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ORIGINAL PAPER

# Who's afraid of immigration? The effect of economic preferences on tolerance

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**Abstract**
This paper suggests that intergenerationally transmitted ancestral characteristics have a significant impact on attitudes toward immigration. Using a sub-population of second-generation immigrants from the European Social Survey (ESS), we find that historical and linguistic factors that contributed to weaker long-term orientation and higher risk aversion are associated with a greater concern, especially among medium- and low-skilled workers, about the economic consequences of immigration and the admission of poorer immigrants. The results are robust to alternative sample definitions, estimation methodology, a rich set of geographical controls, and several potential confounding factors at the country of origin level.

**Keywords** Economic preferences · Immigration attitudes · Ancestral characteristics · Cultural traits

**JEL Classification** D80 · Z13 · J15 · D83

## 1 Introduction

The debate over immigration is now a prominent issue in many European countries. At the beginning of 2020, the number of people living in the European Union who were citizens of non-member countries was 23 million (5.1% of people living in the

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EU) and the number of immigrants who entered the EU from non-EU countries in 2019 was 2.7 million.[1]

Immigration inflows involve both challenges and opportunities for host societies. Despite the short-term costs of native worker displacement, wage effects, and fiscal burden (Özden c, Wagner M,, 2014), immigration has been shown to have positive effects on innovation and output growth (Kerr and Lincoln, 2010; Dao et al., 2018), the creation of new firms, investments, and opportunities (Azoulay et al., 2022; Beerli et al., 2021), an increase in local goods and services production (Peri et al., 2020), international trade (Parsons and Vézina, 2018; Burchardi et al., 2018), and long-term fiscal balance (Dustmann and Frattini, 2014). Yet, these medium- and long-term benefits are not always on the list of priorities when governments set the "optimal" level of immigration.

Migration policies implemented by national governments are strongly influenced by public perceptions of immigration (Esses et al., 2013; Hainmueller and Hopkins, 2014; Koczan et al., 2021). Due to their crucial role in the public debate, an extensive body of literature has analyzed the potential determinants of public concerns, reaching different conclusions on the role played by economic and social factors (Scheve and Slaughter, 2001; Gang et al., 2013; Fertig and Schmidt, 2002; Mayda, 2006; Facchini and Mayda, 2009; Card et al., 2012). Several contributions focus on competition in the labor market (Scheve and Slaughter, 2001), while others (Mayda, 2006; Facchini and Mayda, 2014, 2009; Bisin and Zanella, 2017) consider both economic and non-economic circumstances, such as national pride and cultural traits.

In addition to individual socio-economic and demographic characteristics like age, level of education, and occupational status, some specific character traits, such as patience and risk preferences, might play an important role in shaping attitudes toward immigration. There are at least two channels through which time and risk preferences might influence immigration attitudes. First, natives may perceive immigrants as a threat to their economic well-being (Garcia-Faroldi, 2017) as well as to their national and cultural identity (i.e., their system of values and beliefs). An individual's perception of immigration as an imminent threat to employment opportunities and economic life in general may be influenced by that person's overall tendency to discount the future and to delay gratification. Since the economic costs of immigration in terms of wage and employment reduction occur in the short run rather than in the long run, when the effects of immigration inflows are either null or positive (Jaeger et al., 2018; Ottaviano and Peri, 2012; Borjas, 2014; Edo and Toubal, 2015), individuals with a lower discount rate (more patient) may put less weight on these immediate costs and, hence, be less reluctant to admit immigrants. Second, it is plausible to think that individuals who share the same socio-economic and institutional circumstances but who are generally less inclined to take risks and consequently have a lower tolerance for losses (Bonin et al., 2007) will put more weight on economic and/or cultural risks related to immigration inflows. As a result, they may be less favorable to immigration than similar counterparts with a lower aversion to risk and uncertainty (Shim and Lee, 2018).

[1] See for instance: http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration_and_migrant_population_statistics

Even though the relationship between preferences and immigration attitudes can be considered economically relevant, little has been done to provide a solid empirical contribution to the topic. The lack of rigorous evidence is mainly due to difficulties in finding reliable measures for individual-specific traits. Indeed, isolating the effect of preferences is not an easy task, especially when data are collected by surveys since the elicited self-assessed attitudes are almost always endogenous to experience and economic incentives. Furthermore, preferences are context dependent, and several potentially confounding ancestral characteristics may have influenced their formation and transmission across generations (Bisin and Verdier, 2000, 2001; Galor and Özak, 2016). A further complexity arises from the fact that preferences are not necessarily orthogonal to each other (Andreoni and Sprenger, 2012). Any identification strategy that seeks to solve this complex puzzle must take all these considerations into account.

In this paper, we take a step toward understanding the potential role of time and risk preferences in shaping individuals' current opinions about immigration. On the heels of the emerging literature dealing with the deep historical roots of preference formation, we take an indirect approach to preference approximation and exploit exogenous variation in a set of initial conditions experienced by ancestral populations that may have influenced the emergence of preferences and their transmission across generations. First, relying on Galor and Özak (2016) and Sarid et al. (2017), we consider a set of factors related to agricultural potential during the pre-industrial era as a direct proxy for contemporary time preferences. Galor and Özak (2016) show that higher historical crop yield potential experienced by ancestral populations has a positive effect on descendants' long-term orientation. Societies that were historically exposed to higher returns to agricultural investment or that benefited from the expansion of suitable crops in the pre-industrial era triggered learning processes that have gradually reinforced the traits for higher long-term orientation. Moreover, the authors show that agro-climatic characteristics have also had an impact on different economic behaviors, such as technological adoption, educational achievement, and savings. Sarid et al. (2017) confirm the existence of a significant relationship between higher returns on agricultural investment in ancestral populations and long-term orientation in contemporary environments.

Second, as for an exogenous source of variation in attitudes toward risk, we rely on a novel approach based on the linguistic relativity hypothesis (Sapir, 1921; Whorf and Carroll, 1964; Chen, 2013) and use a linguistic marker developed and empirically validated by Bernhofer et al. (2021) as a proxy for risk preferences. The essential idea underlying the concept of linguistic relativity is that differences in grammatical structures and/or vocabulary may affect the way speakers perceive and interpret the world they observe and consequently, how they behave. In this view, if speakers of different languages tend to think and behave differently depending on the language they use, some dimensions of linguistic structures may also shape their preferences and decision-making. Chen (2013), for instance, shows that speakers of languages that require the use of the future tense when referring to future events ("strong future-time-reference (FTR)" languages) are more prone to dissociating the future from the present (i.e., they have higher discount rates) compared to speakers of languages that do not employ that specific verb morphology ("weak FTR" or "futureless" languages). As a consequence, they save less, accumulate less wealth by retirement, smoke more

frequently, and are less physically active. Bernhofer et al. (2021), on the other hand, analyze the impact of language differences on the cognitive domain and consequently on several aspects of individual economic behavior by means of an innovative linguistic marker based on the intensity of use of specific linguistic categories in grammatical contexts concerned with the expression of uncertainty. The authors show that the likelihood of being risk averse among second-generation immigrants increases with the frequency of use of these forms, even after controlling for a rich set of controls related to parental linguistic backgrounds and ancestral characteristics.

To isolate the direct effect of preferences, we rely on the "epidemiological approach" (Giuliano, 2007; Fernández, 2011; Galor and Özak, 2016, 2020; Bernhofer et al., 2021) and consider a sub-population of native individuals with either one or both foreign-born parents (i.e., second-generation immigrants) as our main analytical sample. In such a way, we are able to exploit the exogenous variation in parental backgrounds while accounting for time-invariant unobserved country-specific factors under the assumption that time and risk preferences are vertically transmitted from parents to children and are stable over time. In order to estimate the direct effect of historical agricultural potential and linguistic backgrounds on tolerance, we regress individual perceptions of the economic and cultural effects of immigration on historical crop yields and crop yield changes in the parental country of origin, as well as their linguistic backgrounds, while controlling for a wide range of demographic and socio-economic characteristics. Furthermore, we account for a set of potentially confounding geographical factors and historical conditions at the parental country of origin level.

Overall, our results suggest that intergenerationally transmitted ancestral characteristics play an important role in determining the degree of tolerance toward immigration. Higher historical crop yield potential in the parental country of origin has a positive effect on tolerance. As for risk preferences, individuals whose linguistic backgrounds have a higher marker value, indicating a higher level of risk aversion, register lower degrees of tolerance toward immigration. The results also suggest that the effects of time and risk preferences vary according to the type of immigration concerns and individuals' skill levels. Less patient and/or more risk-averse individuals are significantly more concerned about the economic consequences of immigration and the admission of immigrants from poorer countries, which are considered close substitutes for their labor market opportunities. These effects are more pronounced for medium- and low-skilled workers.

We complete the analysis by showing that ancestral characteristics influence immigration attitudes through their impact on the component of parental preferences transmitted to current generations. We run a set of instrumental variable regressions that use historical crop yields and linguistic backgrounds as instruments for long-term orientation and risk and uncertainty avoidance at the parental country of origin level, while controlling for historical levels of population density, GDP per capita, school completion, human capital, and generalized trust that may have had a conceivable persistent effect on contemporary development, preferences, and immigration attitudes. We find a robust link between parental long-term orientation and attitudes toward immigration. The effect of risk preferences, on the other hand, is somewhat weaker. Moreover, we perform several placebo tests to show that patience does not affect other dimensions of individual opinions related to trust, the rule of law, equal opportunities,

freedom, and the rights of sexual minorities. These additional results further support the idea that patience shapes tolerance through its impact on individuals' assessments of economic and cultural costs and benefits related to immigration.

Our empirical strategy makes contributions along two main dimensions. First, it highlights the importance of economic preferences (especially long-term orientation) in shaping attitudes toward immigration. The results offer an interesting insight into the transmission channel linking ancestral agricultural productivity to tolerance indirectly through their impact on future orientation transmitted from parents to children. Even though we are unable to directly prove that patience makes people perceive fewer short-term economic costs in comparison to the longer-term benefits of immigration, the fact that future orientation has been shown to have no effect on tolerance in other situations where individual cost-benefit assessments are less important supports the hypothesis that long-term orientation specifically influences immigration attitudes through this mechanism. Second, our findings add to a growing body of research on the importance of preferences in predicting significant economic outcomes, opening up a new channel via which culture and preferences may influence economic development processes. The link between patience and attitudes toward immigration and the resulting economic and social effects in both origin and destination countries complements the picture of the central role played by economic preferences in comparative development.

The remainder of the paper is organized as follows. Section 2 presents our identification strategy and the set of variables used in the empirical analysis. Section 3 describes the empirical strategy, followed by Section 4 which illustrates our main results. Section 5 concludes.

## 2 Data and sampling

Our empirical exercise relies on the European Social Survey (ESS, henceforth), a biennial cross-country survey covering a large set of European countries (plus Israel) since 2002.[2] The survey contains nationally representative samples of individuals aged 15 or older who reside in private households regardless of nationality, citizenship, or language, and collects information on beliefs, attitudes, and behavioral patterns. What makes ESS data particularly suited for the purposes of our analysis is the inclusion of a battery of questions regarding immigration attitudes, covering economic, cultural, and policy aspects. The respondents were natives (and third-plus generation immigrants) and first and second-generation immigrants. Moreover, by employing ESS data, we are able to link the information on parental characteristics to each respondent, such as the parents' country of birth, type of occupation, and linguistic backgrounds. Our sample

[2] The ESS survey selects new sample members each round (cross-sectional sampling) and does not contain a longitudinal component.

includes individuals residing in 33 countries and interviewed in eight consecutive rounds carried out every 2 years starting from 2004 (round 2) to 2018 (round 9).[3]

### 2.1 Sample selection and identification strategy

The identification of the causal effect of time and risk preferences on attitudes to immigration is subject to several concerns. First, both time and risk preferences and immigration attitudes are endogenous and may be co-determined, with the current (or past) immigration situation affecting both. To overcome this concern, we exploit a set of ancestral agro-climatic characteristics from Galor and Özak (2016) as proxies for the intergenerationally transmitted time preferences, and a set of linguistic markers from Bernhofer et al. (2021) associated with the respondents' primary language and their parental linguistic backgrounds as proxies for attitudes to risk and uncertainty.

Second, the potentially omitted geographical, institutional, and cultural characteristics related to individuals' ancestors may have influenced the formation and transmission of preferences across generations. To address this concern, we include a large set of geographical confounding characteristics of the parental country of origin, such as the absolute latitude, mean elevation above sea level, terrain roughness, neolithic transition timing, precipitation, percentage of population living in tropical, sub-tropical and temperate zones, distance to the coast or navigable rivers, as well as landlocked region dummies. Moreover, we control for parental continent of origin in order to account for unobserved time-invariant heterogeneity at the continental level, historical levels of population density, GDP per capita, school completion, human capital, and generalized trust in the parental country of origin, as well as a set of confounding individual demographic and socio-economic characteristics such as age, gender, education, type of occupation, marital status, household composition, religiosity, political interests, and health status.

In order to isolate the effect of preferences on immigration attitudes, we rely on the so-called "epidemiological approach" (Giuliano, 2007; Fernández, 2011; Galor and Özak, 2016, 2020; Bernhofer et al., 2021), and exploit the variation in historical characteristics and cultural attributes related to the individuals parents' country of origin. In such a way, we are able to rule out any kind of potential bias due to omitted parental backgrounds and mitigate the effect of the unobserved heterogeneity in contemporary environments in which individuals live. Our approach relies on three main assumptions: (i) risk and time preferences are vertically transmitted from parents to children, (ii) they systematically vary across individuals having different parental backgrounds; and (iii) despite the heterogeneity in the parental background, individuals living in the same country (or region) face identical economic and institutional arrangements. The main analytical sample, therefore, consists of native individuals with one or both foreign-born parents (i.e., second-generation immigrants).

[3] Round 1 was excluded because it indicates the parental continent, not the country of origin. The list of the countries included in the analysis is set out in Table A.15 in the appendix. Three countries (Albania, Kosovo and Romania) were excluded because of the lack of a sufficient number of second-generation immigrants (less than 20).

Our final sample comprises 12,260 individuals for whom we have complete information on demographic, socio-economic, linguistic, and ancestral characteristics, including 75 countries of origin of foreign-born mothers and 79 countries of origin of foreign-born fathers. Below we describe the variables used in the analysis. Table A.14 (in the appendix) reports summary statistics.

### 2.2 Attitudes toward immigration

Concerning individual attitudes toward immigration, the ESS asks respondents a battery of questions at distinct levels of generality. Dimensions of the respondents' opinions are captured by two specific questions related to the effects of immigration on the economy and cultural identity, as well as a general question about the overall perception of the immigration phenomenon. The answers were categorized on a 10-point scale, ranging from "very intolerant" (score 0 ) to "very tolerant" (score 10). We mainly focus on the first two questions, which are related to the overall effects of immigration on the economy and culture.[4]

On the other hand, the extent to which individuals agree or disagree with more receptive immigration policies regarding the admission of immigrants of the same and different races, as well as those from poor non-EU countries, is categorized on a 4-point scale, ranging from "allow many to come and live here" (score 1) to "allow none" (score 4). In order to make the scale comparable with the questions on immigration attitudes, we re-scale the answers so that 1 corresponds to "allow none" (full disagreement) and 4 to "allow many to come and live here" (full agreement).[5]

Figure 1 displays the average level of tolerance toward immigrants and the average level of agreement with more receptive immigration policies among second-generation immigrants, by country and type of concern. In almost all countries individuals tend to be more concerned about the economic consequences of immigration which may reflect the perceived or actual impact of immigrants on the labor market and welfare system of receiving countries (Bisin and Zanella, 2017). As for the immigration policies, individuals generally tend to be less favorable to admission of poorer immigrants from non-European countries. Hungary, Greece, Cyprus, and Czech Republic, in particular, have the lowest level of tolerance, whereas Sweden, Denmark, and Germany are among the most welcoming to immigrants.

Different generations of migrants, however, may hold different attitudes compared to natives. Second-generation immigrants, for instance, originate from families with one or both foreign-born parents, while first-generation migrants were not born in the country of interview. It is reasonable to suspect that these two categories of migrants may be, on average, less stringent in terms of immigration opinions than natives, which would undermine the representativeness of our main analytical sample.

Figure 2 shows the distribution of attitudes toward immigration (economic and cultural concerns) separately for natives and first and second-generation immigrants.

[4] In addition to our main specification based on questions 1 and 2, we also consider the overall perception of immigration in question 3 and report the results in the appendix.

[5] The questions on attitudes toward immigrants and immigration policies are reported in the appendix.

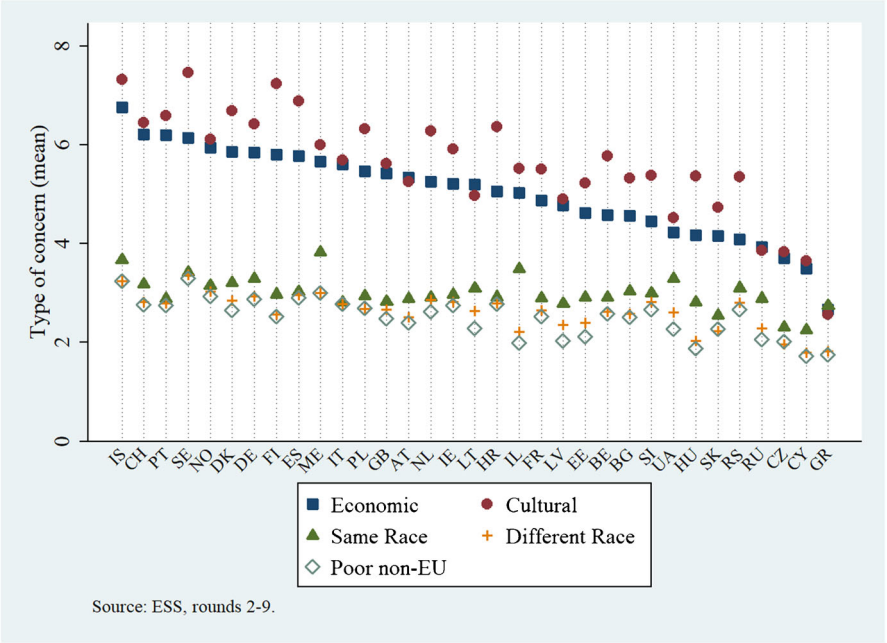


**Fig. 1** Average level of tolerance about immigration and immigration policies, by country and type of concern. Note: The figure reports the average level of tolerance for different types of concerns about immigration. Economic and cultural concerns are categorized on a 10-point scale, ranging from "very intolerant" (score 0) to "very tolerant" (score 10). The extent to which individuals agree or disagree with more receptive immigration policies regarding the admission of immigrants of the same or dierent race and those from poor non-European countries is expressed on a 4-point scale, ranging from "allow none" (score 1) to "allow many to come and live here" (score 4)

For each sub-group of individuals, moving from left to right along the tolerance scale corresponds to higher levels of tolerance.

The distribution of attitudes is very similar between natives and second-generation immigrants. These two sub-groups of the population, therefore, tend to have very similar perceptions of the impact of immigration on economic and cultural life.[6] This is not the case with first-generation immigrants where the distribution is more skewed toward the region of higher tolerance. This suggests that respondents who directly experienced migration are more likely to have favorable attitudes than native individuals (and second-generation immigrants) because they identify themselves more closely with other immigrants due to their own migration background.

[6] The sub-population of second-generation immigrants, therefore, is likely to come from the same distribution as the one of native individuals. Indeed, according to the Kolmogorov-Smirnov test, the null hypothesis of equal distribution of tolerance between second-generation immigrants and the rest of the sample cannot be rejected ($p = 0.655$).

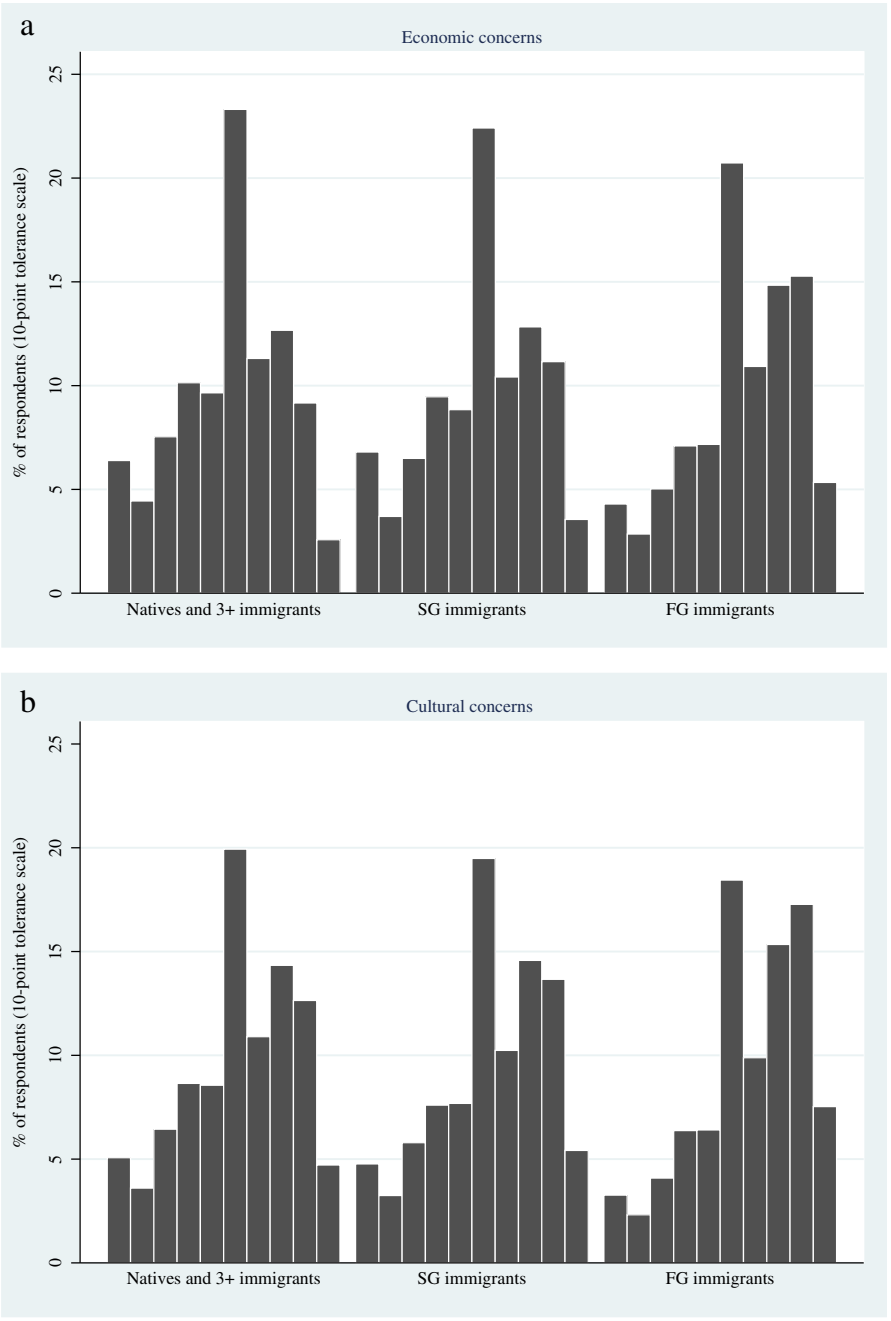


**Fig. 2** Attitudes toward immigration among different sub-groups: economic (left-hand side) and cultural (right-hand side) concerns. Note: The figure depicts the distribution of economic and cultural concerns about immigration for natives, second-generation (SG) immigrants, and first-generation (FG) immigrants (expressed in the far left representing "very intolerant" (score 0) and the far right representing "very tolerant" (score 10)

### 2.3 Agro-climatic characteristics and the IRR linguistic marker

To control for ancestral characteristics from parental country of origin that might have influenced the formation and transmission of time preferences, we rely on Galor and Özak (2016) and exploit a set of agro-climatic characteristics conducive to higher returns on agricultural investment: (i) the yield (measured in millions of kilo calories per hectare per year), (ii) growth cycle (measured in days) for the crop that maximizes potential yield before the Columbian Exchange (Putterman and Weil, 2010), and (iii) the post-1500 changes in the yield and growth cycles of the dominant crop due to the Columbian Exchange. Pre-1500 agricultural conditions are based on the agro-climatic estimates under low level of inputs and rain-fed agriculture and, hence, do not reflect endogenous choices that may potentially be correlated with time preferences, such as irrigation methods or level of agricultural inputs. Crop growth cycle, on the other hand, measures the days elapsed from the planting to full maturity. The evolution of crop yield and crop growth cycle in the post-1500 period captures the expansion of agricultural potential when all regions were equally able to adopt all crops for agricultural production. Since crop yield in the parental country of origin is distinct from the one of the country of residence, the estimated effect of the historical agricultural potential of the parental country of origin should capture the culturally embodied effect of crop yield on the formation of time preferences and their transmission across generations.

In order to proxy individual risk preferences, we follow Bernhofer et al. (2021). On the basis of the postulates of the weak version of linguistic relativity hypothesis, the authors develop a new linguistic marker (denominated as *Irrealis* - IRR) which correlates with individual perceptions of risk. More precisely, the marker is based on the intensity of use of specific grammatical categories (*moods*) in grammatical contexts involving uncertainty. In general, when explaining possible or hypothetical situations, speakers of different languages may use *indicative* or *non-indicative* grammatical moods (such as conditional, subjunctive, etc.). Since indicative moods are usually used to assert that a certain proposition is true (as of the actual world), when applied to hypothetical situations, the use of non-indicative moods, according to the linguistic relativity hypothesis, should induce speakers to perceive the situation as more uncertain compared to similar individuals using an indicative mood to describe the identical hypothetical situation. According to this conjecture, in sentences 1 and 2, for example, a hypothetical situation ("leaving event") should be perceived as less uncertain by an English speaker than by an Italian speaker, even though they describe the same possible situation:

| | | |
|---|---|---|
| 1. *I think s/he has left.* | [**English**] | *Indicative (past-tense)* |
| 2. *Penso sia partito/a.* | [**Italian**] | *Non-indicative (subjunctive)* |

The former expresses the leaving situation by resorting to the indicative mood (past-tense), while the latter has to use a non-indicative or *irrealis* - IRR mood (subjunctive). Even though the two speakers describe the same uncertain situation (i.e., they think and hence are not sure whether the other person is actually away or not), the Italian speaker "externalizes" this uncertainty in a much stronger way with respect to an English speaker, who uses an indicative mood — exactly the same verbal form that would have been used if the statement was certain (i.e., "I know that s/he has left"). In general, by

using non-indicative moods more often, speakers move from the region of certainty to that of uncertainty, i.e., their latent area of the unknown is larger than for their peers who speak a less non-indicative mood-intensive language. As a consequence, they are expected to be more risk averse as the semantic salience of their region of uncertainty increases.

From a cross-linguistic viewpoint there are six grammatical contexts involving hypothetical situations in which non-indicative moods are used more consistently.[7] In order to obtain an indicator measuring the intensity of use of non-indicative moods across languages, each syntactic environment is assigned the value of 1 when a non-indicative mood is used, and 0 when an indicative mood is required. Adding the values, we obtain an indicator of how frequently non-indicative forms are used in a language, so that languages can be ranked according to the intensity of use of non-indicative moods.[8] According to the marker, languages can be classified into three different categories: (i) languages with no required non-indicative moods in contexts involving uncertainty (so-called "moodless" languages), (ii) those with an intermediate intensity of non-indicative moods, and (iii) languages where these moods are frequently required. Bernhofer et al. (2021) show that intensity of displacement into uncertainty, as measured by the IRR marker, directly influences attitudes to risk, and indirectly their beliefs and behavior in uncertain environments. The higher the value of the marker the greater the likelihood of risk aversion and the lower the propensity to invest in risky assets.

In order to proxy the individuals' risk preferences, we assign the linguistic marker both to their first language (i.e., the language they use on a daily basis) and to their parental linguistic backgrounds. As for the language assignment to the individual mother's and father's language of origin, we follow Hicks et al. (2015) and consider the official language spoken in their country of origin (if available) or the official language spoken by more than 80% of the population in these countries (in all those cases where the country of birth has more than one official language).[9] Finally, to capture the effect of the currently spoken language net of the influence of parental linguistic backgrounds we associate the IRR linguistic marker with the respondents' first language (i.e., the one usually spoken at home).

[7] For more details, see Bernhofer et al. (2021).

[8] The original linguistic mapping in Bernhofer et al. (2021) covers 38 languages. The list of languages with the respective values of the marker is set out in Table A.13 in the appendix.

[9] Individuals whose parents originate from linguistically heterogeneous countries, such as Switzerland, Belgium or Canada or were born in countries (federations) which do not exist anymore (such as USSR, Yugoslavia, Czechoslovakia, etc.) are excluded from the analysis since we are not able to track their original language and/or the information on parental ancestral characteristics is not available. The linguistic assignment to parental backgrounds described so far may be biased since in many ethnically heterogeneous (mostly non-European) countries, the members of ethnic minorities rather than majorities are the migrants since they tend to suffer from oppression and/or poor socio-economic conditions. One possibility to solve this issue would be to weight the IRR linguistic marker of each linguistic (ethnic) group by their relative population size in order to obtain a country weighted average. Unfortunately, this is not possible mainly for two reasons: (i) the languages of minorities are usually dialects without an official grammar so the IRR linguistic marker cannot be assigned, and (ii) the linguistic mapping in Bernhofer et al. (2021) covers officially recognized languages spoken around the world but does not include any other country or regionally specific language.

### 2.4 Other controls and cultural indicators

To further control for the in-depth origins of the heterogeneity in preferences, in some models we also account for genetic and linguistic distances between country of residence and parental country of origin. Becker et al. (2020) show that individuals originating from distant cultures differ more in their respective preferences than less culturally distant pairs. These differences are particularly pronounced for risk aversion and prosocial traits (altruism and trust).[10] We use the composite measure of ancestral or temporal distance that is computed as the unweighted average of the standardized values (z-scores) of linguistic and genetic distances.

As for the other individual-level characteristics, we consider a rich set of demographic and socio-economic information. Among demographics, we include age, gender, marital status, household size, and number of children. Socio-economic variables include the highest educational attainment and occupational status. In addition, using the ISCO-08 classification, we group occupations into "white collar" and "blue collar" categories. Moreover, we include a dichotomous variable indicating whether an individual has worked abroad for at least 6 months. We also control for the respondents' self-assessed health (SAH), which is a binary variable with value 1 if individuals declare that their health is very good or good, and 0 otherwise. Self-reported responses on topics such as religion and political involvement are used to control for other non-economic determinants of attitudes to immigration, in addition to those (potentially) captured by ancestral controls and linguistic markers.[11] Finally, we account for the type of parental last occupation (white collar or blue collar) and whether individuals belong to an ethnic minority.

## 3 Empirical strategy

To investigate the relationship between individual attitudes toward immigration and long-term orientation and risk preferences, we empirically validate the following hypotheses:

**Hypothesis 1** *Long-term orientation and opinion about immigration*
*Individuals with a higher general tendency to delay gratification (higher patience) may, on average, be less concerned about the potential imminent (short-run) costs related to immigration and hence less intolerant.*

[10] The construction of linguistic distances is based on the methodology proposed by Fearon (2003) which measure the degree to which two countries' languages differ from each other. Genetic distances, on the other hand, are drawn from Spolaore and Wacziarg (2009) and Spolaore and Wacziarg (2018) and quantify the expected genetic distance between two randomly drawn individuals, one from each country, according to the contemporary composition of the population. For more details on the definition and construction of these distance measures, see Becker et al. (2020).

[11] As regards religion, we include a dummy indicator to capture the intensity of religious feelings. The degree of political interest is measured by individual responses to the following question: "How interested would you say you are in politics - Are you very interested, quite interested, hardly interested or not interested at all?". We dichotomize responses into a binary variable which has value 1 if the respondent is very interested or quite interested, and 0 otherwise.

**Hypothesis 2** *Risk aversion and opinion about immigration*
*Since immigration may generate uncertainty and costs in terms of wage and employment reduction, individuals with higher levels of risk aversion are on average more intolerant toward immigration.*

The empirical strategy consists in estimating three different sets of equations. The first block of models quantifies the potential effect of the component of long-term orientation captured by the pre-industrial crop yield and crop growth cycle on the contemporary degree of tolerance toward immigration, controlling for the expansion of available crops in the post-1500 period, geographical factors experienced by ancestral populations, and a set of individual-specific characteristics:

$$TOL_{i,p,c,r,t} = c_0 + \alpha AGR_{i,p,c,r} + \gamma Geo_{i,p,c,r} + \lambda X_{i,p,c,r,t} + \theta F_{i,p,c,r} + \epsilon_{i,p,c,r,t}, \quad (1)$$

where $TOL_{i,p,c,r,t}$ is an ordinal variable ranging from 0 (full intolerance) to 10 (full tolerance) associated with individual $i$ with parental ancestry $p$, born and currently residing in country $c$ and region $r$, and interviewed in year $t$, $AGR_{i,p,c,r}$ including the potential pre-1500 crop yield and crop growth cycle, and their changes in the post-1500 period ("Columbian exchange") in the parental country of origin, $X_{i,p,c,r,t}$ is a full set of individual-level characteristics, $Geo_{i,p,c,r,j}$ includes geographical characteristics $j$ for individual $i's$ parental country of origin, while $F_{i,p,c,r}$ are the region of current residence and parental continent of origin dummies.

The second set of regressions aims at isolating a direct and independent effect of attitudes to risk reflected by parental linguistic backgrounds:

$$TOL_{i,p,c,r,t} = c_0 + \beta IRR_{i,p,c,r} + \lambda X_{i,p,c,r,t} + \theta F_{i,p,c,r} + \epsilon_{i,p,c,r,t}, \quad (2)$$

where $IRR_{i,p,c,r}$ is the vector of IRR linguistic markers from Bernhofer et al. (2021) associated with the language each respondent speaks most often at home, and with their parental linguistic backgrounds. We consider the lowest category of the marker ($IRR = 0$ or "moodless" speakers) as a reference indicator for low risk aversion (i.e., risk takers).[12] Since preferences are not necessarily independent of each other and some ancestral agricultural and geographic factors may have influenced the formation and transmission of risk preferences, we also regress individual attitudes toward immigration on the entire set of preference-related factors. In all model specifications we cluster the robust standard errors at the parental country of origin level. Given the ordinal nature of the dependent variable, the empirical specifications in Eqs. 1 and 2 are estimated using an ordered logistic model. In order to facilitate the interpretation of the estimated effects, we report the coefficients as log odds ratios with their robust standard errors. As a robustness check, we also report the results based on a standard OLS.

Finally, to show that agricultural proxies actually affect immigration attitudes through their impact on the component of parental long-term orientation transmitted to current generations, the third block of models considers a set of instrumental

[12] See Bernhofer et al. (2021) for more details.

variable regressions that use historical crop yields and crop yield changes in the post-1500 period as instruments for long-term orientation at the parental country of origin level from Hofstede et al. (2010), controlling for several historical conditions that may have had a conceivable persistent effect on contemporary development, preferences, and immigration attitudes. As for risk preferences, we use the Hofstede's uncertainty avoidance indicator and an alternative measure of risk preferences from Falk et al. (2018) as proxies for parental attitudes toward uncertainty and ambiguity, and we instrument them with the parental linguistic markers. To alleviate concerns related to the exclusion restriction, we further check whether the effect of long-term orientation is unaffected by the plausible impact of agricultural productivity on pre-industrial population density, GDP per capita in 1913 and 2005, the percentage of the population 16–64 with completed tertiary education, and the overall level of human capital in the parental country of origin. As shown by Ashraf and Galor (2011) and Nunn and Qian (2011), these factors may have had a persistent effect on contemporary development and indirectly on immigration attitudes. Since economic outcomes may be consistently related to trust and social capital (Algan and Cahuc, 2014), we also look at the importance of social capital, as proxied by the fraction of individuals in a country who believe that most people can be trusted.[13]

Finally, we perform several placebo tests to show that long-term orientation has no effect on other dimensions of individual attitudes, supporting the hypothesis that patience influences immigration attitudes through its impact on individual assessments of the costs and benefits of immigration.

## 4 Results

This section presents our main results. We first show the findings for a direct relationship between ancestral characteristics and attitudes toward immigration, and then report the results from instrumental variable regressions.

### 4.1 Direct effect of ancestral factors on tolerance

Given the data requirements of the identification strategy exposed in Section 2, our empirical exercise focuses on the effect of time and risk preferences on tolerance among second-generation immigrants. In order to assess the potential bias due to the sample, in Table 1 we first report the estimates of Eqs. 1 and 2 for the full sample of individuals (natives and immigrants). In line with the evidence emerging from Fig. 2, the results from a pooled sample show that first-generation immigrants are on average more likely to be tolerant compared to the rest of the population, while the difference with the coefficient associated to second-generation immigrants is about one fourth. The estimated effect of historical agricultural potential is positive and statistically significant at the one percent level for economic consequences of immigration while it is not significantly different from zero for cultural concerns (columns 4 and 8). In

[13] A similar approach has been followed by Figlio et al. (2019).

**Table 1** Attitudes toward immigration among full sample: economic and cultural concerns

| | Economic | Economic | Economic | Economic | Cultural | Cultural | Cultural | Cultural |
|---|---|---|---|---|---|---|---|---|
| Crop yield (anc., pre-1500) | 1.103*** | 1.084** | | 1.097*** | 1.054** | 1.027 | | 1.045 |
| | (0.030) | (0.039) | | (0.034) | (0.025) | (0.030) | | (0.033) |
| Crop yield ch. (post-1500) | 1.018 | 0.952 | | 0.955 | 1.018 | 0.927 | | 0.928 |
| | (0.055) | (0.048) | | (0.051) | (0.057) | (0.046) | | (0.048) |
| Crop g. c. (anc., pre-1500) | 0.991*** | 0.993*** | | 0.993*** | 0.994*** | 0.996 | | 0.996* |
| | (0.002) | (0.002) | | (0.002) | (0.002) | (0.003) | | (0.002) |
| Crop g. c. change (post-1500) | 0.947 | 1.015 | | 1.010 | 0.980 | 1.066 | | 1.061 |
| | (0.037) | (0.046) | | (0.047) | (0.039) | (0.046) | | (0.046) |
| Neolithic transition timing | | 0.967 | | 0.963 | | 0.981 | | 0.974 |
| | | (0.058) | | (0.060) | | (0.065) | | (0.068) |
| Absolute latitude | | 1.135 | | 1.157 | | 1.178 | | 1.191 |
| | | (0.092) | | (0.104) | | (0.130) | | (0.140) |
| Mean elevation | | 1.125 | | 1.120 | | 1.269*** | | 1.261*** |
| | | (0.094) | | (0.092) | | (0.107) | | (0.102) |
| Terrain roughness | | 0.950 | | 0.963 | | 0.972 | | 0.987 |
| | | (0.061) | | (0.055) | | (0.049) | | (0.044) |
| Distance to coast or river | | 0.966* | | 0.970 | | 0.937*** | | 0.942*** |
| | | (0.020) | | (0.020) | | (0.018) | | (0.019) |
| Landlocked | | 0.954 | | 0.953 | | 0.891*** | | 0.892*** |
| | | (0.033) | | (0.034) | | (0.034) | | (0.033) |
| Pct. land in tropics | | 1.338*** | | 1.357*** | | 1.409*** | | 1.432*** |
| | | (0.150) | | (0.155) | | (0.166) | | (0.187) |
| Precipitation | | 0.888 | | 0.866 | | 0.861 | | 0.830 |
| | | (0.128) | | (0.128) | | (0.119) | | (0.124) |

**Table 1** continued

| | Economic | Economic | Economic | Economic | Cultural | Cultural | Cultural | Cultural |
|---|---|---|---|---|---|---|---|---|
| IRR FL (low av. to risk) | | | 1.244 | 1.240 | | | 1.309* | 1.296* |
| | | | (0.253) | (0.197) | | | (0.200) | (0.175) |
| IRR parents (low av. to risk) | | | 0.864 | 0.973 | | | 0.930 | 1.008 |
| | | | (0.092) | (0.080) | | | (0.100) | (0.087) |
| First-generation imm. | 1.658*** | 1.649*** | 1.673*** | 1.654*** | 1.555*** | 1.547*** | 1.591*** | 1.558*** |
| | (0.115) | (0.110) | (0.148) | (0.117) | (0.097) | (0.092) | (0.126) | (0.101) |
| Second-generation imm. | 1.169*** | 1.169*** | 1.120*** | 1.160*** | 1.242*** | 1.229*** | 1.219*** | 1.220*** |
| | (0.044) | (0.051) | (0.044) | (0.049) | (0.051) | (0.050) | (0.056) | (0.049) |
| *Main individual characteristics:* | | | | | | | | |
| Age | 1.002 | 1.002 | 1.001 | 1.002 | 1.000 | 1.000 | 1.000 | 1.000 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Female | 0.840*** | 0.840*** | 0.840*** | 0.839*** | 1.085*** | 1.085*** | 1.085*** | 1.084*** |
| | (0.021) | (0.021) | (0.020) | (0.021) | (0.028) | (0.028) | (0.028) | (0.028) |
| Low education | 0.794*** | 0.794*** | 0.792*** | 0.794*** | 0.766*** | 0.763*** | 0.764*** | 0.763*** |
| | (0.017) | (0.017) | (0.017) | (0.017) | (0.020) | (0.019) | (0.020) | (0.019) |
| High education | 1.610*** | 1.610*** | 1.610*** | 1.610*** | 1.619*** | 1.619*** | 1.620*** | 1.619*** |
| | (0.062) | (0.062) | (0.062) | (0.062) | (0.074) | (0.074) | (0.074) | (0.074) |
| Unemployed | 0.897*** | 0.897*** | 0.897*** | 0.896*** | 1.014 | 1.013 | 1.014 | 1.013 |
| | (0.027) | (0.027) | (0.027) | (0.027) | (0.034) | (0.034) | (0.034) | (0.034) |
| Retired | 1.032 | 1.032 | 1.035 | 1.032 | 0.975 | 0.975 | 0.977 | 0.975 |
| | (0.039) | (0.039) | (0.040) | (0.039) | (0.041) | (0.041) | (0.043) | (0.042) |
| White collar | 1.269*** | 1.269*** | 1.267*** | 1.268*** | 1.212*** | 1.212*** | 1.210*** | 1.210*** |
| | (0.034) | (0.034) | (0.034) | (0.034) | (0.033) | (0.033) | (0.033) | (0.033) |

**Table 1** continued

| | Economic | Economic | Economic | Economic | Cultural | Cultural | Cultural | Cultural |
|---|---|---|---|---|---|---|---|---|
| White collar, father | 1.181*** | 1.181*** | 1.179*** | 1.180*** | 1.196*** | 1.197*** | 1.194*** | 1.196*** |
| | (0.018) | (0.019) | (0.019) | (0.019) | (0.022) | (0.022) | (0.022) | (0.022) |
| White collar, mother | 1.101*** | 1.100*** | 1.102*** | 1.099*** | 1.106*** | 1.108*** | 1.106*** | 1.106*** |
| | (0.015) | (0.015) | (0.015) | (0.013) | (0.018) | (0.018) | (0.018) | (0.017) |
| Number children | 0.962*** | 0.962*** | 0.961*** | 0.962*** | 0.987 | 0.987 | 0.987 | 0.987 |
| | (0.012) | (0.012) | (0.012) | (0.012) | (0.011) | (0.011) | (0.011) | (0.011) |
| *N. Observations* | 189,733 | 189,733 | 189,733 | 189,733 | 190,286 | 190,286 | 190,286 | 190,286 |

Notes: The table shows the association between the main proxies for time and risk preferences (pre-1500 potential crop yield and linguistic markers) and attitudes toward immigration (degree of tolerance — measured on a scale of 0 to 10) for the full sample of individuals (i.e., natives, second-generation immigrants, and first-generation immigrants). All specifications include region of residence and year (survey round) controls. Additional individual characteristics (not reported for the sake of space) include marital status, household size, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority. Abbreviations: *FL*, first language. The method of estimation is Ordered Logit with the coefficients reported as log odds ratios. Robust standard errors clustered at the country of residence level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

particular, a one-unit increase in the pre-1500 crop yield (measured in millions of kilo calories per hectare per year) increases the likelihood of a higher tolerance by 1.1 times. Risk aversion proxies, on the other hand, are not significantly different from zero.

Since the estimations over a pooled sample may suffer from a potential bias due to unobserved heterogeneity in contemporary environments leading to an over- or under-estimation of the real effects of preferences, in Tables 2, 3, 4, and 5 we focus on the subset of second-generation immigrants and report the direct effect of parental backgrounds on opinions about immigration. Together with the standard definition of second-generation immigrants (i.e., individuals with either one or both parents born in a country different from the respondent's country of birth and residence), we also consider three alternative definitions, namely, native individuals with a foreign-born mother and native or foreign-born father, those with a foreign-born father and native or foreign-born mother, and natives whose mother and father were born in the same foreign country (Tables A.1, A.2 and A.7 in the appendix).[14]

Table 2 establishes the statistically and economically significant effect of historical crop yield on economic concerns about immigration of second-generation immigrants. A one-unit increase in the parental crop yield potential translates into a 1.04 increase in the log odds ratio of being at a higher level of tolerance in the case of immigrants with either one or both foreign-born parents (column 1), and up to a 1.14 increase for individuals with both foreign-born parents (column 1, Table A.1 in the appendix). The component of low risk aversion captured by linguistic features associated with the respondent's first language translates into a 1.7 to 2.18 times higher odds of increased tolerance (column 3). Compared to the full sample, the estimated effect of long-term orientation is generally lower, while risk aversion turns out to be significant. Similar effects are obtained with the OLS estimation method (Table A.3 in the appendix).

When accounting for individual proxies for risk preferences together with patience (column 4), the coefficient of potential crop yield remains statistically and economically significant, which suggests that risk and time preferences cannot be considered as perfect substitutes. Moreover, the two aspects of preferences go in the same direction, and the effect of long-term orientation generally gains some power when risk preferences are taken into account, which implies that patience and risk cannot be completely separated. This evidence is in line with Andreoni and Sprenger (2012), Falk et al. (2018) and Bernhofer et al. (2021). Moreover, the effect of risk and time preference proxies is robust to the inclusion of temporal distances between the respondents' country of birth and parental country of origin (column 5). Reassuringly, the pre-1500 crop yield potential coefficient is higher than before and remains statistically significant, while the effect of parental linguistic backgrounds becomes significant and increases in magnitude. Risk aversion seems not to be relevant for individual opinions about the cultural consequences of immigration, while long-term orientation has a significant impact only for second-generation immigrants with foreign-born fathers (column 4, Table 3). This result suggests that other preference traits (such as trust

[14] In addition, we also considered a subset of native individuals with both foreign-born parents, including those whose parents originate from different countries. These additional results are available upon request.

**Table 2** Attitudes toward immigration among second-generation immigrants: economic concerns

| | Economic | Economic | Economic | Economic | Economic |
|---|---|---|---|---|---|
| Crop yield (anc., pre-1500) | 1.044** | 1.049* | | 1.056** | 1.081** |
| | (0.019) | (0.027) | | (0.026) | (0.041) |
| Crop yield change (post-1500) | 0.915** | 0.882* | | 0.883* | 0.796** |
| | (0.041) | (0.065) | | (0.065) | (0.084) |
| Crop growth cycle (anc., pre-1500) | | 1.000 | | 1.000 | 0.995 |
| | | (0.002) | | (0.002) | (0.005) |
| Crop growth cycle change (post-1500) | | 1.037 | | 1.036 | 1.070 |
| | | (0.051) | | (0.050) | (0.069) |
| IRR FL (low aversion to risk) | | | 1.715*** | 1.661*** | 1.408* |
| | | | (0.197) | (0.192) | (0.250) |
| IRR parents (low aversion to risk) | | | 1.059 | 1.110 | 1.389** |
| | | | (0.110) | (0.107) | (0.194) |
| Temporal distance | | | | | 1.090** |
| | | | | | (0.043) |
| *N. Observations* | 12,260 | 12,260 | 12,260 | 12,260 | 7511 |

Notes: The table shows the association between the main proxies for time and risk preferences (pre-1500 potential crop yield and linguistic markers) and second-generation immigrants' attitudes toward immigration (degree of tolerance — measured on a scale of 0 to 10). All specifications include region of residence and year (survey round) controls, a full set of individual characteristics, and geographical controls. The full set of individual characteristics includes age, female, low education, high education, white collar, married, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority, mother white collar, father white collar. Abbreviations: *FL*, first language. The method of estimation is Ordered Logit with the coefficients reported as log odds ratios. Robust standard errors clustered at the parental country of origin level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

**Table 3** Attitudes toward immigration among second-generation immigrants: cultural concerns

| | Cultural | Cultural | Cultural | Cultural | Cultural |
|---|---|---|---|---|---|
| Crop yield (anc., pre-1500) | 1.053** | 1.021 | | 1.024 | 0.960 |
| | (0.022) | (0.025) | | (0.024) | (0.042) |
| Crop yield change (post-1500) | 0.883*** | 0.855** | | 0.856** | 0.779** |
| | (0.042) | (0.058) | | (0.058) | (0.079) |
| Crop growth cycle (Anc., pre-1500) | | 1.005*** | | 1.005*** | 1.008 |
| | | (0.002) | | (0.002) | (0.006) |
| Crop growth cycle change (post-1500) | | 1.037 | | 1.036 | 1.051 |
| | | (0.045) | | (0.044) | (0.065) |
| IRR FL (low aversion to risk) | | | 1.349 | 1.382 | 0.903 |
| | | | (0.330) | (0.317) | (0.235) |
| IRR parents (low aversion to risk) | | | 0.926 | 1.047 | 1.150 |
| | | | (0.076) | (0.092) | (0.156) |
| Temporal distance | | | | | 1.154*** |
| | | | | | (0.050) |
| *N. Observations* | 12,337 | 12,337 | 12,337 | 12,337 | 7575 |

Notes: The table shows the association between the main proxies for time and risk preferences (pre-1500 potential crop yield and linguistic markers) and second-generation immigrants' attitudes toward immigration (degree of tolerance — measured on a scale of 0 to 10). All specifications include region of residence and year (survey round) controls, a full set of individual characteristics, and geographical controls. The full set of individual characteristics includes age, female, low education, high education, white collar, married, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority, mother white collar, father white collar. Abbreviations: *FL*, first language. The method of estimation is Ordered Logit with the coefficients reported as log odds ratios. Robust standard errors clustered at the parental country of origin level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

**Table 4** Impact of the 2015's immigration inflow on attitudes toward immigration among second-generation immigrants: economic and cultural concerns

| | Economic | Economic | Economic | Cultural | Cultural | Cultural |
|---|---|---|---|---|---|---|
| Crop yield (anc., pre-1500) | 1.070*** | 1.063** | 1.047 | 1.037 | 1.036 | 0.971 |
| | (0.028) | (0.028) | (0.038) | (0.026) | (0.025) | (0.047) |
| Crop yield change (post-1500) | 0.814** | 0.814** | 0.719** | 0.830** | 0.827** | 0.675*** |
| | (0.073) | (0.073) | (0.108) | (0.067) | (0.067) | (0.093) |
| Crop growth cycle (Anc., pre-1500) | 0.998 | 0.999 | 1.001 | 1.003* | 1.003* | 1.008 |
| | (0.002) | (0.002) | (0.006) | (0.002) | (0.002) | (0.007) |
| Crop growth cycle change (post-1500) | 1.079 | 1.074 | 1.144 | 1.071 | 1.070 | 1.177* |
| | (0.064) | (0.064) | (0.102) | (0.056) | (0.056) | (0.108) |
| Inflow 2015 | 1.099 | 1.028 | 2.903 | 1.036 | 0.953 | 1.112 |
| | (0.307) | (0.288) | (2.128) | (0.301) | (0.303) | (1.280) |
| Crop yield (anc., pre-1500) x Inflow 2015 | 0.949 | 0.986 | 1.086* | 0.956* | 0.970 | 0.967 |
| | (0.032) | (0.035) | (0.053) | (0.025) | (0.030) | (0.062) |
| Crop yield change (post-1500) x inflow 2015 | 1.004 | 1.003 | 0.988 | 1.004** | 1.004* | 1.002 |
| | (0.003) | (0.003) | (0.007) | (0.002) | (0.002) | (0.011) |
| Crop growth cycle (anc., pre-1500) x inflow 2015 | 1.205* | 1.185* | 1.247 | 1.060 | 1.067 | 1.375 |
| | (0.121) | (0.115) | (0.198) | (0.136) | (0.141) | (0.291) |
| Crop growth cycle change (post-1500) x inflow 2015 | 0.912 | 0.939 | 0.867 | 0.927 | 0.929 | 0.778 |
| | (0.066) | (0.068) | (0.104) | (0.086) | (0.091) | (0.121) |
| IRR FL (low aversion to risk) | | 1.530*** | 1.305 | | 1.314 | 0.840 |
| | | (0.178) | (0.228) | | (0.313) | (0.216) |
| IRR parents (low aversion to risk) | | 1.069 | 1.360** | | 1.045 | 1.156 |
| | | (0.108) | (0.206) | | (0.090) | (0.167) |
| IRR FL x inflow 2015 | | 1.211* | 1.242* | | 1.124 | 1.242 |
| | | (0.128) | (0.162) | | (0.128) | (0.172) |

**Table 4** continued

| | Economic | Economic | Economic | Cultural | Cultural | Cultural |
|---|---|---|---|---|---|---|
| IRR parents x inflow 2015 | | 0.924 | 0.972 | | 0.999 | 1.062 |
| | | (0.055) | (0.100) | | (0.073) | (0.134) |
| Temporal distance | | | 1.087** | | | 1.147*** |
| | | | (0.044) | | | (0.048) |
| *N. Observations* | 12,260 | 12,260 | 7511 | 12,337 | 12,337 | 7575 |

Notes: The table shows the association between the main proxies for time and risk preferences (pre-1500 potential crop yield and linguistic markers) and second-generation immigrants' attitudes toward immigration (degree of tolerance — measured on a scale of 0 to 10). All specifications include region of residence and year (survey round) controls, a full set of individual characteristics, and geographical controls and their interactions with the 2015's immigration inflow dummy. The full set of individual characteristics includes age, female, low education, high education, white collar, married, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority, mother white collar, father white collar. Abbreviations: *FL*, first language. The method of estimation is Ordered Logit with the coefficients reported as log odds ratios. Robust standard errors clustered at the parental country of origin level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

**Table 5** Attitudes toward immigration policies among second-generation immigrants

| | Poor | Poor | Diff. race | Diff. race | Same race | Same race |
|---|---|---|---|---|---|---|
| Crop yield (anc., pre-1500) | 1.043*** | 1.035** | 1.006 | 0.997 | 0.992 | 0.982 |
| | (0.016) | (0.017) | (0.019) | (0.019) | (0.023) | (0.020) |
| Crop yield change (post-1500) | 0.898** | 0.908* | 0.961 | 0.969 | 0.998 | 1.013 |
| | (0.049) | (0.050) | (0.067) | (0.067) | (0.068) | (0.067) |
| Crop growth cycle (anc., pre-1500) | 1.001 | 1.001 | 1.002 | 1.002 | 1.000 | 1.001 |
| | (0.001) | (0.001) | (0.002) | (0.002) | (0.002) | (0.002) |
| Crop growth cycle change (post-1500) | 0.990 | 0.983 | 0.992 | 0.987 | 0.995 | 0.986 |
| | (0.036) | (0.035) | (0.043) | (0.044) | (0.052) | (0.049) |
| IRR FL (low aversion to risk) | | 1.532 | | 1.182 | | 3.136 |
| | | (0.415) | | (0.224) | | (2.246) |
| IRR mother (low aversion to risk) | | 0.863** | | 0.910 | | 0.864* |
| | | (0.064) | | (0.054) | | (0.069) |
| *N. Observations* | 12,396 | 12,396 | 12,395 | 12,395 | 12,434 | 12,434 |

Notes: The table shows the association between the main proxies for time and risk preferences (pre-1500 potential crop yield and linguistic markers) and second-generation immigrants' attitudes toward immigration policies (degree of acceptability — measured on a scale of 0 to 4). All specifications include region of residence and year (survey round) controls, a full set of individual characteristics, and geographical controls. The full set of individual characteristics includes age, female, low education, high education, white collar, married, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority, mother white collar, father white collar. Abbreviations: *FL*, first language. The method of estimation is Ordered Logit with the coefficients reported as log odds ratios. Robust standard errors clustered at the parental country of origin level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

and/or pro-sociality) rather than patience and risk, may be better candidates to explain individual concerns about the effects of immigration on local cultural identities.[15]

As for the other ancestral agricultural factors, an increase in the crop growth cycle is not significantly associated with tolerance. This is not a surprising result. According to the Galor and Özak (2016)'s theory, the effect of growth cycle on patience is ambiguous since it depends on the interplay between two forces: on the one hand, a longer growth cycle (for a given crop yield) reduces the effects of investment rewards on the ability to delay gratification; on the other, a longer investment duration mitigates the aversion from delayed consumption. Indeed, the authors find no significant effect of the crop growth cycle. On the other hand, the effects of the expansion of crop yield during the Columbian Exchange on tolerance are not clear. Contrary to Galor and Özak (2016) who suggest that the expansion of potential crops in the post-1500 period generates an additional increase in long-term orientation, we find a negative coefficient on crop yield change. This effect, however, is not robust to the inclusion of the crop growth cycle and its change, alternative sample definitions (Table A.1 in the appendix), and the OLS estimation method (Tables A.3 and A.4 in the appendix).[16]

Figures A.1 and A.2 (in the appendix) show the estimated average marginal effects of crop yield and the linguistic marker with 95% confidence interval (vertical axis) on economic concerns about immigration (horizontal axis). The reported effects capture the variation in the probability of observing each separate degree of tolerance on a 0–10 scale due to a one-unit increase in ancestral crop yield and for being a risk lover ("*moodless*" speaker) compared to intermediate and high risk aversion. In line with the results in Tables 2 and 3, the average marginal effects are negative for low levels of tolerance (i.e., intolerance region), and increase monotonically along the tolerance scale, and become positive for higher values of tolerance (i.e., tolerance region).

The effects of individual preferences established in Hypotheses 1 and 2 may as well be influenced by external shocks, such as massive immigration inflows. One similar event occurred during and after 2015. According to the International Organization for Migration (IOM), over a million irregular migrants and refugees arrived in Europe in 2015, mostly from Syria, Africa and South Asia.[17] This is nearly double with respect to the previous record set in 1992 after the fall of the Iron Curtain, and more than double with respect to 2014. This unprecedented increase in immigration inflows may have influenced the individual level of tolerance, making the most patient and less risk-averse individuals less supportive. In order to test the sensitivity of our results to the migration shock, we interact the proxies for time and risk preferences with a dummy variable assuming a value of 1 for individuals interviewed after 2015 (rounds 8 and 9), and 0 otherwise. The results in Table 4 suggest that the effect of parental crop yield remained significant, although the 2015 inflow of immigrants reduced the odds of

[15] The results for the overall perception of immigration is set out in Table A.5 in the appendix.

[16] Despite this evidence, controlling for the expansion of suitable crops for cultivation in the post-1500 period is very important in order to account for: (i) the potential effects of the omitted variables at the country level; (ii) a potential sorting of individuals with high long-term orientation into regions with higher crop yield potential; and (iii) to establish the historical nature of the effect of these geographical characteristics as opposed to a potential contemporary link between geographical attributes, development outcomes, and patience.

[17] See: https://www.iom.int/news/irregular-migrant-refugee-arrivals-europe-top-one-million-2015-iom

higher tolerance from 1.07 to 1.02 (column 1).[18] As for risk preferences, the inflow of immigrants seems to have increased the effect of low risk aversion, moving the odds of higher tolerance from 1.530 to 1.853 (column 2). Cultural concerns about immigration, on the other hand, do not seem significantly altered, which complements the evidence in Table 3 on the weaker relevance of preferences in shaping the individual's perception of immigration as a threat to national cultural identity.

As for immigration policies, the effect of time preferences is particularly pronounced regarding the admission of immigrants from poor non-European countries (Table 5). This is an interesting result because it complements the evidence for the relevance of time and risk preferences in the context of economic concerns about immigration (Tables 2 and 4). Since less patient and low and medium-skilled individuals are generally more concerned about the economic consequences of immigration and perceive immigrants from poorer countries as a closer substitute for their labor market opportunities (Card et al., 2012), they disagree to a large extent with more receptive immigration policies. Indeed, the results in Table A.6 (in the appendix) show that the effect of time preferences on economic concerns is significantly reduced for low and medium-skilled workers (blue collars) compared to highly skill-intensive occupations (white collars). A one-unit increase in parental crop yield translates into a 1.068 increase in the odds of a higher tolerance for white-collar workers, but only a 1.012 increase for blue-collar workers (column 2).[19] A similar effect is observed for alternative definitions of second-generation immigrants. The moderating effect of skill endowment is comparable to the effect of immigration inflow pressure documented in Table 4.[20] The absence of the effect of time preferences regarding the admission of immigrants of the same race, on the other hand, may be due to the fact that internal migration from one country to another, especially in the eyes of European citizens, may be considered as a legitimate right not necessarily tied to potential concerns related to the immigration phenomenon itself.

Despite the convincing evidence on the role played by time preferences, it is worthwhile noting that the effect of risk is relatively weaker. The coefficient of parental linguistic background generally does not differ from zero, while the effect of the respondents' first language significantly correlates with tolerance. This is not to say that risk attitudes do not affect tolerance, but it does suggest that the results should be interpreted with caution. Since second-generation immigrants' primary language

[18] This effect is obtained as the sum of the effects of the ancestral crop yield variable and its interaction with the 2015 dummy variable (whose coefficient indicates a negative effect).

[19] The effect of crop yield for white-collar workers is given by the coefficient of the crop variable. The effect for blue-collar workers, on the other hand, is obtained as a log odd ratio of the sum of coefficients related to the ancestral crop yield variable and its interaction with the blue-collar dummy. Because the coefficients are expressed as log odds ratios with values lower than one indicating a negative effect, the underlying "raw" coefficients yield: 0.066 + (-0.054) = 0.012, which when expressed as a log odd ratio gives 1.012. We do not report the standard coefficients for the sake of space. These additional estimates are, however, available upon request.

[20] The effect of ancestral crop productivity is moderated to a lesser extent by parental occupation. When historical agricultural potential is interacted with parental profession, the difference in the odds of high tolerance is somewhat reduced: it ranges from 1.075 for white-collar mothers and 1.076 for white-collar fathers to 1.047 for blue-collar mothers and 1.058 for blue-collar fathers. These additional regression results are available upon reasonable request.

is frequently the official language of their country of residency, the corresponding linguistic marker may still reflect some unobserved variability in current contexts, leading to a potentially spurious relationship.

In what follows, we take a step further and test the indirect effect of ancestral factors through parental long-term orientation and risk aversion on immigration attitudes using a two-stage estimation approach. The aim is to show that historical and linguistic factors capture the component of parental preferences transmitted to current generations, net of other confounding factors at the country of origin level, which then directly influence the descendants' tolerance for immigration.

### 4.2 Indirect effect of ancestral factors through long-term orientation and risk aversion

The results based on the identification strategy presented so far identify the effect of ancestral agro-climatic factors and linguistic backgrounds on the individuals' current attitudes to immigration. Nevertheless, they do not prove that long-term orientation and a lower aversion to risk taking actually cause higher levels of tolerance to immigration. This is because the accounted historical processes may have also affected a plethora of other factors at the country of origin level (such as education, quality of institutions, investments, and social development), which can themselves map into a lower or higher tolerance toward immigration.

Even though it would be very difficult to account for all these potential confounding factors, in order to show that agriculture affects immigration attitudes through its impact on the component of parental long-term orientation, we ran a set of instrumental variable regressions that used crop yields and crop yield changes in the post-1500 period ("Colombian exchange") as instruments for long-term orientation (LTO) proxied by the index of time preference at the parental country of origin level from Hofstede et al. (2010).[21] This measure is occasionally used in economics as a cultural dimension that is evocative of time preferences (Figlio et al., 2019).[22]

The results from two-stage regressions in Table 6 show that the component of LTO driven by long-lasting differences between countries in terms of geographical variations in the return to agricultural investment in the pre-industrial era has a significant

[21] The original country rankings in Hofstede and Hofstede (1968-1995) are based on data elicited from interviews of IBM employees across the world. This data has been further expanded by Hofstede et al. (2010) using the data from the Chinese Values Survey and the World Values Survey data for representative samples of the population in 93 societies. The authors created a measure of long-term orientation using a factor analysis model that loads on three questions contained in the World Value Survey. The long-term orientation index varies between 0 (short-term orientation) and 100 (long-term orientation). This measure correlates positively with the importance placed on future profits, savings rates, real estate investment, and math and science scores (Hofstede et al., 2010). For more info see https://geerthofstede.com/research-and-vsm/dimension-data-matrix/ and the variables description in the appendix.

[22] Falk et al. (2018) propose another measure of long-term orientation derived from the combination of responses to two survey measures, one with a quantitative and one with a qualitative format. However, as shown by the authors, the patience variable does not correlate significantly with crop suitability from Galor and Özak (2016).

**Table 6** Direct effect of agricultural productivity in 1500 on long-term orientation and its indirect effect on the degree of tolerance toward immigration (economic concerns) among second-generation immigrants

| Panel A<br>First-stage | LTO | LTO | LTO | LTO | LTO | LTO | LTO |
|---|---|---|---|---|---|---|---|
| Crop yield (anc., pre-1500) | 5.019*** | 4.673*** | 5.185*** | 5.264*** | 4.721*** | 4.141*** | 6.650*** |
| | (0.967) | (0.841) | (1.015) | (1.042) | (1.138) | (1.196) | (1.094) |
| Crop yield change (post-1500) | 8.179*** | 3.669** | 9.810*** | 8.385*** | 7.806*** | 8.037*** | 7.993*** |
| | (1.796) | (1.627) | (2.594) | (1.804) | (2.154) | (2.294) | (1.643) |
| *1st stage F-statistic* | 18.463 | 17.445 | 15.790 | 17.937 | 10.685 | 8.532 | 23.441 |
| *J-Hansen p-value* | 0.8415 | 0.3337 | 0.2861 | 0.9940 | 0.6401 | 0.6755 | 0.7890 |
| Panel B | | | | | | | |
| Second-stage | Economic | Economic | Economic | Economic | Economic | Economic | Economic |
| Long-term orientation (Hofstede et al., 2010) | 0.014*** | 0.017*** | 0.011* | 0.010** | 0.016** | 0.015** | 0.011** |
| | (0.005) | (0.007) | (0.006) | (0.005) | (0.007) | (0.008) | (0.004) |
| Crop growth cycle (anc., pre-1500) | −0.001 | 0.004 | −0.001 | −0.001 | −0.003 | −0.003 | −0.001 |
| | (0.003) | (0.004) | (0.004) | (0.003) | (0.003) | (0.003) | (0.003) |
| Crop growth cycle change (post-1500) | −0.118** | −0.103** | −0.151** | −0.113** | −0.175*** | −0.172*** | −0.111** |
| | (0.051) | (0.051) | (0.065) | (0.050) | (0.061) | (0.062) | (0.049) |
| Population density in 1500 CE | | −0.194** | | | | | |
| | | (0.085) | | | | | |
| GDP per capita in 1913 (log) | | | −0.376** | | | | |
| | | | (0.156) | | | | |
| GDP per capita in 2005 (log) | | | | −0.145** | | | |
| | | | | (0.074) | | | |

**Table 6** continued

| Panel A<br>First-stage | LTO | LTO | LTO | LTO | LTO | LTO | LTO |
|---|---|---|---|---|---|---|---|
| % tertiary completed (15–64) | | | | | −0.021 | | |
| | | | | | (0.020) | | |
| Human capital (15–64) | | | | | | −0.005 | |
| | | | | | | (0.089) | |
| Trust | | | | | | | −0.004 |
| | | | | | | | (0.002) |
| *N. Observations* | 9623 | 9623 | 7751 | 9623 | 8020 | 8020 | 9619 |

Notes: The table shows the direct effect of ancestral agricultural productivity on the parental long-term orientation (measured on a scale of 0 to 100) and its indirect effect on the second-generation immigrants' (with a foreign-born mother and a native or foreign-born father) degree of tolerance toward immigration (measured on a scale of 0 to 10). All specifications include region of residence and year (survey round) controls, a full set of individual characteristics, and geographical controls. The full set of individual characteristics includes age, female, low education, high education, white collar, married, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority, mother white collar, father white collar. The method of estimation is IVREG2. Robust standard errors clustered at the country of residence and parental country of origin level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

effect on the degree of tolerance.[23] More precisely, moving from one extreme (0 — short-term orientation) to another (100 — long-term orientation) along the LTO scale translates into a 1.4 points increase in tolerance (column 1). Accounting for historical levels of population density, GDP per capita, school completion, human capital, and generalized trust in the parental country of origin does not significantly alter the results.[24] Interestingly, the effect of long-term orientation is more robust for individuals with foreign-born mothers than for those with foreign-born fathers. Furthermore, the effect of parental long-term orientation becomes even stronger when both parents come from the same country of origin (Table A.11 in the appendix). This is in line with the existing empirical evidence on inter-generational transmission of attitudes and behavior, emphasizing the importance of the maternal role in developing the identity of their children (Fernández et al., 2004; Cipriani et al., 2013; Dohmen et al., 2011, 2012; Farré and Vella, 2013; Bracco et al., 2021).

Finally, in order to show that the ancestral LTO directly affects the degree of tolerance toward immigration and does not influence other individual attitudes, in Tables A.8–A.10 (in the appendix), we consider a rich set of individual opinions regarding trust, the rule of law, equal opportunities, freedom, and the rights of sexual minorities.[25] Since the theory suggests that patience shapes tolerance toward immigration through its impact on the individual's assessment of economic costs and benefits associated with immigration inflows and since alternative opinions considered generally do not rely on such evaluations, the effects of agro-climatic proxies and LTO should not be statistically different from zero. As demonstrated in Table A.8, pre-1500 crop yield and its change generally do not affect this set of attitudes, with the exception of opinions regarding members of the LGBT community, helping others, and the importance individuals attach to traditions and customs. Long-term orientation, on the other hand, significantly influences only opinions about the role of traditions (Table A.9) and only marginally the importance of being successful and following rules. The importance of traditions and tolerance toward immigration may be conceptually related since individuals highly attached to national customs may, on average, be associated with lower tolerance. Indeed, the results in Table A.10 confirm this intuition. It is worth

[23] The results are robust to alternative sets of instruments, i.e., when LTO is instrumented with the pre-1500 crop yield only, and when we include crop growth cycles, as well as changes in crop yield and growth cycles in the post-1500 period. These additional tables are available upon request.

[24] The estimated effect of long-term orientation on cultural concerns of immigration is weaker in terms of statistical significance, which is in line with the results from Table 3. The results related to cultural concerns are available upon request.

[25] The degree of trust is expressed on a 10-point scale, ranging from "no trust at all" (score 0) to "complete trust" (score 10). The opinions related to different aspects of economic and social life are expressed on a 6-point scale, ranging from "very much like me" (score 1) to "not like me at all" (score 6). We rescaled them such that higher values correspond to stronger agreement. As for the attitudes toward the gay and lesbian community, the ESS contains three different questions: *1. Gay men and lesbians should be free to live their own lives as they wish.; 2. If a close family member was a gay man or a lesbian, I would feel ashamed.; and 3. Gay male and lesbian couples should have the same right to adopt children as straight couples.* On each of these statements, individuals are asked how much they agree or disagree on a scale ranging from "strongly agree" (score 1) to "strongly disagree" (score 5). We consider only the first statement since the remaining two are available only in rounds 8 and 9. This variable has also been rescaled, with higher values corresponding to greater agreement.

**Table 7** Direct effect of agricultural productivity in 1500 on long-term orientation (as proxied by Restraint vs. Indulgence index) and its indirect effect on the degree of tolerance toward immigration (economic concerns) among second-generation immigrants

| Panel A<br>First-stage | LTO | LTO | LTO | LTO | LTO | LTO | LTO |
|---|---|---|---|---|---|---|---|
| Crop yield (anc., pre-1500) | 3.903*** | 3.912*** | 3.123*** | 2.311*** | 3.523*** | 3.559*** | 2.724*** |
| | (0.726) | (0.729) | (0.699) | (0.692) | (0.781) | (0.819) | (0.824) |
| Crop yield change (post-1500) | 5.062** | 5.163** | 6.327*** | 3.719** | 5.417** | 5.492** | 5.105** |
| | (2.104) | (2.268) | (1.939) | (1.893) | (2.180) | (2.182) | (2.144) |
| *1st stage F-statistic* | 16.037 | 15.562 | 12.016 | 6.620 | 12.002 | 12.092 | 7.384 |
| *J-Hansen p-value* | 0.9116 | 0.6535 | 0.2884 | 0.9885 | 0.7988 | 0.9538 | 0.8281 |
| Panel B | | | | | | | |
| Second-stage | Economic | Economic | Economic | Economic | Economic | Economic | Economic |
| Restraint vs. indulgence (Hofstede et al., 2010) | 0.018*** | 0.020*** | 0.017* | 0.022* | 0.019** | 0.017** | 0.022** |
| | (0.007) | (0.007) | (0.010) | (0.012) | (0.008) | (0.008) | (0.010) |
| Crop growth cycle (anc., pre-1500) | −0.001 | −0.000 | −0.002 | −0.001 | −0.003 | −0.003 | −0.001 |
| | (0.003) | (0.003) | (0.005) | (0.003) | (0.003) | (0.003) | (0.003) |
| Crop growth cycle change (post-1500) | −0.189*** | −0.193*** | −0.230** | −0.210** | −0.233*** | −0.222*** | −0.210*** |
| | (0.065) | (0.065) | (0.094) | (0.082) | (0.076) | (0.073) | (0.080) |
| Population density in 1500 CE | | −0.056 | | | | | |
| | | (0.054) | | | | | |
| GDP per capita in 1913 (log) | | | 0.060 | | | | |

**Table 7** continued

| Panel A<br>First-stage | LTO | LTO | LTO | LTO | LTO | LTO | LTO |
|---|---|---|---|---|---|---|---|
| | | | (0.220) | | | | |
| GDP per capita in 2005 (log) | | | | 0.117 | | | |
| | | | | (0.175) | | | |
| % tertiary completed (15–64) | | | | | −0.002 | | |
| | | | | | (0.020) | | |
| Human capital (15–64) | | | | | | 0.080 | |
| | | | | | | (0.072) | |
| Trust | | | | | | | 0.003 |
| | | | | | | | (0.004) |
| *N. Observations* | 9619 | 9619 | 7751 | 9619 | 8030 | 8030 | 9615 |

Notes: The table shows the direct effect of ancestral agricultural productivity on the parental long-term orientation (measured on a scale of 0 to 100) and its indirect effect on the second-generation immigrants' (with a foreign-born mother and a native or foreign-born father) degree of tolerance toward immigration (measured on a scale of 0 to 10). All specifications include region of residence and year (survey round) controls, a full set of individual characteristics, and geographical controls. The full set of individual characteristics includes age, female, low education, high education, white collar, married, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority, mother white collar, father white collar. The method of estimation is IVREG2. Robust standard errors clustered at the country of residence and parental country of origin level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

**Table 8** Direct effect of linguistic backgrounds on uncertainty avoidance and its indirect effect on the degree of tolerance toward immigration (economic concerns) among second-generation immigrants

| Panel A<br>First-stage | Uncertainty | Uncertainty | Uncertainty | Uncertainty | Uncertainty | Uncertainty | Uncertainty |
|---|---|---|---|---|---|---|---|
| IRR mother | 5.252*** | 6.031*** | 5.166*** | 3.774*** | 5.983*** | 5.588*** | 2.861*** |
| | (0.999) | (0.761) | (1.399) | (0.813) | (1.165) | (1.247) | (0.692) |
| *1st stage F-statistic* | 27.629 | 62.839 | 13.631 | 21.530 | 26.365 | 20.084 | 17.092 |
| Panel B | | | | | | | |
| Second-stage | Economic | Economic | Economic | Economic | Economic | Economic | Economic |
| Uncertainty avoidance Hofstede et al. (2010) | −0.004 | −0.002 | −0.014 | −0.014 | −0.004 | −0.002 | −0.011 |
| | (0.006) | (0.005) | (0.009) | (0.009) | (0.005) | (0.006) | (0.013) |
| IRR FL | 0.017 | 0.011 | 0.019 | 0.018 | 0.021 | 0.025 | 0.015 |
| | (0.055) | (0.052) | (0.057) | (0.054) | (0.057) | (0.057) | (0.054) |
| Population density in 1500 CE | | −0.105 | | | | | |
| | | (0.069) | | | | | |
| GDP per capita in 1913 (log) | | | −0.370* | | | | |
| | | | (0.203) | | | | |
| GDP per capita in 2005 (log) | | | | −0.405* | | | |
| | | | | (0.219) | | | |
| % tertiary completed (15–64) | | | | | −0.001 | | |
| | | | | | (0.021) | | |
| Human capital (15–64) | | | | | | 0.065 | |
| | | | | | | (0.083) | |

**Table 8** continued

| Panel A<br>First-stage | Uncertainty | Uncertainty | Uncertainty | Uncertainty | Uncertainty | Uncertainty | Uncertainty |
|---|---|---|---|---|---|---|---|
| Trust | | | | | | | − 0.007 |
| | | | | | | | (0.009) |
| *N. Observations* | 6667 | 6667 | 5831 | 6667 | 6048 | 6048 | 6608 |

Notes: The table shows the direct effect of parental linguistic backgrounds on uncertainty avoidance (measured on a scale of 0 to 100) and its indirect effect on the second-generation immigrants' (with a foreign-born mother and a native or foreign-born father) degree of tolerance toward immigration (measured on a scale of 0 to 10). All specifications include region of residence and year (survey round) controls, a full set of individual characteristics, and geographical controls. The full set of individual characteristics includes age, female, low education, high education, white collar, married, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority, mother white collar, father white collar. The method of estimation is IVREG2. Robust standard errors clustered at the country of residence and parental country of origin level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

**Table 9** Direct effect of linguistic backgrounds on risk taking and its indirect effect on the degree of tolerance toward immigration (economic concerns) among second-generation immigrants

| Panel A<br>First-stage | Risk | Risk | Risk | Risk | Risk | Risk | Risk |
|---|---|---|---|---|---|---|---|
| IRR mother | −0.054*** | −0.061*** | −0.030** | −0.053*** | −0.059*** | −0.055*** | −0.062*** |
| | (0.013) | (0.011) | (0.014) | (0.013) | (0.015) | (0.015) | (0.017) |
| *1st stage F-statistic* | 16.898 | 31.045 | 4.853 | 15.753 | 15.984 | 13.591 | 12.796 |
| Panel B | | | | | | | |
| Second-stage | Economic | Economic | Economic | Economic | Economic | Economic | Economic |
| Willing to take risks (Falk et al., 2018) | 0.993* | 0.740 | 3.459 | 1.260* | 0.753 | 0.458 | 1.108* |
| | (0.600) | (0.498) | (2.178) | (0.646) | (0.583) | (0.652) | (0.599) |
| IRR FL | 0.036 | 0.033 | 0.008 | 0.033 | 0.036 | 0.044 | 0.032 |
| | (0.052) | (0.049) | (0.061) | (0.052) | (0.056) | (0.055) | (0.051) |
| Population density in 1500 CE | | −0.156** | | | | | |
| | | (0.071) | | | | | |
| GDP per capita in 1913 (log) | | | −0.784 | | | | |
| | | | (0.495) | | | | |
| GDP per capita in 2005 (log) | | | | −0.192** | | | |
| | | | | (0.095) | | | |
| % tertiary completed (15–64) | | | | | 0.012 | | |
| | | | | | (0.023) | | |
| Human capital (15–64) | | | | | | 0.109 | |
| | | | | | | (0.079) | |
| Trust | | | | | | | −0.002 |

**Table 9** continued

| Panel A<br>First-stage | Risk | Risk | Risk | Risk | Risk | Risk | Risk |
|---|---|---|---|---|---|---|---|
| | | | | | | | (0.003) |
| *N. Observations* | 6815 | 6815 | 5710 | 6815 | 5880 | 5880 | 6777 |

Notes: The table shows the direct effect of parental linguistic backgrounds (as measured by the IRR linguistic marker) on risk taking and its indirect effect on the second-generation immigrants' (with a foreign-born mother and a native or foreign-born father) degree of tolerance toward immigration (measured on a scale of 0 to 10). All specifications include region of residence and year (survey round) controls, a full set of individual characteristics, and geographical controls. The full set of individual characteristics includes age, female, low education, high education, white collar, married, household size, number of kids, unemployed, retired, disabled, homemaker, employed, still in education, good overall health, have worked abroad, interest in politics, atheist, member of ethnic minority, mother white collar, father white collar. The method of estimation is IVREG2. Robust standard errors clustered at the country of residence and parental country of origin level are reported in parentheses. Significance levels: $*p < 0.1$; $**p < 0.05$; $***p < 0.01$

noting, however, that accounting for potential confounding effects of this and the other aforementioned factors has no effect on the impact of crop yield and its change on long-term orientation, nor on the direct effect of long-term orientation on economic concerns for immigration.

In addition to the index of long-term orientation, Hofstede et al. (2010) presents another measure that captures some elements of time preference, namely the index of restraint versus indulgence. This measure appears to be partly driven by institutional and religious constraints. According to the authors, indulgent societies gratify the enjoyment of life without social restrictions that hamper one's freedom of choice, are frequently involved in leisurely activities, have lenient sexual norms, etc. Restraint societies, on the other hand, are characterized by stricter social norms and prohibitions. The link between long-term orientation and indulgence/restraint is historically rooted since highly intensive agricultural systems were characterized by hard work, the alternation of food abundance and starvation, conflicts for the territory, and exploitation. Moreover, the high intensity of production required restrained discipline, adequate planning, and savings for the future (Hofstede et al., 2010). Restraint societies, therefore, are expected to be more future oriented than indulgent cultures. The results in Table 7 show that the degree of restraint (measured on a scale of 0–100), when used as a proxy for LTO, yields very similar results.[26]

As for risk preferences, Hofstede et al. (2010) propose an index of uncertainty avoidance, which is defined as the extent to which the members of a culture feel threatened by ambiguous or unknown situations. We estimate a set of instrumental variable regressions using the parental linguistic backgrounds as instruments for uncertainty avoidance. The instrumented effects of preferences toward uncertainty and ambiguity are not statistically different from zero (Table 8). This evidence may be due to the fact that uncertainty avoidance does not capture risk avoidance (aversion), rather leads to a reduction of ambiguity. According to Hofstede et al. (2010), cultures that avoid uncertainty may be more prone to engaging in risky behavior in order to reduce ambiguities. As an alternative, we run our models using the measure of risk taking from Falk et al. (2018), which seems more appropriate for the purposes of our analysis. Although weaker than patience, the estimated effects provide some evidence that attitudes toward immigration are directly influenced by individual risk preferences (Table 9). Panel A shows that parental linguistic backgrounds strongly correlate with risk taking, indicating that the higher the linguistic marker, the lower the willingness to take risks. Once instrumented, being a risk lover translates into a one-point increase in tolerance. The impact of risk preferences doubles for second-generation immigrants with both foreign-born parents (Table A.12 in the appendix).

## 5 Concluding remarks

This paper explores the relationship between intergenerationally transmitted ancestral characteristics and individuals' current opinions about immigration. We find that

[26] The results for alternative definitions of second-generation immigrants are set up in Table A.11 in the appendix.

historical agro-climatic and linguistic factors that contributed to stronger long-term orientation and lower risk aversion significantly increase the degree of tolerance toward immigration. In particular, higher historical crop yield potential in the parental country of origin (used as a proxy for individual long-term orientation) has a positive effect on tolerance, accounting for a wide range of geographical characteristics as well as the confounding effect of a rich set of individual and economic factors at the country of origin level. As for risk preferences, individuals speaking languages with a low value of the linguistic marker used as a proxy for weaker aversion to taking risks, register higher degrees of tolerance. The results also suggest that the effect of preferences varies according to the type of immigration concern. Less patient and more risk-averse individuals are more concerned about the economic consequences of immigration and the entry of poorer immigrants, which are considered closer substitutes for their labor market opportunities. On the other hand, preferences have a weaker effect on cultural and general concerns about immigration, which are probably driven by other preference dimensions such as trust and pro-sociality. Furthermore, the effect of time preferences on economic concerns is significantly reduced for low and medium-skilled workers compared to highly skilled-intensive occupations, while the differential effect of risk preferences is generally weaker.

Finally, we complete the analysis by exploring the indirect effect of ancestral factors through parental long-term orientation and risk aversion on immigration attitudes using a two-stage estimation approach. The results confirm that ancestral agricultural productivity captures a component of parental time preferences, which significantly affects individuals' degree of tolerance, even after controlling for unobserved time-invariant heterogeneity at the continental level, historical levels of population density, GDP per capita, school completion, human capital, and generalized trust in the parental country of origin. Moreover, we show that long-term orientation does not affect other dimensions of individual attitudes, straightening the postulate according to which patience influences immigration attitudes through its impact on individual assessments of costs and benefits related to immigration. Finally, the results provide some evidence that attitudes toward immigration are directly influenced by individual risk preferences as well, suggesting that a lower aversion to risk translates into higher levels of tolerance.

We recognize that our approach has some limitations. In particular, we cannot completely rule out the existence of potential direct effects of ancestral characteristics on some other socio-economic dimensions related to immigration attitudes, making it difficult to ensure the complete validity of the exclusion restriction. To partially address this issue, we have included a wide array of potential confounding characteristics at the parental country of origin level.

Overall, our findings may have some important policy implications. First, they highlight the importance of economic preferences (especially long-term orientation) in shaping the perception of the costs and benefits of immigration; second, they contribute to a growing body of research on the importance of preferences in predicting significant economic outcomes, opening up a new channel via which culture and preferences may influence economic development processes in both origin and destination countries.

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