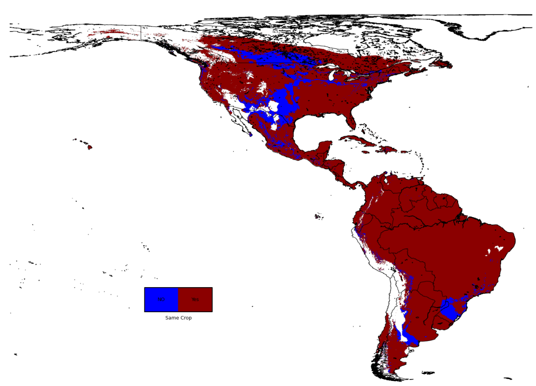
(e) Asia pre-1500CE Crops



(f) Asia post-1500CE Crops



(g) America pre-1500CE Crops



(h) America post-1500CE Crops

Figure B.2: Same Crop Selection under Daily Return and Total Yield .

Table B.8: Potential Daily Crop Return, Crop Growth Cycle, and Long-Term Orientation (Hofstede)

	Long-Term Orientation							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Daily Crop Return	5.71**	9.40***	8.39***	7.00***			10.83***	9.28***
	(2.39)	(2.57)	(2.44)	(2.59)			(2.69)	(2.82)
Crop Growth Cycle				4.04				4.57
				(3.58)				(3.85)
Daily Crop Return (Ancestors)					9.00***	7.57***		
					(2.41)	(2.63)		
Crop Growth Cycle (Ancestors)						4.23		
						(3.79)		
Absolute latitude		3.07	2.07	3.32	2.58	4.08	3.40	5.22
		(4.10)	(3.82)	(4.32)	(3.78)	(4.24)	(4.59)	(5.31)
Mean elevation		6.44*	7.19**	6.39*	6.78*	6.07*	5.98	5.32
		(3.38)	(3.47)	(3.42)	(3.42)	(3.26)	(4.11)	(3.84)
Terrain Roughness		-6.66**	-6.09**	-6.10**	-7.05**	-7.08**	-6.15*	-6.46*
		(2.67)	(2.94)	(2.95)	(3.01)	(3.01)	(3.31)	(3.26)
Neolithic Transition Timing			-6.13*	-6.83**			-5.14*	-5.78*
			(3.11)	(3.18)			(2.93)	(2.94)
Neolithic Transition Timing (Ancestors)					-4.87*	-5.41**		
					(2.62)	(2.66)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.51	0.58	0.59	0.60	0.59	0.60	0.55	0.56
Observations	87	87	87	87	87	87	72	72

Notes: This table establishes the positive, statistically, and economically significant effect of a country's potential crop return, measured in calories per hectare per day, on its level of Long-Term Orientation measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's potential crop growth cycle has a negative and not-statistically significant effect on its Long-Term Orientation. In particular, columns (1)-(3) show the effect of crop yield after controlling for the country's absolute latitude, mean elevation above sea level, terrain roughness, distance to a coast or river, of it being landlocked or an island, and the time since it transitioned to agriculture. Columns (4)-(6) show that the effect remains after controlling for crop growth cycle and the effects of migration. Columns (7)-(8) show that restraining the analysis to the Old World, where intercontinental migration played a smaller role, does not alter the results. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.4 Long-Term Orientation and Geography

This section shows the results when only one geographical control is included in the analysis of section 4. The results of these horse race regressions are similar to the ones presented in tables 2-B.3.

Table B.9: Geographical Characteristics and Long-term Orientation (Hofstede)

	Long-Term Orientation						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield	8.14***	7.74***	7.48***	9.36***	7.32***	7.41***	6.97***
	(2.62)	(2.45)	(2.57)	(2.52)	(2.49)	(2.50)	(2.29)
Absolute latitude	6.26						
	(3.81)						
Mean elevation		2.40					
		(1.91)					
Terrain Roughness			-2.09				
			(2.02)				
Distance to Coast or River				5.79***			
				(1.19)			
Landlocked					2.68**		
					(1.33)		
Island						-1.35	
						(2.59)	
Neolithic Transition Timing							-5.84**
							(2.83)
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.56	0.54	0.54	0.58	0.55	0.54	0.56
Observations	87	87	87	87	87	87	87

Notes: This table establishes the positive, statistically, and economically significant effect of a country's potential crop yield, measured in calories per hectare per year, on its level of Long-Term Orientation measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects in a horse race regression with other geographical characteristics. Additionally, it shows that a country's potential crop growth cycle has a negative and not-statistically significant effect on its Long-Term Orientation. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.10: Geographical Characteristics and Long-Term Orientation (Hofstede)

	Long-Term Orientation						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (pre-1500)	6.34**	6.02**	5.70**	7.62***	5.45**	5.70**	4.96**
	(2.60)	(2.30)	(2.56)	(2.56)	(2.38)	(2.42)	(2.30)
Absolute latitude	5.68						
	(3.68)						
Mean elevation		2.29					
		(1.99)					
Terrain Roughness			-2.03				
			(1.95)				
Distance to Coast or River				5.28***			
				(1.27)			
Landlocked					2.60**		
					(1.29)		
Island						-1.60	
						(2.70)	
Neolithic Transition Timing							-5.88*
							(3.14)
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.52	0.51	0.50	0.53	0.51	0.50	0.52
Observations	87	87	87	87	87	87	87

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500CE potential crop yield, measured in calories per hectare per year, on its level of Long-Term Orientation measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects in a horse race regression with other geographical characteristics. Additionally, it shows that a country's potential crop growth cycle has a negative and not-statistically significant effect on its Long-Term Orientation. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.11: Geographical Characteristics and Long-Term Orientation (Hofstede), for Grids that Experienced Change in Crop post-1500

	Long-Term Orientation						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (pre-1500)	6.06**	4.83**	6.21***	5.48**	4.52*	4.90**	5.27**
	(2.68)	(2.36)	(2.33)	(2.37)	(2.38)	(2.29)	(2.09)
Absolute latitude	6.91						
	(4.48)						
Mean elevation		0.94					
		(2.20)					
Terrain Roughness			-3.85*				
			(2.11)				
Distance to Coast or River				3.80***			
				(1.27)			
Landlocked					1.89		
					(1.33)		
Island						-1.11	
						(2.80)	
Neolithic Transition Timing							-7.25**
							(3.25)
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.52	0.50	0.52	0.52	0.51	0.50	0.54
Observations	87	87	87	87	87	87	87

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500CE potential crop yield on grids that experienced a change in the potential crop post-1500, measured in calories per hectare per year, on its level of Long-Term Orientation measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects in a horse race regression with other geographical characteristics. Additionally, it shows that a country's potential crop growth cycle has a negative and not-statistically significant effect on its Long-Term Orientation. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.5 Potential Crop Yield, Long-Term Orientation and Other Pre-Industrial Channels

This section presents further evidence that rejects the existence of alternative pre-industrial channels. This complements the findings of table 4. Table B.12 reproduces the analysis of table 4, but considers only the cells for which the crop in use changed post-1500CE. As can be seen the results are qualitatively unchanged. Potential crop yield and its change remain economically and statistically significant. Furthermore, none of the additional variables provides any additional explanatory power, while crop yield, growth rate, and their change retain their explanatory power.

Additionally, tables B.13-B.15 analyze the possible effect of other agricultural channels. In particular, it controls for average agricultural suitability (Ramankutty et al., 2002) and the use of the plow (Alesina et al., 2013). Reassuringly, in all columns potential crop yield and its change remain economically and statistically significant. Furthermore, neither one of the other agricultural measures provides any additional explanatory power, while crop yield, growth rate, and their change retain their explanatory power. This reinforces the results in the main body of the paper, that the alternative pre-industrial or agricultural channel do not explain the findings of this paper.

Additionally, table B.13 shows that the results are robust to a country's language's future time reference (FTR), which Chen (2013) shows correlates with individual's savings behavior. Reassuringly, inclusion of the level of strong FTR does not alter the results.

Tables B.16-B.17 analyze the effect of pre-industrial trade on the effect of potential crop yield on Long-Term Orientation. These tables address the potential concern that having trading possibilities might affect the mechanism highlighted in this paper. In particular, one might worry that if agents can trade amongst themselves, then the forces that allowed higher yields to cause higher levels of patience might be undermined and as such also the theoretical and empirical results. However, the theory is based on frictions to intertemporal trade, not to trade in general. Thus, the fact that agents can trade amongst themselves does not necessarily undermine the mechanism. Furthermore, intertemporal trade can affect the results only if patient individuals are not liquidity constrained and can thus lend resources to impatient ones. But the situation in the theory is precisely the opposite, as can be expected in reality also. As shown in tables B.16-B.17 the inclusion of additional controls for trade potential does not affect the empirical results. In particular, accounting for the effect of variation in agricultural suitability, the existence of a means of exchange, the levels of transportation technologies, or the pre-industrial distance to trade routes does not affect the qualitative results of the paper. After accounting for these measures of trade potential there exists a positive, statistically and economically significant effect of potential crop yield pre-1500 and its change post-1500 on Long-Term Orientation.

Finally, table B.18 analyzes the robustness of the results to the possibility of diversification by including scale and risk factors in the analysis. In particular, if larger countries could diversify the timing of planting and harvesting across space, the mechanism highlighted in this paper might be hindered from working. Reassuringly, inclusion of a country's area does not alter the results. Similarly, climatic risks can prevent people adopting the investment mode and thus prevent our mechanism from being operative. Reassuringly, inclusion of the average standard deviation across months of precipitation or temperature does not alter the results. Also, controlling for the spatial autocorrelation with climatic conditions in adjacent cells does not alter the results. After accounting for these measures of climatic risk and scale the positive, statistically and economically significant effect of potential crop yield pre-1500 and its change post-1500 on Long-Term Orientation remains.

Table B.12: Potential Crop Yield, Long-Term Orientation, and Pre-Industrial Development, for Grids that Experienced Change in Crop post-1500

	Long-Term Orientation						
	1500CE					1800CE	
	Population Density		Urbanization		Both	Urbanization	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (Ancestors, pre-1500)	6.63**	6.29**	5.45*	6.14*	6.93**	6.88**	6.86**
	(2.64)	(2.57)	(3.16)	(3.46)	(3.23)	(2.78)	(2.82)
Crop Yield Change (post-1500)	5.90**	4.63	5.71*	5.61	4.86	5.63*	5.67*
	(2.80)	(3.02)	(3.32)	(3.35)	(4.15)	(3.32)	(3.36)
Crop Growth Cycle (Anc., pre-1500)	1.26	2.29	2.02	1.07	0.69	1.04	1.00
	(2.74)	(2.88)	(3.01)	(3.39)	(3.18)	(3.07)	(3.10)
Crop Growth Cycle Ch. (post-1500)	-5.26***	-4.91**	-6.92***	-7.03***	-5.93***	-5.50***	-5.54**
	(1.96)	(2.11)	(2.00)	(2.01)	(2.10)	(2.04)	(2.11)
Population density in 1500 CE		1.89			2.40		
		(2.23)			(3.95)		
Urbanization rate in 1500 CE				-1.56	-2.46		
				(2.06)	(2.86)		
Urbanization rate in 1800 CE							-0.26
							(1.21)
	Partial R^2						
Crop Yield (Ancestors, pre-1500)	0.11**	0.10**	0.08*	0.08*	0.11**	0.12**	0.12**
Crop Yield Change (post-1500)	0.07**	0.03	0.06*	0.06	0.03	0.05*	0.05*
Crop Growth Cycle (Anc., pre-1500)	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Crop Growth Cycle Ch. (post-1500)	0.11***	0.09**	0.21***	0.21***	0.16***	0.12***	0.12**
Population density in 1500 CE		0.01			0.01		
Urbanization rate in 1500 CE				0.01	0.02		
Urbanization rate in 1800 CE							0.00
	Semi-Partial R^2						
Crop Yield (Ancestors, pre-1500)	0.03**	0.03**	0.02*	0.02*	0.03**	0.04**	0.04**
Crop Yield Change (post-1500)	0.02**	0.01	0.02*	0.02	0.01	0.02*	0.02*
Crop Growth Cycle (Anc., pre-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crop Growth Cycle Ch. (post-1500)	0.03***	0.03**	0.07***	0.07***	0.04***	0.04***	0.04**
Population density in 1500 CE		0.00			0.00		
Urbanization rate in 1500 CE				0.00	0.00		
Urbanization rate in 1800 CE							0.00
Continental FE	Yes	Yes	Yes	Yes	Yes		
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes		
Adjusted-R^2	0.68	0.68	0.67	0.66	0.68	0.66	0.65
Observations	87	87	65	65	64	79	79

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield and potential crop growth cycle and their change on grids that experienced change in crop on its level of Long-Term Orientation, while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's level of pre-industrial development as measured by its population density or urbanization rates in 1500 CE have economically smaller and not always statistically significant effects. In particular, columns (1)-(2) compare the effects of potential crop yields and population densities in 1500CE, while columns (3)-(4) use urbanization rates in 1500 CE instead. Column (5) controls for both urbanization rates and population densities in 1500CE. Finally, columns (6)-(7) compare the effects of crop yield pre-1500CE and its change and urbanization in 1800CE. In all columns crop yield and its change remain positive, statistically and economically significant, and have a higher explanatory power than any of the alternative channels. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.13: Potential Crop Yield, Long-Term Orientation, Agriculture and Language

	Long-Term Orientation								
	Agricultural Suitability			Plow			Future Time Reference		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crop Yield (Ancestors, pre-1500)	12.02***	11.46***	10.36***	12.85***	12.80***	12.72***	13.05***	14.10***	13.95***
	(2.69)	(2.91)	(3.32)	(2.65)	(2.67)	(2.70)	(2.75)	(2.77)	(2.80)
Crop Yield Change (post-1500)	10.70***	10.50***	10.03***	10.93***	10.93***	11.17***	10.30***	9.89***	10.13***
	(2.71)	(2.70)	(2.73)	(2.77)	(2.78)	(2.76)	(3.16)	(2.88)	(3.02)
Crop Growth Cycle (Ancestors, pre-1500)	-7.63*	-7.71*	-8.04*	-10.02**	-10.13**	-10.50***	-10.87**	-10.05**	-10.21**
	(3.85)	(3.94)	(4.09)	(3.94)	(3.92)	(3.94)	(4.14)	(3.80)	(3.97)
Crop Growth Cycle Change (post-1500)	-0.90	-0.96	-1.16	-1.30	-1.40	-1.63	-1.09	-0.86	-0.97
	(1.62)	(1.68)	(1.76)	(1.69)	(1.66)	(1.61)	(1.62)	(1.72)	(1.70)
Land Suitability		0.83							
		(2.07)							
Land Suitability (Ancestors)			2.34						
			(3.20)						
Plow					1.62				
					(3.17)				
Plow (Ancestors)						3.35			
						(3.92)			
Strong FTR								-3.68**	
								(1.68)	
Strong FTR (Ancestors)									-2.59
									(1.76)
	Partial R^2								
Crop Yield (Ancestors, pre-1500)	0.23***	0.16***	0.11***	0.25***	0.25***	0.25***	0.28***	0.32***	0.31***
Crop Yield Change (post-1500)	0.17***	0.16***	0.14***	0.17***	0.17***	0.18***	0.15***	0.15***	0.15***
Crop Growth Cycle (Anc., pre-1500)	0.05*	0.06*	0.06*	0.10**	0.10**	0.10***	0.11**	0.10**	0.10**
Crop Growth Cycle Ch. (post-1500)	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01
Land Suitability		0.00							
Land Suitability (Anc.)			0.01						
Plow					0.00				
Plow (Ancestors)						0.01			
Strong FTR								0.08**	
Strong FTR (Anc.)									0.04
	Semi-Partial R^2								
Crop Yield (Ancestors, pre-1500)	0.07***	0.05***	0.03***	0.08***	0.08***	0.08***	0.08***	0.09***	0.09***
Crop Yield Change (post-1500)	0.05***	0.05***	0.04***	0.05***	0.05***	0.05***	0.04***	0.03***	0.04***
Crop Growth Cycle (Anc., pre-1500)	0.01*	0.01*	0.02*	0.03**	0.03**	0.03***	0.03**	0.02**	0.02**
Crop Growth Cycle Ch. (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability		0.00							
Land Suitability (Anc.)			0.00						
Plow					0.00				
Plow (Ancestors)						0.00			
Strong FTR								0.02**	
Strong FTR (Anc.)									0.01
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.68	0.67	0.68	0.67	0.66	0.67	0.70	0.72	0.70
Observations	85	85	85	87	87	87	71	71	71

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield and potential crop growth cycle on its level of Long-Term Orientation, while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's level of agricultural suitability and suitability for the use of plows have economically smaller and not always statistically significant effects. In particular, columns (1)-(3) compare the effects of potential crop yields and agricultural suitability. Columns (4)-(6) compare the effects to the use of plow. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, precipitation and percentage of land in tropical, subtropical and temperate climates. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.14: Potential Crop Yield, Long-Term Orientation, and Agriculture, for Grids that Experienced Change in Crop post-1500

	Long-Term Orientation					
	Agricultural Suitability			Plow		
Crop Yield (Ancestors, pre-1500)	7.50***	7.60***	7.65**	6.63**	6.53**	6.37**
	(2.55)	(2.81)	(3.02)	(2.64)	(2.67)	(2.73)
Crop Yield Change (post-1500)	6.81***	6.87***	6.92***	5.90**	5.89**	5.69**
	(2.45)	(2.42)	(2.49)	(2.80)	(2.77)	(2.71)
Crop Growth Cycle (Ancestors, pre-1500)	1.12	1.18	1.20	1.26	0.93	0.98
	(2.74)	(2.78)	(2.79)	(2.74)	(2.82)	(2.80)
Crop Growth Cycle Change (post-1500)	-4.43**	-4.49**	-4.51**	-5.26***	-5.30***	-5.34***
	(1.89)	(1.88)	(1.93)	(1.96)	(1.99)	(2.00)
Land Suitability		-0.26				
		(1.80)				
Land Suitability (Ancestors)			-0.36			
			(2.90)			
Plow					2.57	
					(2.52)	
Plow (Ancestors)						3.42
						(2.89)
	Partial R^2					
Crop Yield (Ancestors, pre-1500)	0.15***	0.14***	0.12**	0.11**	0.11**	0.10**
Crop Yield Change (post-1500)	0.10***	0.09***	0.09***	0.07**	0.07**	0.06**
Crop Growth Cycle (Ancestors, pre-1500)	0.00	0.00	0.00	0.00	0.00	0.00
Crop Growth Cycle Change (post-1500)	0.09**	0.08**	0.08**	0.11***	0.11***	0.11***
Land Suitability		0.00				
Land Suitability (Ancestors)			0.00			
Plow					0.01	
Plow (Ancestors)						0.02
	Semi-Partial R^2					
Crop Yield (Ancestors, pre-1500)	0.04***	0.04***	0.03**	0.03**	0.03**	0.03**
Crop Yield Change (post-1500)	0.02***	0.02***	0.02***	0.02**	0.02**	0.02**
Crop Growth Cycle (Ancestors, pre-1500)	0.00	0.00	0.00	0.00	0.00	0.00
Crop Growth Cycle Change (post-1500)	0.02**	0.02**	0.02**	0.03***	0.03***	0.03***
Land Suitability		0.00				
Land Suitability (Ancestors)			0.00			
Plow					0.00	
Plow (Ancestors)						0.00
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.71	0.71	0.71	0.68	0.68	0.68
Observations	85	85	85	87	87	87

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield and potential crop growth cycle and their change for grids that experienced change in crops on its level of Long-Term Orientation, while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's level of agricultural suitability and suitability for the use of plows have economically smaller and not always statistically significant effects. In particular, columns (1)-(3) compare the effects of potential crop yields and agricultural suitability. Columns (4)-(6) compare the effects to the use of plow. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.15: Potential Crop Yield, Long-Term Orientation, and Agriculture

	Long-Term Orientation					
	Agricultural Suitability			Plow		
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Ancestors, pre-1500)	10.31***	8.34**	9.15**	11.05***	10.86***	10.68***
	(2.51)	(3.41)	(3.72)	(2.53)	(2.61)	(2.61)
Crop Yield Change (post-1500)	10.41***	10.42***	10.47***	10.76***	10.75***	10.93***
	(2.69)	(2.80)	(2.76)	(2.89)	(2.90)	(2.90)
Crop Growth Cycle (Anc., pre-1500)	-5.73	-6.42	-6.39	-8.06*	-8.19**	-8.74**
	(3.80)	(3.92)	(4.08)	(4.06)	(4.09)	(4.15)
Crop Growth Cycle Change (post-1500)	-0.06	-0.14	-0.17	-0.46	-0.58	-0.88
	(1.59)	(1.69)	(1.69)	(1.72)	(1.72)	(1.69)
Land Suitability (Climate)		3.15				
		(3.24)				
Land Suitability (Climate, Anc.)			1.75			
			(3.92)			
Plow					1.76	
					(3.30)	
Plow (Anc.)						3.89
						(3.72)
	Partial R^2					
Crop Yield (Anc., pre-1500)	0.21***	0.09**	0.08**	0.23***	0.22***	0.21***
Crop Yield Change (post-1500)	0.16***	0.17***	0.17***	0.16***	0.16***	0.17***
Crop Growth Cycle (Anc., pre-1500)	0.03	0.04	0.03	0.06*	0.06**	0.07**
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability		0.01				
Land Suitability (Anc.)			0.00			
Plow					0.00	
Plow (Anc.)						0.02
	Semi-Partial R^2					
Crop Yield (Anc., pre-1500)	0.07***	0.02**	0.02**	0.08***	0.08***	0.07***
Crop Yield Change (post-1500)	0.05***	0.05***	0.05***	0.05***	0.05***	0.06***
Crop Growth Cycle (Anc., pre-1500)	0.01	0.01	0.01	0.02*	0.02**	0.02**
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability		0.00				
Land Suitability (Anc.)			0.00			
Plow					0.00	
Plow (Anc.)						0.00
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.67	0.67	0.67	0.65	0.65	0.65
Observations	85	85	85	87	87	87

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield, crop growth cycle and their change post-1500CE on its level of Long-Term Orientation, while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's level of agricultural suitability and suitability for the use of plows have economically smaller and not always statistically significant effects. In particular, columns (1)-(3) compare the effects of potential crop yields and climatic agricultural suitability. Columns (4)-(6) compare the effects to the use of plow. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.16: Long-Term Orientation and Pre-Industrial Trade

	Long-Term Orientation								
	Suitability		Money			Transportation			Routes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crop Yield (Ancestors, pre-1500)	9.00***	9.84***	11.48***	12.03***	11.27***	11.61***	12.37***	11.17***	11.73***
	(2.85)	(2.45)	(2.73)	(3.33)	(2.61)	(2.67)	(3.35)	(2.66)	(2.76)
Crop Yield Change (post-1500)	10.03***	10.84***	11.08***	11.48***	11.11***	10.98***	11.32***	11.13***	11.81***
	(2.97)	(2.72)	(3.16)	(3.42)	(3.09)	(3.16)	(3.17)	(3.14)	(3.42)
Crop Growth Cycle (Ancestors, pre-1500)	-5.35	-7.71*	-8.36*	-8.96*	-8.79**	-8.33*	-9.28**	-8.56*	-9.73**
	(4.23)	(4.29)	(4.28)	(4.66)	(4.38)	(4.30)	(4.61)	(4.42)	(4.51)
Crop Growth Cycle Change (post-1500)	-0.12	0.27	-0.07	-0.02	-0.10	0.02	0.10	-0.34	0.02
	(1.70)	(1.52)	(1.82)	(1.79)	(1.76)	(1.85)	(1.77)	(1.75)	(1.83)
Land Suitability (Gini)	-2.11								
	(2.02)								
Land Suitability (Range)		2.46							
		(1.65)							
Exchange Medium 1000BCE			0.05						
			(2.43)						
Exchange Medium 1CE				1.15					
				(3.12)					
Exchange Medium 1000CE					4.60				
					(4.32)				
Transportation Medium 1000BCE						0.84			
						(3.18)			
Transportation Medium 1CE							2.40		
							(4.36)		
Transportation Medium 1000CE								1.50	
								(4.39)	
Pre-Industrial Distance to Trade Route									0.16
									(5.98)
	Partial R^2								
Crop Yield (Ancestors, pre-1500)	0.13***	0.20***	0.23***	0.22***	0.23***	0.24***	0.22***	0.22***	0.24***
Crop Yield Change (post-1500)	0.15***	0.17***	0.17***	0.17***	0.16***	0.17***	0.18***	0.16***	0.18***
Crop Growth Cycle (Ancestors, pre-1500)	0.03	0.05*	0.07*	0.07*	0.07**	0.07*	0.07**	0.07*	0.09**
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability (Gini)	0.01								
Land Suitability (Range)		0.02							
Exchange Medium 1000BCE			0.00						
Exchange Medium 1CE				0.00					
Exchange Medium 1000CE					0.01				
Transportation Medium 1000BCE						0.00			
Transportation Medium 1CE							0.01		
Transportation Medium 1000CE								0.00	
Pre-Industrial Distance to Trade Route									0.00
	Semi-Partial R^2								
Crop Yield (Ancestors, pre-1500)	0.04***	0.06***	0.08***	0.08***	0.09***	0.09***	0.08***	0.08***	0.10***
Crop Yield Change (post-1500)	0.05***	0.05***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***	0.07***
Crop Growth Cycle (Ancestors, pre-1500)	0.01	0.01*	0.02*	0.02*	0.02**	0.02*	0.02**	0.02*	0.03**
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land Suitability (Gini)	0.00								
Land Suitability (Range)		0.01							
Exchange Medium 1000BCE			0.00						
Exchange Medium 1CE				0.00					
Exchange Medium 1000CE					0.00				
Transportation Medium 1000BCE						0.00			
Transportation Medium 1CE							0.00		
Transportation Medium 1000CE								0.00	
Pre-Industrial Distance to Trade Route									0.00
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.66	0.67	0.63	0.64	0.63	0.63	0.64	0.62	0.61
Observations	84	84	81	81	81	81	81	81	71

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield, crop growth cycle and their change post-1500 on its level of Long-Term Orientation, while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's opportunities and technologies for trade, as captured by the Gini and range of agricultural suitability, existence of means of exchange, means of transportation, and distance to trade (Özak, 2012) routes have an economically smaller and not statistically significant effect. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.17: Long-Term Orientation and Pre-Industrial Trade, for Grids that Experienced Change in Crop post-1500

	Long-Term Orientation								
	Suitability		Money			Transportation			Routes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crop Yield (Ancestors, pre-1500)	7.39***	7.38***	8.22**	7.56***	7.53***	7.81***	7.52***	7.54***	6.50**
	(2.70)	(2.69)	(3.20)	(2.74)	(2.77)	(2.94)	(2.81)	(2.77)	(2.85)
Crop Yield Change (post-1500)	6.72***	6.72***	6.04**	6.01**	5.63**	5.97**	6.08**	5.61**	7.12**
	(2.51)	(2.51)	(2.85)	(2.90)	(2.80)	(2.86)	(2.84)	(2.80)	(3.34)
Crop Growth Cycle (Ancestors, pre-1500)	1.05	1.17	0.90	0.77	1.97	1.17	1.03	1.63	0.12
	(2.77)	(2.76)	(2.90)	(3.23)	(3.03)	(2.93)	(3.25)	(3.04)	(3.20)
Crop Growth Cycle Change (post-1500)	-4.20**	-4.42**	-5.02**	-5.05**	-5.27**	-5.05**	-5.13**	-5.21**	-5.67**
	(2.06)	(1.94)	(2.16)	(2.13)	(2.10)	(2.15)	(2.11)	(2.11)	(2.17)
Land Suitability (Gini)	-0.50								
	(2.02)								
Land Suitability (Range)		0.37							
		(1.35)							
Exchange Medium 1000BCE			1.31						
			(2.51)						
Exchange Medium 1CE				-0.93					
				(2.73)					
Exchange Medium 1000CE					6.07				
					(4.08)				
Transportation Medium 1000BCE						0.88			
						(3.23)			
Transportation Medium 1CE							-0.71		
							(4.07)		
Transportation Medium 1000CE								3.09	
								(4.07)	
Pre-Industrial Distance to Trade Route									4.40
									(5.78)
	Partial R^2								
Crop Yield (Ancestors, pre-1500)	0.14***	0.14***	0.14**	0.14***	0.14***	0.14***	0.14***	0.14***	0.11**
Crop Yield Change (post-1500)	0.09***	0.09***	0.07**	0.07**	0.06**	0.07**	0.07**	0.06**	0.09**
Crop Growth Cycle (Ancestors, pre-1500)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Crop Growth Cycle Change (post-1500)	0.06**	0.08**	0.10**	0.10**	0.11**	0.10**	0.11**	0.11**	0.12**
Land Suitability (Gini)	0.00								
Land Suitability (Range)		0.00							
Exchange Medium 1000BCE			0.01						
Exchange Medium 1CE				0.00					
Exchange Medium 1000CE					0.02				
Transportation Medium 1000BCE						0.00			
Transportation Medium 1CE							0.00		
Transportation Medium 1000CE								0.01	
Pre-Industrial Distance to Trade Route									0.01
	Semi-Partial R^2								
Crop Yield (Ancestors, pre-1500)	0.04***	0.04***	0.04**	0.04***	0.04***	0.04***	0.04***	0.04***	0.04**
Crop Yield Change (post-1500)	0.02***	0.02***	0.02**	0.02**	0.02**	0.02**	0.02**	0.02**	0.03**
Crop Growth Cycle (Ancestors, pre-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crop Growth Cycle Change (post-1500)	0.02**	0.02**	0.03**	0.03**	0.03**	0.03**	0.03**	0.03**	0.04**
Land Suitability (Gini)	0.00								
Land Suitability (Range)		0.00							
Exchange Medium 1000BCE			0.00						
Exchange Medium 1CE				0.00					
Exchange Medium 1000CE					0.01				
Transportation Medium 1000BCE						0.00			
Transportation Medium 1CE							0.00		
Transportation Medium 1000CE								0.00	
Pre-Industrial Distance to Trade Route									0.00
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.70	0.70	0.67	0.66	0.66	0.66	0.66	0.66	0.63
Observations	84	84	81	81	81	81	81	81	71

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield, crop growth cycle and their change post-1500 in grids that experienced a change in crop on its level of Long-Term Orientation, while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's opportunities and technologies for trade, as captured by the Gini and range of agricultural suitability, existence of means of exchange, means of transportation, and distance to trade routes have an economically smaller and not statistically significant effect. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.18: Long-Term Orientation and Risk

	Long-Term Orientation									
	Scale		Risk							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Crop Yield (Ancestors, pre-1500)	10.62***	9.28***	10.88***	11.56***	10.19***	9.58***	11.06***	11.08***	10.98***	11.04***
	(2.62)	(2.49)	(2.68)	(2.70)	(2.97)	(2.81)	(2.58)	(2.62)	(2.58)	(2.64)
Crop Yield Change (post-1500)	10.23***	8.85***	10.75***	10.72***	10.23***	9.85***	10.77***	10.84***	10.74***	10.74***
	(2.95)	(2.93)	(2.92)	(2.88)	(3.00)	(2.93)	(2.92)	(3.14)	(2.92)	(3.12)
Crop Growth Cycle (Ancestors, pre-1500)	-7.45*	-3.79	-8.14*	-7.22*	-6.31	-4.59	-8.07*	-8.16*	-8.02*	-8.05*
	(4.30)	(4.10)	(4.18)	(4.32)	(4.83)	(4.71)	(4.09)	(4.33)	(4.11)	(4.33)
Crop Growth Cycle Change (post-1500)	-0.60	0.15	-0.47	-0.31	-0.12	0.19	-0.46	-0.48	-0.44	-0.45
	(1.68)	(1.65)	(1.73)	(1.75)	(1.87)	(1.82)	(1.75)	(1.78)	(1.74)	(1.77)
Total land area	3.04									
	(2.17)									
Total land area (Ancestry Adjusted)		7.31***								
		(2.08)								
Precipitation Volatility (mean)			0.69							
			(3.05)							
Precipitation Volatility (mean) (Ancestry Adjusted)				-2.26						
				(3.02)						
Temperature Volatility (mean)					4.37					
					(6.44)					
Temperature Volatility (mean) (Ancestry Adjusted)						6.70				
						(5.07)				
Precipitation Diversification (mean)							-0.22			
							(2.95)			
Precipitation Diversification (mean) (Ancestry Adjusted)								-0.28		
								(2.85)		
Temperature Diversification (mean)									0.78	
									(3.05)	
Temperature Diversification (mean) (Ancestry Adjusted)										0.05
										(2.97)
	Partial R^2									
Crop Yield (Ancestors, pre-1500)	0.21***	0.18***	0.21***	0.23***	0.18***	0.16***	0.22***	0.22***	0.22***	0.22***
Crop Yield Change (post-1500)	0.15***	0.13***	0.16***	0.16***	0.15***	0.14***	0.16***	0.16***	0.16***	0.16***
Crop Growth Cycle (Ancestors, pre-1500)	0.05*	0.01	0.06*	0.05*	0.03	0.02	0.06*	0.06*	0.06*	0.06*
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total land area	0.02									
Total land area (Ancestry Adjusted)		0.14***								
Precipitation Volatility (mean)			0.00							
Precipitation Volatility (mean) (Ancestry Adjusted)				0.01						
Temperature Volatility (mean)					0.01					
Temperature Volatility (mean) (Ancestry Adjusted)						0.03				
Precipitation Diversification (mean)							0.00			
Precipitation Diversification (mean) (Ancestry Adjusted)								0.00		
Temperature Diversification (mean)									0.00	
Temperature Diversification (mean) (Ancestry Adjusted)										0.00
	Semi-Partial R^2									
Crop Yield (Ancestors, pre-1500)	0.07***	0.05***	0.07***	0.08***	0.06***	0.05***	0.08***	0.08***	0.08***	0.08***
Crop Yield Change (post-1500)	0.05***	0.04***	0.05***	0.05***	0.05***	0.04***	0.05***	0.05***	0.05***	0.05***
Crop Growth Cycle (Ancestors, pre-1500)	0.02*	0.00	0.02*	0.01*	0.01	0.00	0.02*	0.02*	0.02*	0.02*
Crop Growth Cycle Change (post-1500)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total land area	0.01									
Total land area (Ancestry Adjusted)		0.04***								
Precipitation Volatility (mean)			0.00							
Precipitation Volatility (mean) (Ancestry Adjusted)				0.00						
Temperature Volatility (mean)					0.00					
Temperature Volatility (mean) (Ancestry Adjusted)						0.01				
Precipitation Diversification (mean)							0.00			
Precipitation Diversification (mean) (Ancestry Adjusted)								0.00		
Temperature Diversification (mean)									0.00	
Temperature Diversification (mean) (Ancestry Adjusted)										0.00
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.65	0.70	0.65	0.65	0.65	0.66	0.65	0.65	0.65	0.65
Observations	87	87	87	87	87	87	87	87	87	87

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield, crop growth cycle and their change post-1500 on its level of Long-Term Orientation, while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's size and climatic volatility, as captured by its area, the volatility of precipitation and temperatures, and the spatial correlation of precipitation and temperatures across cells have do not have a statistically nor economically significant effect. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.6 Long-Term Orientation and Age Structure of Population

Tables B.19-B.21 analyze the robustness of the results in the main body of the paper with respect to the country's age dependency ratio, life-expectancy, and income. These variables can affect Long-Term Orientation if individuals level of patience is affected by their age or life expectancy. Furthermore, if countries are sufficiently developed, they might have institutions like social security, unemployment insurance, etc. which should affect its level of Long-Term Orientation. Reassuringly, the results in these tables show that the results of the main body of the paper are not affected by the inclusion of these variables. The effect of crop yield remains statistically and economically significant and one additional standard deviation in crop yield increases Long-Term Orientation between 0.5 and 1 standard deviations depending on the specification and measure used. Additionally, as can be seen the inclusion of these variables does not change the coefficient on crop yield in a statistically significant manner. Furthermore, the age dependency ratio has a negative, though not always statistically significant effect on Long-Term Orientation. Similarly, the life-expectancy at birth has a positive, though not always statistically significant effect on LTO. Similarly, income levels are positively correlated with LTO, although the result is not statistically significant.

Table B.19: Potential Crop Yield, Crop Growth Cycle, and Modern Development

	Long-Term Orientation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	11.67***	10.87***	13.23***	12.96***				
	(3.80)	(3.58)	(3.95)	(3.90)				
Crop Growth Cycle	-4.53	-4.73	-4.90	-4.61				
	(4.20)	(3.95)	(4.00)	(4.07)				
Crop Yield (Ancestors)					15.52***	14.42***	16.39***	16.31***
					(2.94)	(3.02)	(3.04)	(3.06)
Crop Growth Cycle (Ancestors)					-6.30*	-6.27*	-6.62*	-6.33*
					(3.54)	(3.41)	(3.50)	(3.49)
Age Dependency Ratio		-6.51**				-4.37		
		(2.95)				(2.84)		
Life Expectancy at Birth			7.24*				5.77	
			(4.32)				(3.80)	
Ln[GPD per capita]				3.67				3.04
				(3.00)				(2.57)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.62	0.64	0.63	0.62	0.68	0.69	0.68	0.68
Observations	87	87	87	87	87	87	87	87

Notes: This table shows the robustness of the main findings to the inclusion of a country's age dependency ratio, its life-expectancy at birth, and log-income per capita in 2005. It establishes the positive, statistically, and economically significant effect of a country's potential crop yield on its level of Long-Term Orientation, while controlling for continental fixed effects, geographical characteristics, and the timing of transition to agriculture. Additionally, it shows that a country's age dependency ratio, life-expectancy, and log-income per capita n 2005 do not have a robust effect. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.20: Potential Crop Yield, Crop Growth Cycle, and Modern Development

	Long-Term Orientation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	11.08***	10.19***	12.73***	12.09***				
	(3.72)	(3.60)	(3.78)	(3.84)				
Crop Yield Change (post-1500)	10.32***	9.70***	11.28***	10.78***				
	(2.85)	(2.77)	(2.57)	(2.81)				
Crop Growth Cycle (pre-1500)	-7.72*	-6.95	-8.28**	-7.49*				
	(4.36)	(4.45)	(4.13)	(4.34)				
Crop Growth Cycle Change (post-1500)	-0.69	-1.38	-0.73	-0.89				
	(1.81)	(1.59)	(1.69)	(1.69)				
Crop Yield (Ancestors, pre-1500)					12.83***	12.12***	13.59***	13.40***
					(2.50)	(2.71)	(2.58)	(2.64)
Crop Yield Change (Anc., post-1500)					9.91***	9.35***	10.35***	9.96***
					(2.12)	(2.24)	(1.88)	(2.08)
Crop Growth Cycle (Ancestors, pre-1500)					-9.19***	-8.65**	-9.51***	-8.96***
					(3.34)	(3.55)	(3.13)	(3.36)
Crop Growth Cycle Ch. (Anc., post-1500)					-0.37	-0.74	-0.48	-0.51
					(1.48)	(1.37)	(1.45)	(1.44)
Age Dependency Ratio		-5.83*				-3.18		
		(3.01)				(2.76)		
Life Expectancy at Birth			7.69*				5.82	
			(4.22)				(3.67)	
Ln[GPD per capita]				3.07				2.15
				(2.88)				(2.52)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.63	0.65	0.64	0.63	0.69	0.69	0.69	0.69
Observations	87	87	87	87	87	87	87	87

Notes: This table shows the robustness of the main findings to the inclusion of a country's age dependency ratio, its life-expectancy at birth, and log-income per capita in 2005. It establishes the positive, statistically, and economically significant effect of a country's pre-1500CE potential crop yield and its change on its level of Long-Term Orientation, while controlling for continental fixed effects, geographical characteristics, and the timing of transition to agriculture. Additionally, it shows that a country's age dependency ratio, life-expectancy, and log-income per capita n 2005 do not have a robust effect. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.21: Potential Crop Yield, Crop Growth Cycle, and Modern Development, for Grids that Experienced Change in Crop post-1500

	Long-Term Orientation							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	6.37**	5.54*	6.60**	6.24*				
	(3.18)	(3.19)	(3.26)	(3.25)				
Crop Yield Change (post-1500)	5.71**	5.67**	6.01**	5.88**				
	(2.66)	(2.45)	(2.37)	(2.54)				
Crop Growth Cycle (pre-1500)	-0.37	-0.52	0.60	0.45				
	(2.60)	(2.73)	(2.45)	(2.65)				
Crop Growth Cycle Change (post-1500)	-4.75**	-4.66*	-5.42**	-5.14**				
	(2.25)	(2.36)	(2.30)	(2.39)				
Crop Yield (Ancestors, pre-1500)					7.85**	7.21**	7.48**	7.63**
					(3.26)	(3.37)	(3.36)	(3.34)
Crop Yield Change (Anc., post-1500)					7.31***	6.93***	7.47***	7.31***
					(2.25)	(2.12)	(1.98)	(2.14)
Crop Growth Cycle (Anc., pre-1500)					-0.95	-1.27	0.52	-0.01
					(3.16)	(3.24)	(3.17)	(3.34)
Crop Growth Cycle Ch. (Anc., post-1500)					-3.44	-3.48	-4.06*	-3.80
					(2.27)	(2.37)	(2.27)	(2.33)
Age Dependency Ratio		-5.84**				-4.12		
		(2.88)				(2.62)		
Life Expectancy at Birth			7.14*				6.31	
			(4.19)				(3.90)	
Ln[GPD per capita]				2.42				2.35
				(3.08)				(2.71)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geography & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.65	0.66	0.65	0.64	0.69	0.69	0.69	0.68
Observations	87	87	87	87	87	87	87	87

Notes: This table shows the robustness of the main findings to the inclusion of a country's age dependency ratio, its life-expectancy at birth, and log-income per capita in 2005. It establishes the positive, statistically, and economically significant effect of a country's pre-1500CE potential crop yield and its change (on grids that experienced a change in its potential crop) on its level of Long-Term Orientation, while controlling for continental fixed effects, geographical characteristics, and the timing of transition to agriculture. Additionally, it shows that a country's age dependency ratio, life-expectancy, and log-income per capita n 2005 do not have a robust effect. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.7 Long-Term Orientation, Education, and Other Economic Outcomes

This action presents additional results that show the effect of crop yield on economic development. In particular, Table B.22 shows that the effects of crop yield on education presented in the main body of the paper are robust to the use of crops available pre-1500CE on grids that experienced a change in crop post-1500CE.

Table B.22: Potential Crop Yield, Long-Term Orientation, and Education, for Grids that Experienced Change in Crop post-1500

	Years of Schooling					
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Ancestors, pre-1500)	0.57**	0.57**	0.54**	0.55**	0.59**	0.59**
	(0.25)	(0.26)	(0.26)	(0.27)	(0.26)	(0.27)
Crop Growth Cycle (Ancestors, pre-1500)	0.25	0.29	0.20	0.22	0.19	0.20
	(0.28)	(0.32)	(0.28)	(0.33)	(0.29)	(0.34)
Crop Yield Change (post-1500)		-0.34		-0.31		-0.30
		(0.25)		(0.24)		(0.30)
Crop Growth Cycle Change (post-1500)		-0.00		0.03		0.13
		(0.18)		(0.19)		(0.20)
Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes
Timing of Neolithic	No	No	Yes	Yes	Yes	Yes
Continental FE	No	No	No	No	Yes	Yes
Adjusted-R^2	0.50	0.50	0.50	0.50	0.57	0.57
Observations	129	129	129	129	129	129

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield and potential crop growth cycle on its average number of years of schooling as measured by Barro and Lee (2013), while controlling for continental fixed effects and other geographical characteristics. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, mean temperature, precipitation, shares of land in tropical, subtropical and in temperate climate zones, average precipitation, average suitability for agriculture. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.23 shows the effect of pre-1500 crop yield experienced by a country's ancestors on its level of log-income per capita, gross domestic savings rate, and years of schooling, when one additionally controls for a country's institutional level as measured by its level of democracy as measured by the Polity IV project. As established, all three measures are positively correlated with the crop yield experienced by the ancestors of country's current inhabitants both when averaging across all cells in a country or only on cells that experienced a change in crop use. Although the statistical significance varies between both crop measures, the estimated coefficients suggest a statistically and economically significant effect of crop yield on these variables.

Table B.23: Potential Crop Yield and other Economic Outcomes

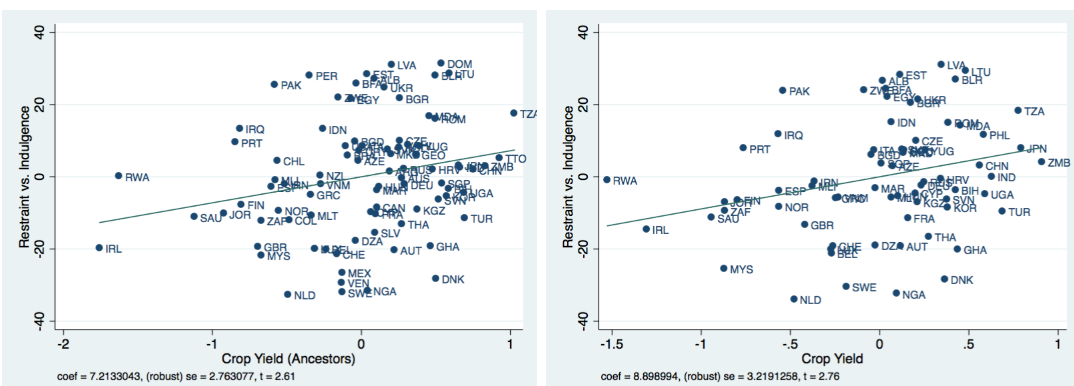
	All Cells			Cells Changing Crops		
	Ln(GDPpc)	Savings	Schooling	Ln(GDPpc)	Savings	Schooling
	(1)	(2)	(3)	(4)	(5)	(6)
Crop Yield (Anc., pre-1500)	0.10	5.71**	0.90***	0.18**	4.09*	0.58**
	(0.11)	(2.52)	(0.28)	(0.08)	(2.16)	(0.27)
Crop Growth Cycle (Anc., pre-1500)	0.07	-0.98	-0.02	-0.01	2.26	0.23
	(0.08)	(1.86)	(0.28)	(0.10)	(2.09)	(0.34)
Crop Yield Change (post-1500)	0.04	3.81*	-0.03	-0.01	0.70	-0.45
	(0.10)	(2.14)	(0.34)	(0.09)	(1.91)	(0.30)
Crop Growth Cycle Change (post-1500)	0.07	1.86**	0.15	0.01	-0.95	0.13
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes
OPEC FE	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes
Institutions	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.76	0.42	0.61	0.76	0.41	0.59
Observations	144	141	127	144	141	127

Notes: This table establishes the positive, statistically, and economically significant effect of a country's pre-1500 CE potential crop yield on its level of log-income per capita in 2005, as measured by Alan Heston and Aten (2011); its gross domestic saving rate in 2005, as measured by the World Development Indicators; and its average number of years of schooling in 2005, as measured by Barro and Lee (2013), while controlling for continental fixed effects, a dummy for being a member of OPEC, geographical characteristics, and institutions measured by the democracy index of the Polity IV project. Geographical controls include absolute latitude, mean elevation above sea level, distance to coast or river, landlocked and island dummies, precipitation, shares of land in tropical, subtropical and in temperate climate zones, average precipitation, and average suitability for agriculture. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.8 Restraint vs Indulgence

Hofstede (1991) presents a second measure that could capture some elements of time preference. This measure, which he calls Restraint vs. Indulgence, "is characterized by a perception that one can act as one pleases, spend money, and indulge in leisurely and fun-related activities with friends or alone. All this predicts relatively high happiness. At the opposite pole we find a perception that one's actions are restrained by various social norms and prohibitions and a feeling that enjoyment of leisurely activities, spending, and other similar types of indulgence are somewhat wrong." (Hofstede et al., 2010, p.281) Although this seems to capture some elements of long-term orientation, it is also closely related to institutional and religious restraints on behavior, which are not related to the type of restraint caused by having higher levels of patience. For this reason, the analysis in this paper focuses on the Long-Term Orientation of Hofstede et al. (2010) instead of the Restraint vs. Indulgence (RIV) one. Still, as the analysis below shows, the main results would remain qualitatively unchanged with this other measure.

The partial correlation between RIV and potential crop yield, after controlling for time invarying continental heterogeneity, is 0.32 ($p < 0.01$). Table B.24 replicates the analysis of table 2, which used Hofstede's Long-Term Orientation, using the Restraint vs. Indulgence measure. As can be seen there the results are fairly similar, although a little weaker in this case. This supports the interpretation that RIV is a noisy measure of Long-Term Orientation and captures additional elements unrelated to patience. Figure B.3 shows the partial correlation between both variables for the specifications in columns (6) and (8). The next section analyzes further the relation between crop yield, Long-Term Orientation and other societal cultural measures.



(a) Ancestry adjusted (b) Old World

Figure B.3: Restraint vs. Indulgence and Potential Crop Yield

Table B.24: Potential Crop Yield, Potential Crop Growth Cycle, and Restraints vs. Indulgence (Hofstede)

	Restraints vs. Indulgence							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	6.16***	7.95***	8.26***	7.66**			9.28***	8.90***
	(1.78)	(1.80)	(1.77)	(2.90)			(1.86)	(3.22)
Crop Growth Cycle				1.05				0.60
				(4.07)				(4.46)
Crop Yield (Ancestors)					7.38***	7.21**		
					(1.71)	(2.76)		
Crop Growth Cycle (Ancestors)						0.30		
						(4.22)		
Absolute latitude		0.83	1.40	1.67	3.00	3.06	0.97	1.12
		(3.16)	(3.19)	(3.13)	(3.40)	(3.30)	(3.60)	(3.49)
Mean elevation		0.37	-0.18	-0.39	-0.60	-0.64	-2.39	-2.46
		(2.96)	(3.13)	(3.18)	(3.12)	(3.16)	(2.87)	(2.90)
Terrain Roughness		-2.35	-2.55	-2.54	-2.53	-2.53	-2.49	-2.50
		(2.15)	(2.18)	(2.18)	(2.26)	(2.27)	(2.25)	(2.26)
Neolithic Transition Timing			2.89	2.72			3.79	3.69
			(3.38)	(3.29)			(3.39)	(3.34)
Neolithic Transition Timing (Ancestors)					2.58	2.54		
					(2.70)	(2.66)		
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	Yes	Yes
Adjusted-R^2	0.37	0.42	0.41	0.41	0.39	0.38	0.23	0.22
Observations	86	86	86	86	86	86	71	71

Notes: This table establishes the positive, statistically, and economically significant effect of a country's potential crop yield, measured in calories per hectare per year, on its level of restraint as opposed to indulgence measured, on a scale of 0 to 100, by Hofstede et al. (2010), while controlling for continental fixed effects and other geographical characteristics. Additionally, it shows that a country's potential crop growth cycle does not have a statistically significant effect on its restraint vs. indulgence measure. In particular, columns (1)-(3) show the effect of crop yield after controlling for the country's absolute latitude, mean elevation above sea level, terrain roughness, distance to a coast or river, of it being landlocked or an island, and the time since it transitioned to agriculture. Columns (4)-(6) show that the effect remains after controlling for potential crop growth cycle and the effects of migration. Columns (7)-(8) show that restraining the analysis to the Old World, where intercontinental migration played a smaller role, does not alter the results. Additional geographical controls include distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on a country's restraint vs. indulgence measure. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.9 Potential Crop Yield and Other Societal Preferences and Cultural Characteristics

This section analyzes the relation between potential crop yield, Long-Term Orientation and other cultural characteristics of countries. Hofstede et al. (2010) present various additional measures of societal preferences. In particular, they measure Uncertainty Avoidance, which measures the level of tolerance and rigidness of society; Power distance, which measures the level of hierarchy and inequality of power; Individualism, which measures how individualistic as opposed to collectivistic a society is; and Masculinity, which measures a society's level of internal cooperation or competition. In order to complement this set of country-level cultural characteristics, this analysis also considers the level of generalized trust.

Table B.25: Long-Term Orientation and Other Societal Preferences

	Correlation Among Cultural Indices						
	(LTO)	(RVI)	(Trust)	(Ind)	(PDI)	(Coop)	(UAI)
Long-Term Orientation (LTO)	1.00						
Restraint vs. Indulgence (RIV)	0.53***	1.00					
Trust	0.19	-0.07	1.00				
Individualism (Ind)	0.12	-0.18	0.45***	1.00			
Power Distance (PDI)	0.05	0.34**	-0.50***	-0.66***	1.00		
Cooperation	0.01	-0.09	-0.21	0.05	0.16	1.00	
Uncertainty Avoidance (UAI)	-0.04	0.07	-0.50***	-0.23	0.27*	-0.00	1.00

Notes: This table shows the correlations between Long-Term Orientation and various measures of societal preferences and culture. In particular, it includes all other measures presented by Hofstede et al. (2010) and the conventional measure of interpersonal trust based on the World Values Survey. As can be seen, the only measure that correlates with Long-Term Orientation is Restraint vs. Individualism (RIV). This is expected, since RIV seems to capture some elements of the ability to delay gratification, although it is mostly correlated with institutional level constraints on behavior. *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.25 shows the Pearson correlations between these cultural characteristics. As expected,[32] Long-Term Orientation is significantly statistically correlated with the measure of Restraint vs. Indulgence. On the other hand, it is not correlated with *any* of the other cultural characteristics measured by Hofstede et al. (2010), nor with levels of generalized trust.

Table B.26 shows the effect of crop yield on each of these measures after controlling for continental fixed effects. As can be seen there, crop yield is only economically and statistically significant in columns (1) and (2), i.e. for Long-Term Orientation and Restraint vs. Indulgence. On the other hand, it is not economically nor statistically significant in the regression of any of the other cultural measures.

Tables B.27-B.29 show the relation between ancestry adjusted potential crop yield and its change for crops available pre-1500CE on the various cultural measures after controlling for continental fixed effects, geography, agricultural suitability and years since transition to agriculture. As can be seen there, the effect of crop yield is economically and statistically significant only on Long-Term Orientation.[33]

Finally, tables B.30 and B.31 show the relation between ancestry adjusted crop yields and their

[32]See previous subsection.

[33]In some specifications crop yield or agricultural suitability are negatively correlated with levels of trust and cooperation. This result supports similar findings by Litina (2013).

Table B.26: Crop Yield, Crop Growth Cycle, and Other Societal Preferences

	Cultural Indices						
	Long-Term Orientation	Restraint vs Indulgence	Trust	Individualism	Power Distance	Cooperation	Uncertainty Avoidance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield	9.67***	6.76**	-4.24	-1.32	4.04	-2.16	4.37
	(2.86)	(2.82)	(2.98)	(3.33)	(4.29)	(3.65)	(5.02)
Crop Growth Cycle	-3.78	-1.81	-2.65	-1.52	2.35	10.07***	2.87
	(2.29)	(3.14)	(2.86)	(3.10)	(3.81)	(3.10)	(5.27)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.55	0.37	0.32	0.53	0.14	0.10	0.16
Observations	87	85	85	62	62	62	62

Notes: This table analyzes the relation between various societal preferences and cultural indices and potential crop yield and growth cycle. All columns account for continental fixed effects. It establishes that potential crop yield has a positive, statistically, and economically significant effect only on measures of a country's level of time preference, i.e. Long-Term Orientation and Restraint vs Indulgence. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

change for crops available pre-1500CE and Long-Term Orientation, after controlling for the effect of geography, agricultural suitability, years since the transition to agriculture, and continental fixed effects. Additionally it shows the effect of including each of the other cultural measures. As can be seen there, the effect of crop yield is not affected by the inclusion of this large set of geographical controls, nor of the cultural measures. Furthermore, except for Restraint vs. Indulgence, none of the other cultural measures has an effect on Long-Term Orientation that is statistically significantly different from zero.

These results suggest that crop yield's effect on a country's culture is mainly on its level of time preference. Furthermore, and reassuringly, there does not seem to exist a significant correlation among the time preference measures and other measures of culture at the country level, which might have biased the results.

Table B.27: Crop Yield, Crop Growth Cycle, and Other Societal Preferences

	Cultural Indices						
	Long-Term Orientation	Restraint vs Indulgence	Trust	Individua-lism	Power Distance	Coopera-tion	Uncertainty Avoidance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (Ancestors, pre-1500)	7.29**	1.99	-10.60***	-8.90*	7.71*	-0.62	5.83
	(2.89)	(3.51)	(2.97)	(4.47)	(4.46)	(5.02)	(4.10)
Crop Growth Cycle (Ancestors, pre-1500)	-1.10	-1.95	-1.38	2.45	-1.47	3.13	4.33
	(3.01)	(3.44)	(2.68)	(3.42)	(3.69)	(4.11)	(3.95)
Land Suitability	3.03	6.51*	0.02	3.48	6.81*	7.47*	3.33
	(2.70)	(3.28)	(3.33)	(3.41)	(3.43)	(3.84)	(2.72)
Neolithic Transition Timing (Ancestors)	-7.92**	-1.30	-1.00	0.73	-0.44	3.89	-7.51*
	(3.75)	(4.60)	(3.97)	(3.62)	(4.11)	(5.28)	(3.79)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.62	0.38	0.46	0.66	0.41	0.43	0.61
Observations	85	83	83	60	60	60	60

Notes: This table analyzes the relation between various societal preferences and cultural indices and pre-1500CE potential crop yield and growth cycle experienced by a country's ancestors. All columns account for continental fixed effects, geographical controls, land suitability, and the ancestry adjusted timing of transition to agriculture. It establishes that potential crop yield has a positive, statistically, and economically significant effect only on a country's level of Long-Term Orientation. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, precipitation, and shares of land in tropical, subtropical and in temperate climate zones. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.28: Crop Yield, Crop Growth Cycle, and Other Societal Preferences

	Cultural Indices						
	Long-Term Orientation	Restraint vs Indulgence	Trust	Individualism	Power Distance	Cooperation	Uncertainty Avoidance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (Ancestors, pre-1500)	11.02***	4.61	-11.23***	-7.70	8.80*	-1.80	5.94
	(2.63)	(3.20)	(3.36)	(5.09)	(5.00)	(5.79)	(4.99)
Crop Yield Change (Anc., post-1500)	9.39***	7.49***	-1.77	-1.98	3.66*	0.42	0.55
	(2.11)	(2.69)	(3.15)	(2.66)	(2.07)	(2.33)	(2.39)
Crop Growth Cycle (Ancestors, pre-1500)	-5.75**	-5.03	-0.43	2.27	-2.82	3.63	4.15
	(2.66)	(3.41)	(3.43)	(3.81)	(4.14)	(4.44)	(4.35)
Crop Growth Cycle Change (Anc., post-1500)	-0.58	1.61	1.07	-3.73	-1.05	2.99	-0.04
	(1.55)	(2.27)	(1.98)	(3.41)	(2.87)	(2.63)	(3.16)
Land Suitability	0.92	4.39	0.05	3.99	6.70**	7.13*	3.30
	(2.14)	(3.10)	(3.48)	(3.29)	(3.21)	(3.78)	(2.77)
Neolithic Transition Timing (Ancestors)	-7.18**	-0.63	-0.98	0.87	-0.78	3.89	-7.56*
	(2.97)	(4.49)	(4.03)	(3.39)	(4.09)	(5.54)	(3.89)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.68	0.42	0.44	0.67	0.40	0.41	0.59
Observations	85	83	83	60	60	60	60

Notes: This table analyzes the relation between various societal preferences and cultural indices and pre-1500CE potential crop yield and growth cycle and their change post-1500CE experienced by a country's ancestors. All columns account for continental fixed effects, geographical controls, land suitability, and the ancestry adjusted timing of transition to agriculture. It establishes that potential crop yield has a positive, statistically, and economically significant effect only on a country's level of Long-Term Orientation. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, precipitation, and shares of land in tropical, subtropical and in temperate climate zones. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.29: Crop Yield, Crop Growth Cycle, and Other Societal Preferences

	Cultural Indices						
	Long-Term Orientation	Restraint vs Indulgence	Trust	Individualism	Power Distance	Cooperation	Uncertainty Avoidance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (Ancestors, pre-1500)	10.03***	6.58	-7.11*	-10.88	6.69	-7.60	3.03
	(3.05)	(3.99)	(3.72)	(6.59)	(5.92)	(5.98)	(5.55)
Crop Yield Change (Anc., post-1500)	9.03***	7.91**	-0.53	-3.05	2.50	-1.51	-0.39
	(2.16)	(3.10)	(3.48)	(2.62)	(2.18)	(2.23)	(2.21)
Crop Growth Cycle (Ancestors, pre-1500)	-5.98**	-4.59	0.35	2.20	-2.50	3.50	4.06
	(2.75)	(3.57)	(3.47)	(3.82)	(4.11)	(4.15)	(4.33)
Crop Growth Cycle Change (Anc., post-1500)	-0.77	2.02	1.96	-3.72	-0.89	3.00	-0.05
	(1.60)	(2.42)	(2.09)	(3.18)	(2.90)	(2.51)	(3.24)
Land Suitability (Ancestors)	2.33	0.91	-6.17	6.94	7.75*	12.54***	6.08
	(3.15)	(4.86)	(5.10)	(4.99)	(4.22)	(3.91)	(3.98)
Neolithic Transition Timing (Ancestors)	-7.58**	-0.19	0.56	-0.60	-2.13	1.22	-8.88**
	(3.04)	(4.62)	(4.09)	(3.32)	(4.40)	(5.85)	(3.77)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.68	0.41	0.46	0.68	0.39	0.46	0.60
Observations	85	83	83	60	60	60	60

Notes: This table analyzes the relation between various societal preferences and cultural indices and pre-1500CE potential crop yield and growth cycle and their change post-1500CE experienced by a country's ancestors. All columns account for continental fixed effects, geographical controls, and the land suitability and the timing of transition to agriculture experienced by the ancestors of the country. It establishes that potential crop yield has a positive, statistically, and economically significant effect only on a country's level of Long-Term Orientation. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, precipitation, and shares of land in tropical, subtropical and in temperate climate zones. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.30: Crop Yield, Crop Growth Cycle, and Other Societal Preferences

	Long-Term Orientation						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (Ancestors, pre-1500)	7.29**	6.76**	7.84**	11.75**	10.33**	10.74**	10.21**
	(2.89)	(2.89)	(3.51)	(5.19)	(5.07)	(4.68)	(4.92)
Crop Growth Cycle (Ancestors, pre-1500)	-1.10	-0.62	-1.90	-2.92	-2.55	-3.26	-2.91
	(3.01)	(3.06)	(3.16)	(5.14)	(5.20)	(5.19)	(4.96)
Restraint vs. Indulgence		4.44**					
		(2.05)					
Trust			-0.09				
			(3.12)				
Individualism				3.01			
				(4.22)			
Power Distance					0.77		
					(3.55)		
Cooperation						4.39	
						(3.57)	
Uncertainty Avoidance							1.59
							(5.58)
Land Suitability	3.03	1.73	2.74	-2.81	-2.62	-3.93	-2.60
	(2.70)	(2.80)	(2.72)	(3.55)	(3.72)	(3.87)	(3.81)
Neolithic Transition Timing (Ancestors)	-7.92**	-7.71**	-7.51*	-7.50	-7.39	-8.22	-6.88
	(3.75)	(3.67)	(3.82)	(5.40)	(5.50)	(5.14)	(5.53)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.62	0.63	0.61	0.56	0.56	0.58	0.56
Observations	85	83	83	60	60	60	60

Notes: This table establishes the positive, statistically and economically effect of pre-1500CE potential crop yield and growth cycle experienced by a country's ancestors on its level of Long-Term Orientation. All columns account for continental fixed effects, geographical controls, and the land suitability and timing of transition to agriculture experienced by the country's ancestors. It establishes that the inclusion of other societal preferences and cultural indices does not affect the estimated coefficient on potential crop yield. Furthermore, other cultural values do not have a statistically significant effect different from zero. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, precipitation, and shares of land in tropical, subtropical and in temperate climate zones. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.31: Crop Yield, Crop Growth Cycle, and Other Societal Preferences

	Long-Term Orientation						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crop Yield (Ancestors, pre-1500)	10.03***	9.38***	10.30***	13.54**	11.47*	12.76*	11.17*
	(3.05)	(3.21)	(3.41)	(6.49)	(6.78)	(6.78)	(6.53)
Crop Yield Change (Anc., post-1500)	9.03***	8.55***	8.97***	7.45***	6.88**	7.11***	6.84***
	(2.16)	(2.53)	(2.23)	(2.47)	(2.63)	(2.53)	(2.50)
Crop Growth Cycle (Ancestors, pre-1500)	-5.98**	-5.71*	-6.05**	-5.53	-5.14	-5.75	-5.29
	(2.75)	(3.08)	(2.76)	(4.88)	(5.32)	(5.14)	(4.89)
Crop Growth Cycle Change (Anc., post-1500)	-0.77	-0.88	-0.71	0.17	-0.61	-1.16	-0.59
	(1.60)	(1.71)	(1.84)	(3.11)	(3.11)	(3.20)	(3.03)
Restraint vs. Indulgence		2.18					
		(2.22)					
Trust			0.63				
			(3.10)				
Individualism				4.80			
				(3.96)			
Power Distance					-0.45		
					(3.90)		
Cooperation						3.95	
						(4.20)	
Uncertainty Avoidance							1.18
							(6.06)
Land Suitability (Ancestors)	2.33	2.30	2.35	-2.71	-1.13	-3.67	-1.61
	(3.15)	(3.30)	(3.51)	(4.93)	(4.76)	(5.54)	(5.32)
Neolithic Transition Timing (Ancestors)	-7.58**	-7.49**	-7.51**	-7.86	-8.03	-8.22	-7.53
	(3.04)	(3.05)	(3.14)	(5.32)	(5.34)	(5.07)	(5.91)
Continental FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Geographical Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.68	0.68	0.67	0.59	0.58	0.59	0.58
Observations	85	83	83	60	60	60	60

Notes: This table establishes the positive, statistically and economically effect of pre-1500CE potential crop yield, growth cycle and their change post-1500CE experienced by a country's ancestors on its level of Long-Term Orientation. All columns account for continental fixed effects, geographical controls, and the land suitability and timing of transition to agriculture experienced by the country's ancestors. It establishes that the inclusion of other societal preferences and cultural indices does not affect the estimated coefficient on potential crop yield. Furthermore, other cultural values do not have a statistically significant effect different from zero. Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, landlocked and island dummies, precipitation, and shares of land in tropical, subtropical and in temperate climate zones. Heteroskedasticity robust standard error estimates are reported in parentheses; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.10 Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation in Second-Generation Migrants

This section presents additional supporting tables for the analysis of Long-Term Orientation in second-generation migrants.

Table B.32: Long-Term Orientation and Education

	Years of Schooling							
	Second-Generation Migrants				All Individuals			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Long-Term Orientation	0.35***	0.37***	0.36**	0.32**	0.79***	0.88***	0.70***	0.63***
	(0.13)	(0.14)	(0.14)	(0.13)	(0.05)	(0.05)	(0.05)	(0.04)
Country FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Sex & Age	No	No	Yes	Yes	No	No	Yes	Yes
Pray & Health	No	No	No	Yes	No	No	No	Yes
Adjusted-R^2	0.01	0.10	0.10	0.11	0.04	0.15	0.19	0.21
R^2	0.01	0.13	0.13	0.16	0.04	0.15	0.20	0.21
Observations	705	705	705	705	42016	42016	42016	42016

Notes: This table establishes the positive correlation between Long-Term Orientation and individual education levels for respondents in the third wave of the European Social Survey. Long-term orientation is measured on a scale of 0 to 100 by the answer to the question "Do you generally plan for your future or do you just take each day as it comes?". The data is taken from the third wave of the European Social Survey (2006). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the country of origin level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.33: Long-Term Orientation and Income

	Total Household Income							
	Second-Generation Migrants				All Individuals			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Long-Term Orientation	0.33**	0.22*	0.22**	0.23**	0.35***	0.45***	0.36***	0.32***
	(0.14)	(0.12)	(0.10)	(0.11)	(0.08)	(0.04)	(0.04)	(0.04)
Country FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Sex & Age	No	No	Yes	Yes	No	No	Yes	Yes
Pray & Health	No	No	No	Yes	No	No	No	Yes
Adjusted-R^2	0.01	0.40	0.40	0.41	0.01	0.50	0.52	0.53
R^2	0.01	0.43	0.43	0.47	0.01	0.50	0.52	0.53
Observations	383	383	383	383	29323	29323	29323	29323

Notes: This table establishes the positive correlation between Long-Term Orientation and individual income levels for respondents in the third wave of the European Social Survey. Long-term orientation is measured on a scale of 0 to 100 by the answer to the question "Do you generally plan for your future or do you just take each day as it comes?". The data is taken from the third wave of the European Social Survey (2006). All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the country of origin level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.34: Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation

	Long-Term Orientation (Ordered Probit)							
	Country of Origin							
	Mother					Parents		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	0.11***	0.11***	0.23***	0.27***		0.23***		0.31***
	(0.04)	(0.04)	(0.07)	(0.07)		(0.09)		(0.11)
Crop Growth Cycle				-0.13*		-0.09		-0.10
				(0.07)		(0.07)		(0.09)
Crop Yield (Ancestors)					0.30***		0.27***	
					(0.08)		(0.09)	
Crop Growth Cycle (Ancestors)					-0.14*		-0.10	
					(0.07)		(0.08)	
Absolute Latitude			0.14***	0.11**	0.12**	0.15**	0.16**	0.16**
			(0.05)	(0.06)	(0.06)	(0.07)	(0.07)	(0.08)
Mean Elevation			-0.00	-0.02	-0.02	0.01	0.01	0.04
			(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
Terrain Roughness			0.15**	0.16***	0.17***	0.10**	0.11**	0.13***
			(0.06)	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)
Neolithic Transition Timing			-0.08	-0.06		-0.02		-0.08
			(0.06)	(0.05)		(0.05)		(0.06)
Neolithic Transition Timing (Ancestors)					-0.08		-0.04	
					(0.05)		(0.06)	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sex & Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Ind. Chars.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	No	Yes
Pseudo-R^2	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.03
Observations	705	705	705	705	705	566	566	557

Notes: This table establishes that the potential crop yield in the country of origin of first generation migrants in Europe has a positive, statistically, and economically significant effect on the Long-Term Orientation of their foreign born children. Long-term orientation is measured on a scale of 0 to 100 by the answer to the question "Do you generally plan for your future or do you just take each day as it comes?".The data is taken from the third wave of the European Social Survey (2006). The analysis is restricted to second-generation migrants, i.e. individuals who were born in the country where the interview was done, but whose parents were born overseas and migrated to that country. All columns include fixed effects for the country where the interview was conducted, and individual characteristics (sex, age, education, marital status, health status, religiosity). Additional geographical controls include distance to coast or river, and landlocked and island dummies. In columns (1)-(4) the potential crop yield, potential crop growth cycle, and geographical characteristics of the country of origin of the mother are used as controls. Column (5) uses the data of the father's country of origin, while columns (6)-(7) restricts the sample to individuals whose parents come from the same country of origin. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the country of origin level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.35: Pre-1500 Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation in Second-Generation Migrants

	Long-Term Orientation (OLS)								
	Country of Origin								
	Mother						Parents		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crop Yield (pre-1500)	2.96**	3.40**	6.45***	6.50***	6.65***		5.08**		7.62**
	(1.18)	(1.32)	(2.17)	(2.16)	(2.15)		(2.48)		(2.92)
Crop Yield Change (post-1500)				0.44	1.37		1.98		2.29
				(1.20)	(1.40)		(1.63)		(1.65)
Crop Growth Cycle (pre-1500)					-1.60		-2.65		-2.36
					(2.58)		(2.37)		(2.53)
Crop Growth Cycle Change (post-1500)					-1.27		-0.07		-0.24
					(0.92)		(1.19)		(1.29)
Crop Yield (Ancestors, pre-1500)						8.10***		6.54**	
						(2.03)		(2.55)	
Crop Yield Change (Anc., post-1500)						1.00		1.87	
						(1.45)		(1.66)	
Crop Growth Cycle (Ancestors, pre-1500)						-2.42		-3.16	
						(2.53)		(2.67)	
Crop Growth Cycle Ch. (Anc., post-1500)						-1.03		0.13	
						(0.92)		(1.17)	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sex & Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Ind. Chars.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	No	No	Yes
R^2	0.06	0.11	0.12	0.12	0.12	0.12	0.15	0.15	0.15
Observations	705	705	705	705	705	705	566	566	557

Notes: This table establishes that the potential crop yield in the country of origin of first generation migrants in Europe has a positive, statistically, and economically significant effect on the Long-Term Orientation of their foreign born children. Long-term orientation is measured on a scale of 0 to 100 by the answer to the question "Do you generally plan for your future or do you just take each day as it comes?". The data is taken from the third wave of the European Social Survey (2006). The analysis is restricted to second-generation migrants, i.e. individuals who were born in the country where the interview was done, but whose parents were born overseas and migrated to that country. All columns include fixed effects for the country where the interview was conducted, and individual characteristics (sex, age, education, marital status, health status, religiosity). Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, and landlocked and island dummies. In columns (1)-(4) the potential crop yield, potential crop growth cycle, and geographical characteristics of the country of origin of the mother are used as controls. Column (5) uses the data of the father's country of origin, while columns (6)-(7) restricts the sample to individuals whose parents come from the same country of origin. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the country of origin level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.36: Pre-1500 Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation in Second-Generation Migrants, for Grids that Experienced Change in Crop post-1500

	Long-Term Orientation (OLS)								
	Country of Origin								
	Mother						Parents		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crop Yield (pre-1500)	3.71***	3.81***	6.16***	6.09***	6.44***		4.97**		4.85*
	(1.19)	(1.30)	(1.59)	(1.63)	(1.67)		(2.42)		(2.46)
Crop Yield Change (post-1500)				0.42	-0.25		0.39		0.94
				(1.58)	(1.52)		(1.45)		(1.47)
Crop Growth Cycle (pre-1500)					0.14		-0.07		0.79
					(1.88)		(2.28)		(2.30)
Crop Growth Cycle Change (post-1500)					1.18		2.06		1.01
					(1.62)		(1.63)		(1.37)
Crop Yield (Ancestors, pre-1500)						6.49***		4.50**	
						(1.70)		(2.23)	
Crop Yield Change (Ancestors, post-1500)						-0.86		0.41	
						(1.49)		(1.47)	
Crop Growth Cycle (Ancestors, pre-1500)						0.28		0.22	
						(1.86)		(2.30)	
Crop Growth Cycle Ch. (Anc., post-1500)						1.88		2.24	
						(1.59)		(1.62)	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sex & Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Ind. Chars.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Old World Sample	No	No	No	No	No	No	No	No	Yes
R^2	0.06	0.11	0.12	0.12	0.12	0.12	0.15	0.15	0.15
Observations	705	705	705	705	705	705	566	566	557

Notes: This table establishes that the potential crop yield in the country of origin of first generation migrants in Europe has a positive, statistically, and economically significant effect on the Long-Term Orientation of their foreign born children. Long-term orientation is measured on a scale of 0 to 100 by the answer to the question "Do you generally plan for your future or do you just take each day as it comes?".The data is taken from the third wave of the European Social Survey (2006). The analysis is restricted to second-generation migrants, i.e. individuals who were born in the country where the interview was done, but whose parents were born overseas and migrated to that country. All columns include fixed effects for the country where the interview was conducted, and individual characteristics (sex, age, education, marital status, health status, religiosity). Geographical controls include absolute latitude, mean elevation above sea level, terrain roughness, distance to coast or river, and landlocked and island dummies. In columns (1)-(4) the potential crop yield, potential crop growth cycle, and geographical characteristics of the country of origin of the mother are used as controls. Column (5) uses the data of the father's country of origin, while columns (6)-(7) restricts the sample to individuals whose parents come from the same country of origin. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the country of origin level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.37: Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation in Second-Generation Migrants

	Long-Term Orientation (weighted OLS)											
	All crops				All cells				Changing cells/crops			
	(Survey)	(N_c)	(N)	(N_m)	(Survey)	(N_c)	(N)	(N_m)	(Survey)	(N_c)	(N)	(N_m)
Crop Yield (Ancestors)	7.10***	15.24***	12.16***	9.29***								
	(2.48)	(3.25)	(2.83)	(3.42)								
Crop Growth Cycle (Anc.)	-4.72*	1.46	0.05	4.58								
	(2.43)	(3.78)	(3.25)	(4.43)								
Crop Yield (Anc., pre-1500)					7.03***	15.24***	12.29***	11.88***				
					(2.39)	(2.54)	(2.21)	(2.86)				
Crop Yield Change (post-1500)					0.87	0.50	0.33	-1.75				
					(1.55)	(2.61)	(2.20)	(1.94)				
Crop Growth Cycle (Anc., pre-1500)					-3.28	2.98	1.61	4.23				
					(2.77)	(4.25)	(3.90)	(4.93)				
Crop Growth Cycle Ch. (post-1500)					-1.70*	1.11	-0.04	1.34				
					(0.98)	(1.69)	(1.41)	(1.39)				
Crop Yield (Anc., pre-1500)									6.38***	9.39***	8.18***	8.25***
									(1.97)	(2.68)	(2.25)	(2.24)
Crop Yield Change (post-1500)									-1.46	0.92	0.38	-0.73
									(1.66)	(2.74)	(2.43)	(2.27)
Crop Growth Cycle (Anc., pre-1500)									-0.96	1.26	1.32	-0.45
									(2.27)	(2.49)	(2.31)	(2.45)
Crop Growth Cycle Ch. (post-1500)									2.49	0.78	-0.70	-2.60
									(1.59)	(1.97)	(1.95)	(1.95)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sex & Age	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education & Marital Status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pray & Health	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.05	0.20	0.23	0.27	0.05	0.21	0.24	0.28	0.05	0.17	0.22	0.27
R^2	0.13	0.26	0.29	0.32	0.13	0.27	0.30	0.34	0.13	0.24	0.28	0.33
Observations	705	705	705	705	705	705	705	705	705	705	705	705

Notes: This table shows that the results of Tables 6-B.36 are robust to the weighting scheme applied in the analysis. (Survey) uses the weights provided by the survey (variable dweight in the ESS), (N_c) uses weights that ensure the same sample size of countries of origin within each interview country, (N) uses weighs that additionally ensure the same sample size for each country of origin in each country of interview, (N_m) uses weighs that ensure the same sample size for each country of origin. The positive, statistically, and economically significant effect of potential crop yield on an individual's Long-Term Orientation is robust and increasingly so as one weighs appropriately. All columns include continental fixed effects, geographical controls, and the ancestry adjusted timing of the Neolithic. Crop yield, crop growth cycle, and all other geographical controls refer to the country of origin of the mother. Geographical controls include absolute latitude, mean elevation above sea-level, mean terrain roughness, distance to coast or river, and landlocked and island dummies. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.11 Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation in the World Values Survey

Tables 7 and B.38 in section 6 included the same geographical controls and years since transition to agriculture in the analysis as used in sections 4 and 5. Given that the same set of variables was not available at the regional level, it could not be employed in the regional analysis of section 6. For this reason, tables B.41 and B.42 replicate the analysis of tables 7 and B.38 using the same set of controls used in the regional analysis in tables 9 and B.43. As can be seen the results in both sets of tables is similar and are not driven by the particular choice of controls.

Table B.38: Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation (WVS Country Analysis)

	Long-Term Orientation (Probit)							
	Whole World							Old World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	0.036***	0.041***	0.054***	0.051***	0.048***	0.027***		0.055***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)		(0.003)
Crop Growth Cycle						0.029***		0.024***
						(0.003)		(0.003)
Crop Yield (Ancestors)							0.047***	
							(0.003)	
Crop Growth Cycle (Ancestors)							0.016***	
							(0.003)	
Absolute Latitude			-0.014***	-0.021***	-0.023***	-0.013***	-0.004*	0.003
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Mean Elevation			0.003	0.012***	0.008***	0.002	0.007***	0.002
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Terrain Roughness			-0.020***	-0.021***	-0.016***	-0.017***	-0.024***	-0.027***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Neolithic Transition Timing				-0.031***	-0.038***	-0.040***		-0.029***
				(0.002)	(0.002)	(0.002)		(0.002)
Neolithic Transition Timing (Ancestors)							-0.035***	
							(0.002)	
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	No	No	No	No	Yes	Yes	Yes	Yes
Old World Subsample	No	No	No	No	No	No	No	Yes
Pseudo-R^2	0.00	0.02	0.02	0.02	0.03	0.03	0.03	0.04
Observations	217953	217953	217953	217953	217953	217953	217953	176489

Notes: This table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation. Shown are the average marginal effects of probit regressions. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the country where the interview was conducted. Additional geographical controls include distance to coast or river, and landlocked and island dummies. Individual Characteristics include age, sex, education, and income. Columns (1)-(7) show the results for the whole world sample, while column (8) shows the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.39: Pre-1500 Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation (WVS Country Analysis), for Grids that Experienced Change in Crop post-1500

	Long-Term Orientation (OLS)							
	Whole World							Old World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield (pre-1500)	0.039***	0.053***	0.052***	0.049***	0.041***	0.034***		0.034***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)		(0.002)
Crop Yield Change (post-1500)					0.034***	0.032***		0.036***
					(0.002)	(0.002)		(0.002)
Crop Growth Cycle (pre-1500)						0.013***		0.013***
						(0.002)		(0.003)
Crop Growth Cycle Change (post-1500)						-0.008***		-0.011***
						(0.001)		(0.001)
Crop Yield (Ancestors, pre-1500)							0.029***	
							(0.002)	
Crop Yield Change (Anc., post-1500)							0.028***	
							(0.002)	
Crop Growth Cycle (Ancestors, pre-1500)							0.014***	
							(0.002)	
Crop Growth Cycle Change (Anc., post-1500)							-0.012***	
							(0.001)	
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Old World Subsample	No	No	No	No	No	No	No	Yes
Adjusted-R^2	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.05
Observations	217953	217953	217953	217953	217953	217953	217953	176489

Notes: This table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the country where the interview was conducted. Additional geographical controls include distance to coast or river, and landlocked and island dummies. Individual Characteristics include age, sex, education, and income. Columns (1)-(7) show the results for the whole world sample, while column (8) shows the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.40: Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation (Weighted)

	Long-Term Orientation (Weighted OLS)											
	All crops				All cells				Changing cells/crops			
	(No)	(Survey)	(Same N)	(Pop)	(No)	(Survey)	(Same N)	(Pop)	(No)	(Survey)	(Same N)	(Pop)
Crop Yield (Ancestors)	0.048***	0.047***	0.056***	0.015**								
	(0.003)	(0.003)	(0.003)	(0.006)								
Crop Growth Cycle (Ancestors)	0.017***	0.018***	0.010***	0.046***								
	(0.003)	(0.003)	(0.003)	(0.006)								
Crop Yield (Anc., pre-1500)					0.046***	0.044***	0.048***	0.021***				
					(0.002)	(0.002)	(0.002)	(0.004)				
Crop Growth Cycle (Anc., pre-1500)					-0.012***	-0.010***	-0.019***	0.006				
					(0.003)	(0.003)	(0.003)	(0.005)				
Crop Yield Ch. (post-1500)					0.052***	0.051***	0.062***	0.038***				
					(0.003)	(0.003)	(0.003)	(0.004)				
Crop Growth Cycle Ch. (post-1500)					0.021***	0.020***	0.014***	0.033***				
					(0.002)	(0.002)	(0.002)	(0.003)				
Crop Yield (Anc., pre-1500)									0.033***	0.032***	0.028***	0.033***
									(0.002)	(0.002)	(0.002)	(0.004)
Crop Growth Cycle (Anc., pre-1500)									0.010***	0.016***	0.014***	-0.000
									(0.002)	(0.002)	(0.002)	(0.003)
Crop Yield Ch. (post-1500)									0.032***	0.031***	0.041***	0.026***
									(0.002)	(0.002)	(0.002)	(0.003)
Crop Growth Cycle Ch. (post-1500)									-0.006***	-0.005***	-0.007***	0.007***
									(0.001)	(0.001)	(0.001)	(0.003)
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Chars	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Geographical Controls & Neolithic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.04	0.05	0.05	0.07	0.05	0.05	0.05	0.07	0.04	0.05	0.05	0.07
Adjusted-R^2	0.04	0.05	0.05	0.07	0.05	0.05	0.05	0.07	0.04	0.05	0.05	0.07
Observations	217953	217953	217953	217953	217953	217953	217953	217953	217953	217953	217953	217953

Notes: This table shows that the results of Tables 7-B.39 are robust to the weighting scheme applied in the analysis. (No) refers to unweighted OLS, (Survey) uses the weights provided by the survey (variable s017 in the WVS), (Same N) uses weights that ensure same sample size across countries (variable s018 in WVS), (Pop) weighs by population ($s018 * Population/1000$). The positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation is robust. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted, continental fixed effect, geographical controls, and the ancestry adjusted timing of the Neolithic. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the country where the interview was conducted. Geographical controls include absolute latitude, mean elevation above sea-level, mean terrain roughness, distance to coast or river, and landlocked and island dummies. Individual Characteristics include age, sex, education, and income. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.41: Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation (WVS Country Analysis)

	Long-Term Orientation (OLS)							
	Whole World							Old World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	0.036***	0.041***	0.035***	0.035***	0.032***	0.020***		0.046***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)		(0.003)
Crop Growth Cycle						0.019***		0.023***
						(0.003)		(0.003)
Crop Yield (Ancestors)							0.041***	
							(0.002)	
Crop Growth Cycle (Ancestors)							0.011***	
							(0.003)	
Absolute Latitude			-0.004*	-0.004*	-0.005*	0.003	0.010***	0.015***
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Mean Elevation			0.013***	0.013***	0.008***	0.003	0.001	-0.007***
			(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
Terrain Roughness			-0.020***	-0.020***	-0.016***	-0.016***	-0.017***	-0.021***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Individual Chars	No	No	No	No	Yes	Yes	Yes	Yes
Old World Subsample	No	No	No	No	No	No	No	Yes
Adjusted-R^2	0.01	0.02	0.03	0.03	0.04	0.04	0.04	0.05
Observations	217953	217953	217953	217953	217953	217953	217953	176489

Notes: This table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the country where the interview was conducted. Additional geographical controls include percentage of land within 100 kms. of sea, landlocked dummy, and suitable area. Columns (1)-(7) show the results for the whole world sample, while column (8) shows the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.42: Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation (WVS Country Analysis)

	Long-Term Orientation (Probit)							
	Whole World							Old World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	0.036***	0.041***	0.035***	0.035***	0.032***	0.020***		0.046***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)		(0.003)
Crop Growth Cycle						0.019***		0.022***
						(0.003)		(0.003)
Crop Yield (Ancestors)							0.041***	
							(0.002)	
Crop Growth Cycle (Ancestors)							0.011***	
							(0.003)	
Absolute Latitude			-0.004*	-0.004*	-0.004*	0.004	0.010***	0.014***
			(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Mean Elevation			0.012***	0.012***	0.007***	0.003	0.001	-0.007***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Terrain Roughness			-0.019***	-0.019***	-0.015***	-0.015***	-0.016***	-0.020***
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	No	Yes	Yes	Yes	Yes	Yes	Yes	No
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Individual Chars	No	No	No	No	Yes	Yes	Yes	Yes
Old World Subsample	No	No	No	No	No	No	No	Yes
Pseudo-R^2	0.00	0.02	0.02	0.02	0.03	0.03	0.03	0.04
Observations	217953	217953	217953	217953	217953	217953	217953	176489

Notes: This table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation. Shown are the average marginal effects of probit regressions. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the country where the interview was conducted. Additional geographical controls include distance to coast or river, and landlocked and island dummies. Columns (1)-(7) show the results for the whole world sample, while column (8) shows the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

Table B.43: Potential Crop Yield, Potential Crop Growth Cycle, and Long-Term Orientation (WVS Regional Analysis)

	Long-Term Orientation (Probit)							
	Whole World						Old World	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crop Yield	0.036***	0.039***	0.041***	0.038***	0.035***	0.007**	0.059***	0.008**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.002)	(0.004)
Crop Growth Cycle					0.007**	-0.011***	0.000	-0.010**
					(0.003)	(0.004)	(0.003)	(0.004)
Absolute Latitude			0.007***	0.006**	0.008***	0.028***	0.012***	0.034***
			(0.002)	(0.002)	(0.003)	(0.006)	(0.003)	(0.008)
Mean Elevation			-0.013***	-0.012***	-0.011***	0.002	-0.001	0.009**
			(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)
Terrain Roughness			0.010***	0.010***	0.009***	-0.009***	-0.020***	-0.015***
			(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
			(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)
Wave FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Continent FE	No	Yes	Yes	Yes	Yes	No	Yes	No
Additional Geographical Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	No	No	No	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	No	No	Yes	No	Yes
Old World Subsample	No	No	No	No	No	No	Yes	Yes
Pseudo-R^2	0.00	0.02	0.02	0.03	0.03	0.06	0.04	0.07
Observations	217953	217953	185659	185659	185659	185659	151299	151299

Notes: This table establishes the positive, statistically, and economically significant effect of potential crop yield on the probability an individual has Long-Term Orientation across regions, accounting of country fixed effects. Shown are the average marginal effects of probit regressions. Individuals have Long-Term Orientation if they consider thrift as an especially important child quality in the World Values Survey. All columns include fixed effects for the wave the interview was conducted. Potential crop yield, potential crop growth cycle, and all other geographical controls refer to the region where the interview was conducted. Additional geographical controls include percentage of land within 100 kms. of sea, landlocked dummy, and area suitable for agriculture. Individual Characteristics include age, sex, education, and income. Columns (1)-(6) show the results for the whole world sample, while columns (7)-(8) show the results for the Old World sample. All independent variables have been normalized by subtracting their mean and dividing by their standard deviation. Thus, all coefficients can be compared and show the effect of a one standard deviation in the independent variable on Long-Term Orientation. Heteroskedasticity robust clustered standard error estimates are reported in parentheses; clustering at the region of interview and individual characteristics level; *** denotes statistical significance at the 1% level, ** at the 5% level, and * at the 10% level, all for two-sided hypothesis tests.

B.12 The Effect of Migration on the Estimation: A Monte Carlo Study

The cross country analysis in this paper has tried to correct the measurement error caused by large intercontinental and cross country migrations by using the population matrix developed by Putterman and Weil (2010) or by using the Old World subsample. Since such a matrix does not exist for migration that occurred within regions in the same country and between countries, the regional analysis performed for the World Values Survey is prone to have measurement error caused by within country interregional migration. In order to assess the size of the bias generated by internal migration, this section creates artificial data on individuals in regions within countries and studies the effect of migration on the OLS estimates.

In particular, the outcome for individual i in region r in country c is generated by

$$y_{irc} = x_{irc} + \epsilon_{irc},$$

where ϵ_{irc} is normally distributed with mean zero and variance equal to 1, and $x_{irc} = r \cdot c$, i.e. each individual's outcome is equal to the region within a country in which she resides plus some idiosyncratic shock. Countries and regions within each country are generated in such a way that both within and across countries the true data generating process has a slope equal to 1 and a constant equal to zero.

The original data represents the migration corrected data, i.e. where migration did not occur or one correctly identifies the migrants and assigns them the correct value. In order to analyze the measurement error generated by internal migration, it is assumed that each individual has a probability $\lambda \in (0,1)$ of migrating to another region within her own country. No cross country migrations are allowed. If she gets a migration shock, she chooses a region within the same country at random. Thus, with probability $\lambda(N_{r_c} - 1)/N_{r_c}$ she will move to another region and with probability $(1-\lambda) + \lambda/N_{r_c}$ she remains in the same region she was born, where N_{r_c} is the number of regions in her country. The migration based data represent the data one would observe if (i) no cross country migration had occurred or if the data had been corrected for cross country migration; and (ii) if within country migration cannot be corrected.

For each constructed set of data, with and without internal migration, the following two relations were estimated

$$y_{irc} = \beta_0 + \beta_1 x_{irc} + e_{irc} \qquad\qquad y_{irc} = \beta_0 + \beta_1 x_{irc} + \sum_c \delta_c \gamma_c + e_{irc}$$

where γ_c is a complete set of country fixed effects and β_1 is the coefficient of interest. By construction, the real values are $\beta_0 = 0$ and $\beta_1 = 1$. Figure B.4(a) shows the estimated coefficient $\hat{\beta}_1$ for various levels of the probability of migration when there are 100 countries, each with 10 regions and 10 individuals per region, and each specification is replicated 5000 times.[34] As can be seen there, the OLS estimate for the data without migration is correctly estimated to be $\hat{\beta}_1 = 1$

[34] Similar results were obtained for other parametrizations.

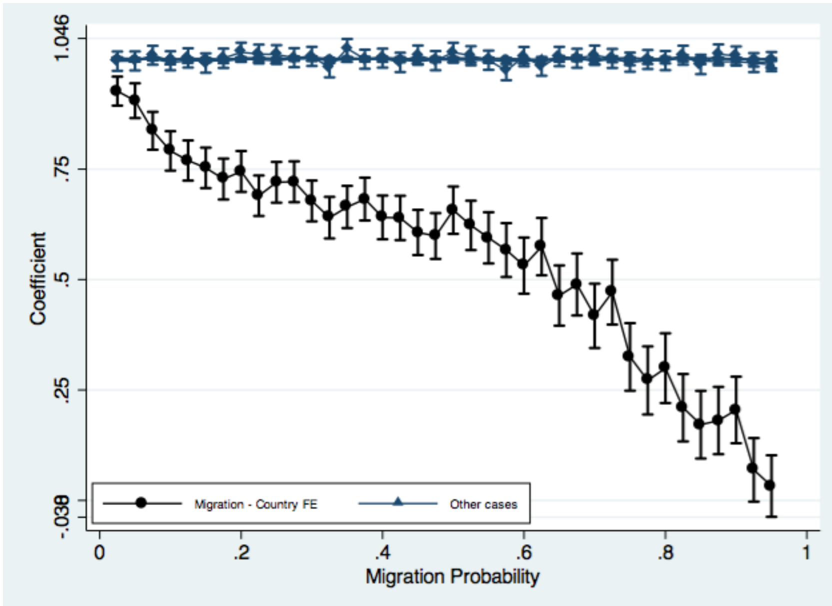
both for the specification with and without country fixed effects. On the other hand, for the data with migration, the specification without country fixed effects correctly estimates $\hat{\beta}_1 = 1$, but with country fixed effects there exists a bias that increases with the probability of migration. This shows that not correcting for migration destroys the informational content of x_{irc} and can create a large bias in the estimated coefficient.

As a second exercise the individual data is aggregated at the regional level both before and after migration. Again the data generating process implies that the correct relation between the regional averages is

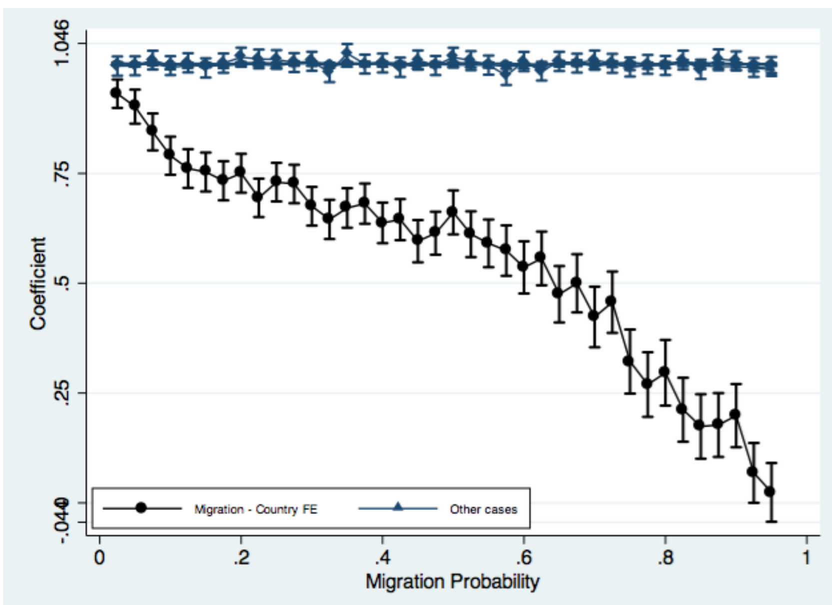
$$\bar{y}_{rc} = \bar{x}_{rc} + \epsilon_{rc},$$

with $\bar{x}_{rc} = rc$. Figure B.4(b) shows the estimated coefficient $\hat{\beta}_1$ for the same specifications as before. As can be seen there the results are similar to the individual level regressions. In particular, the regressions on the data without migration or with migration without country fixed effects correctly estimate $\hat{\beta}_1 = 1$, while there exists a bias increasing in the rate of migration in the estimation of the data with migration and country fixed effects.

The results show that with a migration rate of 60% the estimated coefficient falls by about 1/2, i.e. $\beta/\hat{\beta} = 2$. Furthermore, while relation between $\beta/\hat{\beta}$ is concave for $\lambda < 1/2$, the relation becomes convex for $\lambda > 1/2$. These results suggest that as most countries have experienced large increases in urbanization rates and within country mobility is easier than cross country mobility, one should expect measurement error due to within country migration to be larger than due to cross country migration.



(a) Individuals



(b) Regions

Figure B.4: Migration Rates and Measurement Error

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