

The Cultural Transmission of Environmental Values: A Comparative Approach

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Abstract

This paper investigates the hypothesis that individual environmental attitudes are partly determined by a cultural component. We empirically identify this component using a comparative approach that exploits variations associated with European migration flows. We find that the environmental attitudes of migrants, while being resilient to environmental conditions, are also determined by a cultural component that persists from one generation to another. Our results suggest that in the presence of multiple environmental problems that require collective action, comprehending the driving forces behind the formation of an environmental culture is critical to effective policy formation.

Keywords: Cultural Transmission, Migration, Environmental Values, Environmental Preferences

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1 Introduction

The profound effects of culture on economic outcomes and the formation of public policies have been at the center of recent debates on the transmission of cultural values. Several economical and societal factors such as fertility rates, female labor force participation levels and redistribution preferences have been argued to manifest a cultural component that frames individual economic behaviors and ultimately economic policies. In the light of major ecological problems that require immediate collective action, several studies in the fields of anthropology and sociology have argued that accounting for cultural factors is important in reference to environmental issues. Humans possess values that shape their choices concerning the environment (Dietz et al [17]; Steg and de Groot [38]). Indeed, facing contradicting preferences (for instance, travel by car or use public transportation), individuals refer to their value systems to make their final decisions. Those who prioritize prosocial values with a positive impact on the environment (environmental values) are more likely to make consumption choices that are environmentally-friendly than those who prioritize egoistic-proself values.

Furthermore, barriers to the achievement of consensus on greenhouse gas emission targets for the 2013-2020 period within the United Nations Framework Convention on Climate Change suggest that in addition to political or economic factors, a cultural component heterogeneously shapes environmental cultures across country members.

The economic literature has thus far neglected analyses on the role of environmental culture. Defining culture is a challenging task. In this paper, we follow Dietz et al [17]; and Steg and de Groot [38] by defining environmental culture as the set of environmental values that reflects general beliefs concerning the desirability of environmental conditions. These values guide individual preferences and thus their choices and attitudes that directly affect the environment. We advance the hypothesis that differences in environmental values across individuals can be partly traced to cultural differences. In particular, we argue that environmental attitudes (e.g., the willingness to pay for environmental causes) are not solely a product of the effects of local environmental conditions on individual attitudes but are also

a product of cultural orientations.

Our analysis tackles this issue both theoretically and empirically. In the theoretical section of the paper, we place Bisin and Verdier [9] model into an environmental context involving migration to serve as a theoretical background for the transmission of environmental values. In our study, these values determine disutility from pollution. Agents consume goods whose production causes pollution. Each community is composed of two social groups (natives and migrants) which defend specific environmental values that yield differing levels of disutility from pollution. For both communities, their offspring may acquire cultural values of the other group via peer socialization (indirect transmission). Thus, if individuals wish for their cultural values to prevail in a new environment, they must invest in family cultivation (direct transmission). We find that the environmental trait is successfully transmitted, either directly or indirectly, when the direct transmission of the environmental traits acts as a cultural substitute to indirect transmission, as shown in Bisin and Verdier [9].

The empirical analysis is designed to test the broad hypothesis that environmental values may be culturally transmitted across generations. To establish our testable hypothesis, we use survey data from the European Values Study (EVS). The EVS dataset includes data on 45 European countries as well as information on the attitudes, beliefs and preferences of Europeans towards a range of issues (e.g., the environment, religion, politics, the economy, etc.), allowing us to identify first- and second-generation migrants. As a measure of individuals' environmental values, we focus on individuals' willingness to pay for environmental causes.¹

Our empirical strategy is based on a comparative approach that involves the use of variations associated with international migration flows in identifying the causal impact of culture on individual preferences (see Fernandez [21]). A comparison between immigrants from different countries reveals the existence of an environmental culture that is formed and that persists in a migrant's country of origin. Our focus on immigrants allows us to distinguish cultural effects from other (economic and environmental) incentives migrants are exposed to in their destination countries. This approach allows us to account for the endogeneity of culture

¹While our focus is on one's marginal willingness to pay for the environment, our results hold for a range of other variables capturing environmental values, as we show in the robustness analysis.

with respect to the environment, prompting a causal interpretation of our results.

Our findings suggest that culture has a persistent and statistically significant impact on the environmental values of migrants: differences in environmental attitudes among migrants can be traced to a persistence of social values in their countries of origin. We also show that environmental attitudes are resilient to incentives derived from the external environment: environmental conditions migrants have been exposed to in their countries of origin do not have a significant impact on their preferences when living in the host country.

Our empirical findings are robust to a number of alternative assumptions and present interesting dimensions of heterogeneity. A first dimension relates to degrees of cultural integration: migrants who appropriate certain important aspects of the host culture (e.g., language or laws) are also more willing to retain the environmental values derived from their own culture. This trend is well recognized in cross-cultural psychology and it is referred to as an “integration strategy” i.e., a strong association with one’s host and origin countries (Berry [7]). A second heterogeneity dimension concerns the cultural transmission process: immigrant networks and families both serve as key cultural transmission channels; moreover, the quality of transmission processes (e.g., as measured by intra-family relationships) and paternal (relative to maternal) influences play a pivotal role.

Overall, this paper addresses an intriguing and largely unexplored issue in the literature. In doing so, we refer to pioneering contributions such as Boyd and Richerson [10]; Cavalli-Sforza and Feldman [15]; we use standard tools such as the Bisin and Verdier [9] framework of cultural transmission and the epidemiological approach presented by Fernández [21]. Nevertheless, and despite using standard tools, our findings are novel and illuminating in regards to mechanisms associated with the transmission of environmental values. The next question to answer concerns why such a question is interesting. Our findings have two main implications. First, they suggest that governments should encourage social learning activities that foster the emergence of an environmental culture that can be transmitted from one generation to another. This is crucial to the sustainable and long-term pro-environmental future of our planet. This issue has become even more critical in an era where international migration

flows are rather vast, leading several different cultures to coexist in many countries. Second, international environmental agreements are reached by leaders who represent the social values that prevail in part among citizens and in part among the policy elite of each country (Henry and Vollan [25] ; Henry [24]; Sabatier and Weible [34]). Therefore, understanding the driving forces behind the formation of an environmental culture is critical to reaching international consensus.

The paper is organized as follows. Section 2 explores the related theoretical and empirical literature and highlights the contributions of our paper. Section 3 presents a formal model that explores the transmission mechanism. Section 4 presents the empirical analysis. Section 5 concludes.

2 Related literature

Our research adds to a growing body of economic literature that examined cultural transmission mechanisms. Social scientists (Campbell [13]), biologists and psychologists (Boyd and Richerson [10], [11], Cavalli-Sforza and Feldman [15]) have been the pioneers of this approach. This literature has put forward the hypothesis that cultural transmission can be modeled as a process of inheritance.² More specifically, Boyd and Richerson [12], pg. 400, argue that certain cultural processes are analogous to processes of natural selection, mutation and drift (random forces, decision-making forces, and natural selection operating directly on cultural variation), which shape evolution and thus the transmission of culture from one generation to another. Importantly, this literature finds that natural selection effects on cultural variation may favor transmission via peers rather than parents. A seminal economic work by Bisin and Verdier [9] in assuming an endogenous process of transmission, finds a similar process referred to as cultural substitutability.³ In the context of environmental economics, some theoretical

²In other words, cultural transmission is not the antipode of Darwin's theory of evolution. On the contrary, the inheritance of acquired variation is compatible with the action of natural selection.

³Another seminal theoretical paper on these issues is Epstein [20], who presents a specific case of extremism whereby parents choose, in the presence of their children, an extreme way of life that would not have been chosen without having children. They do so to increase the cost of deviation of children to select trait differing that of the parents.

studies have explored the impact of social norms on the environment. Sethi and Somanathan [35] examined the endogenous evolution of social norms in a local common-property resource setting using evolutionary game theory. They find that with a sufficiently large number of individuals who act as enforcers, a society can evolve into a norm-guided society rather than into an individualistic one. Schumacher [36] investigates cultural dynamics of environmental preferences (as in Bisin and Verdier [9]), including feedback effects of pollution on cultural dynamics. Pollution affects the proportion of the two cultural traits that exist: greens and browns. Dynamic transmission is such that green values are less likely to be transmitted intergenerationally for low levels of pollution, whereas they are likely to be transmitted for high levels of pollution. Schumacher [37], rather than assuming exogenously given environmental values, studies the endogenous formation and transmission of environmentalism using an overlapping generations model with Leontief preferences. This represents a novel approach employed in cultural economics. It pushes forward the notion that environmental culture is not only transmitted intergenerationally, but is also shaped by resources released for public investment on environmental-friendly education (depending on how wealthy an economy is). In a similar fashion, Bezin [8] builds an overlapping generations model of environmental externalities and capital accumulation. The author argues that individuals have incentives to contribute to the improvement of environmental quality, as their final aim is to promote environmental attitudes. Hence, in this framework, environmentalism is transmitted and evolves according to the conditions of the environment, which ultimately determines the level of private contributions.⁴

The evolution of social norms and their effect on the use of natural resources constitutes a central theme in the literature of the commons (Dietz et al [18]; Ostrom [31]; Ostrom et al [32]). According to this literature, the challenge is to develop institutions and norms that encourage the monitoring and use of natural resources and the rate of change of such resources

⁴In employing an industrial organization approach, Behadj and Tarola [5] study social norms and their effects on consumer environmentalism. These authors consider consumption choices between green and brown products created under social norm influences: individuals suffer if they buy a brown product when peers in their social group select a green version. This mechanism promotes a build market demand that embodies social norms concerning the environment.

while favoring dense social networks that aliment and sustain trust among members of the same social group.

Finally, the transmission of social norms has recently been positioned at the root of what is called the "new economics of migration" (Clemens et al [16]), which examines the role of cultural variables in explaining the complex effects of migration in origin and destination countries (Bertoli and Bacchetta [6]).

Our theoretical analysis presents a simple and intuitive mechanism through which environmental culture can be transmitted across individuals. In building upon the baseline cultural transmission model while plausibly assuming that individuals may migrate, driven primarily by economic incentives, we identify the conditions under which environmental culture is transmitted, and we generate a clear hypothesis to be tested in the empirical section of the paper. To build our theoretical prior, we use a simple version of Stokey [39] to determine individual consumption and pollution choices. These choices are dictated, among other things, by the disutility of pollution that encompasses the environmental culture of a social group. Then, such choices are combined with the hypothesis of Bisin and Verdier [9], which guarantees the cultural transmission of environmental culture.

On the empirical side, while the notion that culture affects economic phenomena is quite established and much debated in other fields such as anthropology and sociology, quantitative analyses of the impact of culture on economic outcomes were only initiated in the early nineties. Carroll et al. [14] attempt to identify a cultural component in the propensity to save but fail to find a systematic effect of culture, likely due to data restrictions, as admitted by the authors. More recently, Ottaviano and Peri [33] analyze the economic value of cultural diversity in the US and find that an increase in the share of foreign-born citizens between 1970 and 1990 in metropolitan areas generated a significant increase in wages and in the rental price of housing for native US citizens.

An obvious issue pertaining to the identification of cultural impacts on economic outcomes relates to the fact that past economic outcomes may determine a national population's

general beliefs and values and its current economic outcomes.⁵ The development of large-scale survey datasets such as the World Values Survey and European Surveys (ESS and EVS) has favored the emergence of a literature that tackles the endogeneity of culture relative to economic outcomes. A number of studies adopt an instrumental variables (IV) approach. For instance, Tabellini [40] explore the impact of culture on growth, using historical literacy rates as an instrument of culture. Fernández [21] and Fernández and Fogli [22] propose a different approach that exploits variations associated with international migration flows in order to isolate cultural determinants (that arise in the country of origin) from local determinants (linked to economic conditions in the destination country) of individual preferences. While this approach does not model the transmission mechanism from cultural to social preferences, it has the advantage of cutting the link between past and existing economic outcomes. In applying this approach, Fernández and Fogli [22] examine the effect of culture on fertility and female labor participation while Alesina and Giuliano [1] identify the causal impact of family ties on economic outcomes. These studies proxy culture by either observed economic outcomes in a country of origin (e.g., female labor market participation rates) or based on the average set of values and beliefs in a country of origin (e.g., the average strength of family ties). To address concerns regarding selective migration, the authors exploit the multilateral movements of migrants from many different origin countries to several different host countries and focus on second-generation migrants.

The present paper contributes to this expanding literature by applying this comparative approach to an analysis of the cultural transmission of environmental values.⁶ Though we use a reduced form empirical specification according to Fernández [21], we gain interesting insight into important features of the process of environmental culture determination. We determine whether environmental values held by immigrants are formed strictly through cultural transmission or whether immigrants also respond to environmental conditions prevailing in their

⁵Cultural effects on economic outcomes have been highlighted in several strands of literature, see e.g., Alesina and Fuchs-Schundeln [2] and Ashraf and Galor [3].

⁶This approach is borrowed from the field of "epidemiology," which involves comparing migrants from different countries of origin living in a common destination to isolate genetic from external causes of a disease (Fernández [21]).

countries of origin. We also analyze some aspects of the cultural transmission process, i.e., the role of the cultural integration of migrants, the type and quality of cultural transmission and relative maternal and paternal effects.

3 Description of the model

Here, we briefly describe a model that follows from Bisin and Verdier [9] to clarify how environmental culture is manifested in our setup and to explain the notion of environmental culture transmission.

Preferences. Consider a population of individuals that, due to migration flows, is composed of two communities, migrants and natives, which each share a group-specific system of values. More precisely, each community is assumed to have a specific environmental culture that differs from that of the other group. Environmental culture is a set of prosocial values that drives consumption choices. More precisely, individuals make consumption choices to maximize their preferences, which are defined by their system of values. In this setup, we assume that the balance of system of values for individuals of each group is reflected in the intensity of the disutility of pollution. The production of consumption goods generates emissions as a by-product. Thus, the degree of production technology environmental friendliness and consumer utility, with corresponding choices, define not only the quantity of goods produced but also the level of pollution. It immediately follows that prosocial values that shape consumption preferences also determine the level of pollution. In our framework, environmental culture is manifested as disutility from pollution that determines the individual marginal willingness to pay for the environment. We use this variable in our empirical analysis to show how environmental values are reflected in preferences. It is worth noting that in our setup, we are agnostic regarding the source of environmental cultural differences. They may be rooted in historical pasts, differing levels of economic development, or in long-term policies carried out in migrant host and origin countries (see for instance Schumacher [37]).

Transmission. In the absence of migratory flows or any other mutation, individuals retain their values and children obtain these values from their family or peers. However,

due to migration, two cultural forces have opposing effects on individuals in migrant and native communities. A child born in a migrant (resp. native) family may acquire the same values as her/his parents during the within-family (direct) socialization process, or (s)he may obtain cultural values of the other community during processes of socialization with his/her peers (indirect socialization). We assume that parents care about their children and that they wish to socialize their children with their values. To do so, parents must engage in the costly activity of rearing. Thus, with some degree of positive probability, which depends on parental resources devoted to child rearing, transmission within the family is successful. If this socialization process fails, children build their environmental values through indirect peer socialization. More precisely, a child acquires the environmental values of peers chosen randomly within society (natives or migrants), rendering the probability of acquiring the migrant culture (resp. natives) equivalent to the fraction of migrants (resp. natives) in the population of the destination country.

It is well known in the cultural transmission literature that a heterogeneous population composed of individuals who successfully transmit their traits to their roles is a stable outcome if family cultivation activities and outdoor socialization serve as substitutes. This occurs when parents are less keen to invest in family education the larger the number of families sharing the same trait (in our case, the larger the number of migrant families). Furthermore, this occurs because if family indoctrination fails, the higher the number of migrant families, the higher the chances that a child will acquire the migrant trait via peer socialization.

In Appendix, we present the details of this model and show when the direct transmission of cultural values works as a cultural substitute for indirect transmission.

4 Empirical analysis

4.1 Data and empirical strategy

In this section, we estimate the impact of environmental culture on environmental preferences using data from the European Values Study (EVS). The EVS is a large-scale cross-national

survey with four waves covering the 1981-2008 period. We focus on the 2008 wave of the EVS.⁷, as this is the only survey with information on first- and second-generation immigrants. We exclude all individuals who do not provide information on their countries of origin and on their parents' countries of origin and who are under the age of 18. We also exclude observations for which environmental preferences or any other individual controls are missing. We obtain a final sample of 2,855 migrants from the 45 countries. Of these migrants, 1,674 are first-generation migrants, whereas 1,181 are second-generation migrants. Notably, all of these immigrants are European immigrants who have migrated to Europe.

In line with our theoretical analysis, we proxy the impact of environmental culture on environmental preferences based on individuals' willingness to pay for the environment. The EVS includes an ordered variable that measures the extent of agreement with the statement "I would contribute part of my income if I were certain that the money would be used to prevent further environmental pollution." The variable takes a value of 1 for "strongly disagree," 2 for "disagree," 3 for "agree" and 4 for "strongly agree." Crucially, the question explicitly mentions "if I were certain" to mitigate concerns regarding the effective allocation of income on environmental causes.⁸

We follow the recent empirical literature on the economic effects of culture (Fernández [21], Fernández and Fogli [22]) and estimate the following reduced form specification for immigrant preferences:

$$MWP_{irb} = \beta * \overline{MWP}_b + \gamma * (Environmental\ Quality)_b + \delta * GDPxc_b + \lambda * \mathbf{X}_i + \theta_r + \epsilon_{irb}. \quad (1)$$

⁷The 2008 wave includes the most countries. Forty-two countries are included in the sample: Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lithuania, Macedonia, Moldova, the Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and the Ukraine. In addition to these data, information on immigrants from the former Czechoslovakia, USSR and Yugoslavia (Socialist Federal Rep.) is included (see Online Appendix for additional details)

⁸Notice that to reduce concerns regarding idiosyncratic risk attitudes, in our baseline specification we control for individual age, gender and marital status attributes, all of which are correlated with risk attitudes. To further address individuals' suspicions regarding whether money will indeed be allocated to environmental causes, we conduct a robustness check where we control for trust in environmental organizations.

MWP_{irb} denotes immigrant i 's marginal willingness to pay (MWP) for the environment. Immigrant i lives in country r and originates from country b . We use the environmental payment willingness indicator as the main variable of interest, as it serves as an unambiguous economic expression of the role played by environmental values in individual environmental choices.

Following the related literature, we define the immigrant's country of origin b as the immigrant's father's country of origin.⁹ \overline{MWP}_b is the mean value of the MWP for the environment measured for natives only in immigrant i 's country of origin b .

The Environmental Quality variable captures environmental quality levels in the immigrant's country of origin b . As pollution is a rather complex phenomenon that takes several forms, we employ a wide range of measures that proxy for environmental quality in the country of origin. In particular, we use measures for organic water pollutant emissions, agricultural methane emissions, CO₂ emissions and particulate matter concentrations; a composite index of environmental quality (i.e., the EPI index, which captures environmental health, ecosystem vitality and climate and energy variables); and a measure of nitrous oxide emissions.

For the controls, we include per capita GDP in the country of origin, $GDPxc_b$, a vector of extensive individual, spouse, and parental characteristics, X_i , and a fixed effect for the residence country of immigrant i , θ_r . Finally, ϵ_{irb} denotes the error term.

Our coefficient of interest in Equation 1 is β . This identifies the impact of environmental culture on the environmental preferences of the migrant, isolating the effect of culture from external factors associated with the destination country (e.g., local environmental, economic and social conditions). As is typically the case in the cultural economics literature (see e.g., Fernández [21] and Fernández and Fogli [22]), β identification involves explicitly modelling environmental culture in the manner described above while controlling for confounding features of the destination country through the inclusion of a dummy variable θ_r .¹⁰ This empirical

⁹In the results section, we check the robustness of our results against alternative definitions of countries of origin based on the immigrant's mother's country of origin. We also extensively discuss the roles of fathers and mothers in cultural transmission mechanisms.

¹⁰In practice, our empirical strategy is to net out the effect of all the characteristic of the residence country that remain constant and are applicable to all immigrants while exploiting the variation within the residence country across immigrants from different origins. This way of modelling culture in the country of origin is to

approach ensures that no omitted factors are correlated with environmental values of the country of origin other than cultural factors that affect immigrant environmental values in the destination country. Accordingly, estimates of β based on ordinary least squares (OLS) can be given a causal interpretation. Rather, if a migrant's environmental values are only affected by relevant economic and institutional factors found in his/her country of residence, we should expect $\beta = 0$. However, a value of $\beta > 0$ denotes a positive impact of culture on the environmental values of the immigrant. We discuss below the validity of our identifying assumption.

Endogeneity issues. A number of endogeneity issues may arise in a specification such as equation (1), rendering OLS estimates of β biased and inconsistent. A first potential issue pertains to selective migration (if workers with strong environmental preferences can migrate from highly polluted countries to less polluted ones).¹¹

We argue that selective migration processes do not affect our estimates for four reasons. First, environmental migration flows are generally triggered by long-term trends (e.g., increased drought or flooding), which may negatively affect livelihoods in certain areas, and particularly those based on agriculture (see e.g., Martin, [28]). These events are of limited relevance to our sample, which as already stated, is composed of European immigrants that have migrated to Europe. We thus make the implicit assumption that differences in environmental conditions, while they certainly exist, are not excessive compared to cases where immigrants migrating to Europe from all over the world are studied. Table 1 describes migration flows and conveys the notion that international migration flows in our sample mostly take place between Southern and Northern European countries or between Eastern and Western European countries. As an example, Poland is an important origin country

be preferred to origin country dummies. Including country of origin dummies would eliminate variation at the origin country level, which would not allow to trace which aspect of culture matters more. Accordingly, the inclusion of country of origin dummies would only make it possible to see whether origin plays a role or not (see also Fernández [21]).

¹¹Note that selective environmental migration from highly polluted countries to less polluted countries would imply that the MWP for migrant environmental values is systematically higher than the average MWP value for natives in the country of origin. In this case, environmental migration is likely to have a downward bias effect the estimated impact of culture on individual preferences, implying that our estimates would provide a lower estimate of the true effect of culture on individual migrant preferences.

(see Columns (1)-(4)). In our sample, it accounts for 83 migrants that have traveled to 24 different destinations, with the most common one being Germany (14 of the migrants of Polish origin reside in Germany). Conversely, Switzerland is an important destination country (see Columns (5)-(8)). In our sample, this country hosts 186 migrants from 22 countries, with the most prevalent origin country being Italy (39 migrants of Italian origin from our sample currently live in Switzerland). This descriptive evidence is consistent with the view that migration flows are mostly determined by income differences. Selection is economically motivated selective migration. This argument mitigates concerns regarding the selection of environmental preferences provided that lower income countries are not necessarily the more polluted ones. However, as it is difficult to disentangle the various incentives that may trigger selection, we further address this concern in Online Appendix, where we explicitly account for Eastern-Western and low-high income country migration flows.

Second, regarding concerns that selection driven by the environment constitutes a first order effect, there is no such evidence of such an effect in the empirical literature. Beine and Parsons [4] report that there is no direct effect of long-run climatic factors on international migration. Third, Table 3, which presents summary statistics for the sample of natives, does not support the presence of a selected sample of immigrants. The summary statistics are quite similar for both natives and immigrants. Finally, we examine the impact of culture on the environmental preferences of second-generation migrants. Following Fernández and Fogli [22], this focus on second-generation migrants serves to minimize selective migration effects, as second-generation migrant migration statuses are determined by their parents' migration decisions and are thus exogenous with respect to their environmental values.¹²

There is a second issue pertaining to omitted variable bias in so far as other factors than culture (e.g., low unobserved skills) determine both a migrant's migration status (e.g., unemployment, low income levels or segregation in the country of origin) and marginal willingness to pay for the environment. Table 2 reports demographic characteristics of the

¹²Note that our focus on second-generation migrants also allows us to attenuate other endogeneity issues (e.g., omitted individual characteristics) correlated with migration decisions or exposure to non-cultural features of the country of origin, which may also affect migrant preferences. See below for a discussion.

sample of migrants and confirms that unobserved individual characteristics may be a concern, as over 30 percent of the migrants in the sample only have a primary education, and over 50 percent are females, potentially rendering the sample particularly subject to segregation issues. Following Fernández and Fogli [22], we assume that the extensive set of individual, family, parental and spousal characteristics available in the data fully captures the effect of such unobserved factors. We also carry out an extensive set of robustness checks to control for any omitted factors that may confound our baseline estimates.

There is third issue of simultaneity, potentially due to economic conditions in the country of origin, which may determine both the regressors and the dependent variable. We account for this by adding controls for economic performance in the country of origin (per capita GDP). A final concern pertains to issues of reverse causality, which may be triggered by feedback effects between migrant and native preferences. This is also not a concern for our sample given the absence of massive flows of return migration included in the data. However, we account for this by removing all return migrants from the sample (i.e., an individual born abroad but who is a resident in of his/her father's country of birth).

Finally, it can be argued that our main regressor in equation (5) features contemporaneous environmentalism in the country of origin, while a migrant's environmental values are better reflected by values for the country of origin at the time he/she (or his/her parents) left the country. As stressed by Fernández [21] and Fernández and Fogli [22], contemporaneous values still serve as a good proxy, as social values present a very persistent cultural component (see Tabellini [40], Steg and de Groot [38]). Even in cases of measurement error in the explanatory variable, the OLS estimator would be biased downwards, i.e., our estimates would actually estimate a lower bound of the true effect of culture.¹³

¹³Fernández [21] also makes an argument in favor of a contemporaneous explanatory variable: values transmitted to migrants' offspring can be best reflected by the values of their non-migrant contemporaneous counterparts. Data limitations, in any case, mandate the use of a contemporaneous indicator of environmental spending, as migration identifiers are only available for the 2008 EVS wave. We further explore the robustness of this assumption in Online Appendix by conducting a cohort-based analysis and by exploring inertia in cultural values.

4.2 Empirical results

Table 4 reports estimates on the impact of culture on immigrants' MWP for the environment. The analysis is undertaken for the full sample of migrants (Columns [1]-[3]), for the sample of first-generation migrants (Column [4]), and for the sample of second-generation migrants (Columns [5]). In column [1], we only include the host country dummies. In column [2], we add controls for income in the country of origin (measured by the log of purchasing power parity adjusted GDP in 2000) as well as relevant demographic, socioeconomic and household characteristics (i.e., age, age squared, gender, education, employment status, individual income, marital status, number of children). In column [3], we enrich the set of individual controls by adding dummy variables for parental and spousal characteristics (i.e., education, employment status, occupation). The coefficient of the mean MWP for the country of origin is positive and statistically significant, suggesting that a migrant's native culture has a positive impact on a migrant's attitudes. In particular, the estimates suggest that one unit increase in the mean level of the marginal willingness to pay for the environment in the country of origin is associated with a 0.21 increase in the MWP index of the migrant.

[Table 4 here]

In columns [5] and [6], we report separate estimates for the first- and second-generation immigrants, respectively, with the full set of controls. The coefficients of mean environmental attitudes for the country of origin remain positive and highly significant for both immigrant categories. In particular, the positive and significant coefficient found for the second-generation immigrants confirms that a cultural transmission mechanism is at work and that the results are not driven by selective migration.

As our main variables of interest are ordered indicators obtained from survey responses, it is of use to develop insight into the size of the estimated impact of culture on individual preferences. Overall, the results shown in Table 4 indicate that one standard deviation increase in the mean MWP for the environment in the country of origin is associated with a 0.04-0.08 unit increase in immigrants' MWP for the environment i.e., 5%-10% of one standard

deviation of immigrants' MWP (compared to Table 2). These figures are non-negligible, as they are obtained *ceteris paribus* i.e., with all other individual and host and origin country characteristics being the same. We performed the test recommended by Frank et al. [23] to assess the strength of the inference based on results from the baseline specification shown in column [3]. Given our sample size (and the number of parameters estimated), the results of this test indicate that to invalidate our inference regarding the effect of Mean WTP in the country of origin on migrants' MWP, one would need to replace 51% of the sample used in our study and to assume a limiting condition of zero mean MWP effect in the replacement cases.¹⁴

Regarding the controls, individuals with a secondary or tertiary education have stronger environmental attitudes than individuals who have only completed primary education, and unemployment experiences adversely affect one's willingness to pay. Of the individual controls examined, age, gender and income characteristics do not have a significant impact on individual MWP. The log of purchasing power parity adjusted GDP in the country of origin, which is meant to capture economic differences across countries, is not statistically significant.

A potential concern regarding baseline estimates shown in Table 4 is related to environmental conditions in the country of origin, which may determine both the regressors and dependent variable. We account for this by adding controls for environmental conditions in the country of origin. In Table 5, we add a wide range of alternative environmental quality measures to our baseline specification. As a measure of environmental quality, Column [1] employs a measure of organic water pollutant emissions. Column [2] introduces a measure of agricultural methane emissions. Column [3] controls for CO₂ emissions. Column [4] uses a measure of particulate matter concentrations. Column [5] uses an environmental performance index (EPI). Reassuringly, the results remain unaffected by the use of other environmental measures, whereas the coefficients retain their magnitude and significance. Column [6] uses

¹⁴Given the size of the sample used (and the number of parameters estimated) and our standard error of 0.054, the threshold for statistical significance based on Frank [23] is $0.054 * (-1.96) = (-0.105)$. Given that the estimated effect of mean WTP in the country of origin is 0.216, to invalidate the inference, bias levels must be greater than $0.216 - 0.105 = 0.11$, which is indeed 51% of the estimated coefficient.

an indicator of Nitrous Oxide Emissions.¹⁵ Including these environmental quality measures in the set of controls does not affect our results.

[Table 5 here]

In the following sections, we subject our baseline analysis to a number of sensitivity exercises. First, we check that our results are not driven by omitted individual attitudes (such as trust, altruism, or political views) or by political and institutional characteristics of the country of origin. Second, we check whether our results are robust against alternative measures of individual environmentalism and against the adoption of alternative specifications. We finally present some heterogeneity exercises that allow us to acquire insight into some relevant features of the cultural transmission process.

4.2.1 The role of individual preferences and characteristics of the country of origin

The MWP for the environment can be affected by a multitude of factors (e.g., trust levels, political orientations, or altruism). As these factors may also display a cultural component, not accounting for them may generate false evidence of the cultural transmission of environmental values. In Table 6, we address this concern and add a number of controls for additional individual attitudes to the baseline specification. In panel a, we report results for first-generation migrants, while in panel b, we report results for second-generation migrants.

In Column [1], we add a dummy equal to 1 if an individual has never provided any unpaid work and equal to 0 otherwise (column [1]). The estimated impact of culture remains largely unaffected. Additionally, the results point to a strong effect of altruism on immigrants'

¹⁵This environmental indicator serves as a good proxy for environmental quality in the country of origin for a number of reasons. Nitrous oxide gas emissions have considerable environmental impacts (with a Global Warming Power level 300 times higher than that of CO₂ ; see EPA [19] for details) and reflect primarily local (as opposed to trans-boundary) pollution trends, and over 40% of these emissions are triggered by human behaviors. Additionally, gas emission levels can be regarded as a "stock" pollution variable (nitrous oxide remains in the atmosphere for over 100 years), thus they serve a good proxy of pollution levels that the migrants faced when they left their countries of origin.

MWP for the environment: a lack of unpaid work performed for any organization has a significantly negative impact on the MWP of first-generation migrants (see Dietz et al. [17]).

It may be argued that a low marginal willingness to pay for the environment is not only attributable to little environmental concern, but to a lack of confidence that the money given will actually be used to protect the environment. In Column [2], we check whether our results are driven by generalized distrust. The results show that distrust has a strong negative impact on the MWP of both first- and second-generation immigrants. However, the impact of culture on immigrants' MWP remains statistically significant at conventional levels.

In Column [3], we investigate the role of political views and add a dummy for left-wing orientation. Once again, in this case, the estimated impact of culture on immigrants' MWP is unaffected. Left-wing political orientation is not significantly correlated with the MWP of first-generation migrants, while it displays a positive association (significant at the 1% level) with the MWP of second-generation migrants.

Finally, in Column [4], we introduce the full set of attitudes examined. While the significance of the impact of the MWP in the country of origin reduces somewhat, it still confirms the presence of a cultural effect. The results also confirm that a lack of altruism and trust reduces immigrants' MWP for the environment.

[Table 6 here]

Another source of potential concern in our estimates pertains to omitted institutional characteristics that may affect processes of social and human capital accumulation in the country of origin, thus serving as an unobserved component of immigrants' skills. To address this concern, in Table 7, we check the robustness of our results to the addition of country of origin indicators on political orientations (the share of natives that declare themselves extremely left-wing or extremely right-wing, column [1]), education system quality levels (pupil-to-teacher ratios and government expenditures on education, column [2]), (political) and institution quality levels (the age of democratic institutions and parties, columns [4] and [5], respectively) as well as country specific indicators of trust and environmentalism in

the country of origin (average degrees of trust towards environmental organizations and the percentage of volunteers for environmental causes, column [5]). The results from this additional set of estimates suggest that the additional explanatory variables are not significantly correlated with the MWP of migrants and that their inclusion does not affect the estimated cultural effects and the R-squared value (with the latter measuring the overall explanatory power of the model). This approach mitigates concerns regarding unobservables (see, e.g., Oster [30]).

[Table 7 here]

4.2.2 Other measures of environmentalism and alternative specifications

It can be argued that environmentalist values determine various attitudes and beliefs that cannot be described by an indicator on one's marginal willingness to pay for the environment (Dietz et al [17]). We tackle this issue by investigating two dimensions of environmentalism that may be viewed as complementary to an individual's willingness to pay for the environment. The first dimension captures beliefs that one may express with respect to human behaviors and the environment but that do not necessarily lead to individual action (e.g., I believe humans should respect the environment). The second dimension concerns active behaviors that support environmental protection other than those that involve donating money (e.g., volunteering for environmental causes).

In Table 8, we report the results obtained when we consider the transmission of these alternative measures of beliefs rather than one's marginal willingness to pay for the environment.¹⁶ In Panel (1), we measure these beliefs as the score of the first component in a principal component analysis performed on individual beliefs in four sub-dimensions. Rows (1a)-(1d) explore the aggregate indicator in each of the four sub-dimensions. Panel (2)

¹⁶In practice, we replaced the marginal willingness to pay with each alternative measure of environmentalism, as a dependent variable (at the migrant level) and as a main regressor (as a mean in the country of origin) in equation (5). Kountouris and Remoundou [26] have presented a similar exercise using several measures of environmentalism, without however accounting for unobservables at the origin country, transmission of environmental attitudes or type and quality of transmission.

reports results obtained when we consider the component that involves actively volunteering for environmental causes. This is a dummy equal to 1 if the respondent either belongs to an environmental organization or performs unpaid work for an environmental cause. Rows (2a) and (2b) examine the cultural transmission of the two specific aspects of environmental volunteering.

The results suggest that coefficients of the mean indicators on beliefs and on volunteering for environmental causes have a positive sign and are statistically significant. This suggests that the native culture has a positive impact on migrant environmentalism in both dimensions. Regarding beliefs, estimates shown in rows (1a)-(1d) suggest that all beliefs that enter the aggregate indicator are equally important (with the partial exception of the importance of human ingenuity). As for the environmental volunteering variable, estimates shown in rows (2a) and (2b) indicate that cultural transmission is relatively more important in determining whether an individual will belong to an environmental organization.

Table 9 establishes the robustness of our results for first- and second-generation migrants regarding the use of alternative specifications. For expositional purposes, we only report our results for the coefficient of interest. The ordered variable used in our baseline specification mixes the extensive margin for one's willingness to pay for the environment (agreement vs. disagreement) with the intensive margin (strong vs. weak agreement or disagreement). It may be argued that the extensive margin is the most relevant from a cultural perspective, as it better measures social adherence to an environmental norm. Thus, in Rows [1] and [2], we isolate the extensive margin by recoding the ordered MWP variable into a binary variable that takes a value of 1 if individuals "agree" with allocating part of their income to an environmental cause and a value of 0 otherwise. A similar approach is adopted to construct the mean MWP of the country of origin. Using the binary variables, we replicate the baseline analysis. The results suggest that a 1 p.p. increase in the average number of individuals who are willing to pay for the environment in the country of origin is associated with an approximately 0.2 p.p. increase in the probability that an individual migrant would

be willing to pay for the environment in the host country.¹⁷ For the baseline specification, the significance of the coefficients is somewhat reduced, suggesting that some part of the cultural transmission process is associated with the intensive margin and is thus not identified by the probability models.

Our baseline specification includes an extensive set of parental and spousal characteristics to control for the confounding role of any unobserved individual factors. Rows [3] and [4] provide insight into the direction of the bias imposed by these confounding factors by excluding baseline specification parental and spouse characteristics, respectively. The results for the first-generation migrants remain unaffected, suggesting that unobserved individual characteristics do not serve as a significant source of bias in our baseline estimates. Conversely, the coefficient of the average MWP in the country of origin becomes insignificant after spouse controls are excluded from the regressions on second-generation migrants. This suggests the presence of unobserved features of second-generation migrants described by spousal characteristics (e.g., limited capacities or social segregation), which are also negatively correlated with migrants' marginal willingness to pay for the environment.

While our baseline specification includes host country dummies to control for local environmental and economic conditions, other relevant geographical dimensions may be associated with the host country at the regional or city levels. Thus, in Row [5], we replace the host country dummies with fixed effects for the NUTS1 region of residence, while in Row [6], we add dummies for the size of the city of residence. Our results remain robust, confirming persistent effects of origin cultures on environmental attitudes.

[Table 8 and 9 here]

4.3 Heterogeneous features of cultural transmission

The reduced form nature of our empirical specification makes it difficult to obtain any direct inference regarding features of the cultural transmission process. In this section, we attempt

¹⁷Note that estimated coefficients of the Probit model (Row [2]) do not measure marginal effects and are thus not directly comparable with those from the linear probability model (Row [1]).

to gain insight into this issue by studying whether the effect of culture on environmental preferences varies depending on a number of factors i.e., the degree of migrant cultural integration, the type and quality of cultural transmission processes, and the role played by parents in the transmission of culture.¹⁸

4.3.1 Cultural transmission and integration of migrants in the host country

We begin by exploring whether our findings on the transmission of cultural values are heterogeneously driven by differences in immigrant integration processes in host countries. While this analysis does not involve directly examining individual integration patterns in the host country, useful data in the EVS can be used to reconstruct this information. The first set of data pertains to host country citizenship measures. Due to the prevalent application of the “Ius Sanguinis” principle in European countries, an immigrant must fulfill very strict terms to acquire host country citizenship, e.g., by marriage or naturalization. Furthermore, acquiring host country citizenship comes with a high opportunity cost, e.g., in terms of time and resources devoted to complying with all bureaucratic procedures, but with relatively limited benefits for immigrants.¹⁹ This suggests that immigrants who acquire citizenship in the host country have some intrinsic motivations to do so that stem from a cultural integration process. A related dimension of immigrant integration pertains to the number of years a migrant has spent in a host country. Immigrants who have spent a longer time in their countries of residence are likely to consider themselves more assimilated into the host country’s national culture.

A second important factor pertains to an immigrant’s own judgments regarding possibilities of becoming integrated in the host country’s culture. The EVS includes a number of

¹⁸Note that we carry out these heterogeneity exercises for the entire pool of migrants examined. In fact, distinguishing between first- and second-generation would entail a too significant a reduction in the number of observations available in each cell.

¹⁹This argument applies to intra-EU immigrants, who compose the majority of our sample. EU citizenship is granted to all citizens of a EU member state, regardless of their countries of residence. This provision does not apply to EU immigrants coming from the 13 countries examined in our sample, which are not involved in the process of European integration i.e., Albania, Armenia, Azerbaijan, Bosnia-Herzegovina, Belarus, Georgia, Iceland, Kosovo, Moldova, Macedonia, Russia, Serbia, and Turkey. Immigrants from these countries still enjoy considerable benefits (e.g., in terms of free mobility) from acquiring citizenship in an EU country.

questions that focus on this issue. Immigrants are asked whether they consider "speaking a host country's language", "living in a host country for a long period", and "respecting a host country's laws" important ways to participate in a country's national culture. An affirmative answer to each of these questions implies a positive judgment of the possibility that immigrants who comply with linguistic, temporal, or civic dimensions may become integrated within a host country's culture. We argue that such subjective statements serve as good predictors of immigrant integration efforts and of the effectiveness of their cultural integration experiences. The EVS also includes a question concerning whether "having a country's ancestry" represents an important way to participate a country's national culture. An affirmative answer to this question from immigrants implies a negative judgment of the possibility to become culturally integrated in a host country: if ancestry is the only relevant dimension used to enter a country's national culture, cultural integration may never occur regardless of any effort to comply with linguistic, legal, or civic norms of the host country.

We explore whether MWP effects in the country of origin on individual MWP differ among immigrants, who are heterogeneous in terms of each of the six dimensions of cultural integration specified above, i.e., (i) having host country citizenship, (ii) having spent more (less) than 20 years in one's country of residence, (iii) ascribing importance to speaking the host country's language, (iv) attaching importance to having lived in the host country for a long time, (v) attaching importance to respecting the host country's laws and (vi) attaching importance to having host country ancestry. To construct the heterogeneous effects of MWP in the country of origin, for each dimension (i)-(vi) we construct two "yes" and "no" dummy variables, which we interact with the MWP variable in the country of origin. We thus obtain two (heterogeneous) effects: the first is the average MWP effect in the country of origin for those migrants who do hold the host country citizenship, who have lived in the host country for more than 20 years or who consider the specified dimension (ii)-(v) important to sharing the host country's culture, and the second measures the average effect for those who do not hold citizenship, who have lived in the host country for less than 20 years or who consider the specified dimension (iii)-(v) unimportant to entering the host country's culture.

We report results of this set of regressions in Table 10. Rows [i]-[vi] correspond to single regressions, where direct homogeneous MWP effects in the country of origin are replaced by two heterogeneous effects in each of the dimensions described above. For each regression, we also report the p-value for a test on whether the two coefficients in each regression are equal. Estimates shown in Rows [i] and [ii] suggest that the effect of culture on environmental preferences is more pronounced for citizens and migrants who have spent more than 20 years in a host country. Additionally, the size and statistical significance of coefficients estimated in Rows [iii]-[v] suggests that migrants who attach importance to speaking the host country's language, to having lived in the host country for a long time, or to respecting the host country's laws are the most affected by their origin cultures (even though p-values do not reject the hypothesis that the two coefficients are equal in these cases).

All of these results indicate some degree of complementarity between environmental culture and cultural integration in host countries: the environmental culture of origin is more important for migrants who are more assimilated into the destination country. In cross-cultural psychology, this attitude is well known and is documented as the outcome of a migrant pursuing an "integration strategy," i.e., considering maintaining one's own cultural identity while establishing relationships with the larger society of the destination country simultaneously important (Berry [7]). Our results indeed suggest that immigrants may follow an integration strategy in regards to environmentalism: migrants who have spent a longer time in the host country, who are more respectful and ready to appropriate some aspects the host country and who are also more willing to transmit the most relevant traits of their own environmental culture. Other research papers come to a somewhat opposite conclusion with respect to attitudes towards labor force participation, income redistribution and work (see e.g., Fernández [21], Luttmer and Singhal [27], Moriconi and Peri [29]). For these values, migrants tend to follow an "assimilation strategy," i.e., they consider it to be worthwhile to give up their own cultural identity in order to establish a closer relationship with the culture of the destination country. As noted by Berry [7], choices made between cultural integration or assimilation strategies depend on characteristics of the cultural trait involved. Integration

strategies are more likely to be acceptable in private spheres or domains (e.g., environmental values) than in public spheres (e.g., the workplace or female decisions to work), where cultural traits may conflict with the set economic incentives prevailing in the destination country. Finally, note that estimates shown in Row [vi] suggest that migrants who attach importance to ancestry are similarly affected by their origin cultures as immigrants who do not attach importance to it. This result provides indirect support for our complementarity hypothesis: as ancestry is clearly beyond an immigrant's control, it is not relevant to an evaluation of their cultural integration efforts

[Table Appendix B.2 here]

4.3.2 Cultural transmission type and quality

We now turn to an analysis of whether our baseline results present any degree of heterogeneity with respect to features of the cultural transmission process. First, in the theoretical model, we stress that cultural transmission may occur through family socialization (direct transmission) or through peer socialization within a given migrant group (indirect transmission). While distinguishing the two channels clearly falls beyond the scope of the present paper, the EVS provides information that we can use to further explore whether these two channels are both at work in our estimates. Second, immigrants may be subject to adverse family situations (e.g., parents' divorce or death), potentially reducing the quality of the cultural transmission process. The EVS also includes a number of questions that we can use to investigate whether MWP effects in the country of origin on individual MWP levels differ among immigrants, who are heterogeneous in terms of the quality of cultural transmission experiences they have had. As in the previous case, to construct heterogeneous effects of MWP in the country of origin, for each relevant dimension, we construct two "yes" and "no" dummy variables that we use to interact with the MWP value of the country of origin. We then replace the homogeneous MWP effect in the country of origin with corresponding heterogeneous effects in each of the relevant dimensions.

We report the results for this new set of regressions in Table 11, Rows [1]-[7]. As in the previous set of estimates, in each row we report estimates of the two heterogeneous effects as well as the p-value drawn from the test on whether the two coefficients in each regression are equal. As for the type of cultural transmission involved, our results confirm that both the direct and indirect channel are in operation: the effect of culture on environmental preferences is more pronounced for individuals who consider friends important (Row [1]) and for individuals who consider family values important (Row [2]). As for the quality of cultural transmission, our estimates suggest that family relations play an key role: the effect of culture on environmental preferences is more pronounced for individuals whose fathers enjoy following the news (Row [4]) and for individuals whose parents have not divorced (Row [6]), and in the latter case, heterogeneous effects are significant at the 5 percentage level. These findings suggest that families characterized by both external commitment (i.e., towards society as a whole) and internal commitment (i.e., towards other family members) are more successful at transmitting culture. Finally, the effect of culture on environmental preferences is also more pronounced for individuals whose fathers have died (Row [7]), with heterogeneous effects being significant at the 5 percentage level. This may indicate that offspring value their parents' teachings more after their parents' death. It may also denote increasing returns from time spent with one's father: individuals who have lost their fathers are also those who have spent more time with their fathers, as their fathers likely died when they were of an older age. No significant heterogeneity patterns were found in other quality dimensions of the cultural transmission process i.e., one's father's interest in reading books (Row [3]) and the occurrence of political discussions with one's father (Row [4]).²⁰

Table 11 here

²⁰Note that in this section, we evaluate the quality of cultural transmission using a baseline definition of culture premised on the country of origin of the father. Below, we also check the robustness of our results against alternative definitions of culture based on the country of origin of the mother.

4.3.3 The role of parents in cultural transmission

In this section, we examine the role of parental transmission and determine the robustness of our results to alternative specifications where culture is based on different definitions of migrant countries of origin.

In Table 12, Panel [A], we present the results of the baseline specification for comparative purposes, i.e., where the definition of culture is based on the country of origin of the father (in comparison with Table 4, Column [4]). In Row [A.1], we retain a definition of culture based on the country of origin of the father but allow for heterogeneous effects of the father's culture depending on whether the mother was born in the host country or not. There appears to be no heterogeneous effect for this dimension. The same result is found in Column [A.2], where we allow for heterogeneous effects of the father's culture depending on whether the mother was born in the country of origin (of the father) or not. The results show that the transmission mechanism of the paternal culture is rather strong and independent of the effect of maternal culture.

Table 12 here

This does not imply however that maternal culture does not affect cultural transmission. To explicitly explore this hypothesis, in Table 12, Panel B we test the robustness of our results when we use a specification where culture is defined by the country of origin of the mother. Reassuringly, the results suggest that even in such a specification, our main findings are confirmed. However, interestingly, the point estimate shown in panel B (0.130) is lower than the point estimate shown in panel A (0.210), confirming that paternal culture effects are stronger than maternal culture effects. This result is further reinforced in row [1.B], where we explore the presence of a heterogeneous effect based on the fact that the father comes from the country of origin (of the mother). The results suggest that the effect of culture on environmental preferences is more pronounced for individuals whose father had come from the country of origin (of the mother).

5 Conclusions

Fertility rates, female labor participation levels, and preferences for redistribution serve as cultural attributes that frame individual economic behaviors and ultimately economic policies. As forms of culture, these traits are transmitted across generations from parents to children. Are environmental values considered among these cultural "traits"? This is the main question we attempted to answer in this study.

We first presented a model on the transmission of environmental preferences following Bisin and Verdier [9]. We defined environmental culture as the set of values that has an impact on individual dis-utility from pollution, which ultimately determines one's marginal willingness to pay to reduce pollution levels. Agents live in two heterogeneous social groups where population mixing has occurred as a result of migration. We found that under certain assumptions that environmental culture is successfully transmitted across generations.

We then empirically tested our theoretical results using survey data on environmental preferences for 45 European countries. We found that the average environmental culture in an immigrant's country of origin has a large and significant effect on his/her own environmental preferences. More importantly, this result persists for second-generation migrants, thereby confirming that attitudes are partly driven by a cultural component. The analysis is then extended to account for the heterogeneous effects. A first interesting finding pertains to the fact that as far as environmental attitudes are concerned, immigrants in our sample seem to adopt "integration strategies," i.e., they identify with the host and home country. Regarding types of cultural transmission, both networks and family ties play a role in cultural transmission. However, in the context of family transmission, paternal influences are stronger than maternal influences. Our empirical findings are robust to a number of alternative assumptions and specifications.

Determining whether environmental values constitute a form of culture improves our knowledge of the status quo of environmental policies and of international economic agreements. As a matter of fact, barriers to a consensus on greenhouse gas emission targets for the 2013-2020 period may partly reflect the fact that country members of the United

Nations Framework Convention on Climate Change present highly heterogeneous views on issues of environmental protection. Similarly, in the context of national policies, our findings highlight the fact that the occurrence of environmental degradation is not sufficient enough to trigger a shift in environmental culture. Governments should not only adopt policies aimed at improving environmental quality levels but also adopt policies targeted at changing individual attitudes towards the environment. According to our findings, these values have a more direct effect and persist for longer periods. An interesting future research topic is to built upon the theoretical literature on endogenous environmental culture and to investigate empirically how environmental values evolve due to long term policies and due to the level of pollution and how these cultural changes are transmitted from one generation to another.

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TABLE 1: Migration flows

Country	(1) (2) (3)			(4) (5) (6)			(7) (8)		
	Distinct Host Countries	Number of Immigrants from Origin Country	Most Prevalent Host Country	Number of Migrants to Prevalent Host Country	Distinct Origin Countries	Number of Immigrants in Host Country	Most Prevalent Origin Country	Number Immigrants from Most Prev. Country	
Albania	5	32	Greece	26	1	2	Kosovo	2	
Armenia	7	35	Azerbaijan	28	9	110	Azerbaijan	41	
Austria	6	17	Switzerland	11	14	81	Germany	21	
Azerbaijan	6	50	Armenia	41	4	33	Armenia	28	
Belgium	5	74	Luxembourg	63	20	95	Italy	24	
Bulgaria	9	21	Turkey	9	6	20	Greece	7	
Bosnia-Herzegovina	12	153	Croatia	54	3	16	Serbia	11	
Belarus	7	98	Latvia	46	6	136	Russia	88	
Switzerland	3	3	Luxembourg	1	22	186	Italy	39	
Czechoslovakia	4	6	Hungary	2					
Cyprus	2	2	Greece	1	6	66	Turkey	59	
Czech Republic	11	33	Slovakia	13	9	55	Slovakia	43	
Germany	15	169	Luxembourg	47	21	72	Poland	14	
Denmark	5	20	Norway	6	13	30	Germany	12	
Spain	8	41	France	16	10	281	Romania	12	
Estonia	3	9	Sweden	4	8	23	Russia	2	
Finland	5	33	Sweden	22	4	5	Russia	2	
France	10	93	Luxembourg	59	12	69	Italy	16	
Great Britain	14	54	Great Britain	9	3	15	Ireland	8	
Georgia	10	30	Armenia	17	2	6	Russia	5	

Notes: Migration flows between 42 European countries (plus Czechoslovakia, USSR and Yugoslavia). Data drawn from the European Value Study (EVS), 2008.

Country	(1) (2) (3) (4) (5) (6) (7) (8)							
	Immigration Flows from Country			Immigration Flows to Country				
	Distinct Host Countries	Number of Immigrants from Origin Country	Most Prevalent Host Country	Number of Migrants to Host Country	Distinct Birth Countries	Number of Immigrants in Host Country	Most Prevalent Origin Country	Number Immigrants from Most Prev. Country
Greece	10	29	Macedonia	9	13	92	Turkey	46
Croatia	13	67	Russia	19	5	71	Bosnia	54
Hungary	12	46	Slovakia	18	8	22	Russia	8
Ireland	3	7	Great Britain	4	3	12	Great Britain	8
Iceland	3	4	Norway	2	9	17	Germany	4
Italy	13	160	Luxembourg	55	1	1	Great Britain	1
Kosovo	6	16	Macedonia					
Latvia	3	13	Estonia	9	10	192	Russia	92
Lithuania	7	24	Latvia	14	5	40	Russia	18
Luxembourg					26	417	Portugal	122
Moldova	6	15	Russia	9	5	55	Ukraine	29
Macedonia	12	29	Ukraine	11	5	18	Greece	9
Netherlands	7	35	Belgium	14	12	27	Germany	10
Norway	4	6	Sweden	3	17	44	Denmark	6
Poland	24	83	Germany	14	4	14	Russia	5
Portugal	7	155	Luxembourg	122				
Romania	14	50	Spain	12	7	67	Moldova	2
Russia	22	600	Estonia	205	5	35	Ukraine	21
Serbia	18	101	Montenegro	30	7	73	Montenegro	31
Slovakia	5	54	Czech Republic	43	7	39	Hungary	18
Slovenia	5	13	Croatia	6	14	66	Bosnia-Herz.	22
Sweden	7	15	Norway	6	22	72	Finland	22
Turkey	16	195	Cyprus	59	3	13	Bulgaria	9
Ukraine	20	165	Belarus	39	9	150	Russia	120

Notes: Migration flows between 42 European countries (plus Czechoslovakia, USSR and Yugoslavia). Data drawn from the European Value Study (EVS), 2008.

TABLE 2: Sample summary statistics

	(1)	(2)	(3)	(4)	(5)
Variable	Number of Obs	Mean	Standard Deviation	Min	Max
Willingness to Pay for the Environment	2855	2.751	0.881	1	4
Mean Will. to Pay for the Environment (Host)	2855	2.676	0.289	2.115	3.377
Age	2855	47.556	16.611	18	95
Secondary Educational Level	2855	0.492	0.500	0	1
Primary Educational Level	2855	0.339	0.474	0	1
Monthly Income Household	2855	6.868	1.015	3.203	9.211
Female	2855	0.566	0.496	0	1

Summary: The table presents the summary statistics of our 2008 EVS sample. We use a sample of 2885 first and second generation migrants who come from 47 countries of origin and have moved to 47 host countries.

TABLE 3: Sample summary statistics

	(1)	(2)	(3)	(4)	(5)
Variable	Number of Obs	Mean	Standard Deviation	Min	Max
Willingness to Pay for the Environment	129028	2.274	0.889	1	4
Age	129028	45.132	45.132	15	108
Secondary Educational Level	129028	0.328	0.469	0	1
Primary Educational Level	129028	0.320	0.466	0	1
Monthly Income Household	129028	6.729	1.037	2.323	9.597
Female	129028	0.535	0.498	0	1

Summary: The table presents the summary statistics of our 2008 EVS sample. We use a sample of 2885 first and second generation migrants who come from 47 countries of origin and have moved to 47 host countries.

TABLE 4: Predictors of marginal willingness to pay for the environment

	(1)	(2)	(3)	(4)	(5)
	All Immigrants			First Generation	Second Generation
Mean WTP (Origin Country)	0.148** (0.060)	0.210*** (0.054)	0.216*** (0.054)	0.271*** (0.087)	0.176** (0.083)
Log GDP per Capita (Origin Country)		0.002 (0.018)	0.005 (0.019)	0.031 (0.031)	-0.033 (0.032)
Age		0.004 (0.005)	0.002 (0.006)	-0.006 (0.010)	0.013* (0.006)
Age Square		-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Female		0.002 (0.031)	-0.004 (0.036)	-0.004 (0.048)	0.019 (0.051)
Secondary Education		-0.135*** (0.043)	-0.091* (0.050)	-0.117* (0.069)	-0.034 (0.064)
Primary Education		-0.240*** (0.048)	-0.186*** (0.068)	-0.205* (0.103)	-0.147* (0.081)
Log Individual Income		0.039 (0.030)	0.021 (0.035)	-0.021 (0.038)	0.052 (0.046)
Unemployed		-0.154** (0.076)	-0.173** (0.077)	-0.250** (0.103)	-0.080 (0.093)
Host Country FE	Yes	Yes	Yes	Yes	Yes
Other individual controls	No	Yes	Yes	Yes	Yes
Parental and Spouse Controls	No	No	Yes	Yes	Yes
R-Squared	0.089	0.114	0.123	0.124	0.183
Observations	2855	2855	2855	1674	1181

Notes: In all specifications the dependent variable is the Marginal Willingness to Pay for the Environment (MWP) of the individual migrant. In all specifications, other individual controls include employment status, occupation, marital status, a dummy equal to 1 for children in the family. Parental/Spouse controls include parental/spouse education, employment status, and occupation. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

TABLE 5: Alternative measures of environmental quality - All immigrants

	(1)	(2)	(3)	(4)	(5)	(6)
	Marginal Willingness to Pay for the Environment (MWP)					
	All Immigrants					
Mean WTP (Origin Country)	0.191*** (0.069)	0.203*** (0.051)	0.203*** (0.057)	0.224*** (0.056)	0.246*** (0.058)	0.209*** (0.052)
Organic Water Pollutant Emissions (Or. C)	-0.000 (0.001)					
Agricultural Methane Emissions (Or. C)		0.001 (0.000)				
CO2 Emissions (Origin Country)			-0.000 (0.000)			
Particulate Matter Concentrations (PM10)				-0.000 (0.001)		
Environmental Performance Index (EPI)					0.002 (0.002)	
Nitrus Oxide Emissions						-0.011 (0.009)
Host Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Full Set of Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.123	0.123	0.126	0.126	0.128	0.123
Observations	2402	2855	2748	2748	2712	2855

Notes: Column 1 employs as environmental measure organic water pollutant emissions. Column (2) a measure of agricultural methane emissions. Column (2) CO2 emissions. Column (4) uses the measure PM10 and Column (5) uses an environmental performance index. All environmental measures are measured at the origin country. All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

TABLE 6: The role of individual preferences

	(1)	(2)	(3)	(4)
(a) First Generation Immigrants				
Mean WTP (Origin Country)	0.230*** (0.083)	0.263*** (0.084)	0.276*** (0.084)	0.181* (0.103)
No Unpaid Work (Any Organization)	-0.141*** (0.045)			-0.107* (0.058)
Distrust Other People		-0.129** (0.062)		-0.109** (0.045)
Left Wing Political Orientation			0.085 (0.054)	0.017 (0.055)
R-squared	0.131	0.125	0.123	0.161
Observations	1596	1633	1694	1454
(b) Second Generation Immigrants				
Mean WTP (Origin Country)	0.187* (0.095)	0.186* (0.098)	0.161* (0.087)	0.22* (0.11)
No Unpaid Work (Any Organization)	-0.108 (0.066)			-0.09 (0.07)
Distrust Other People		-0.116* (0.060)		-0.09* (0.05)
Left Wing Political Orientation			0.186*** (0.046)	0.17*** (0.05)
R-squared	0.19	0.19	0.19	0.24
Observations	1116	1146	1189	1013

Notes: All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***, 1% **; 5% *; 10%

TABLE 7: Additional controls for the country of origin

	[1]	[2]	[3]	[4]	[5]
Mean WTP (Origin country)	0.19** (0.07)	0.32*** (0.10)	0.24** (0.10)	0.18*** (0.07)	0.19*** (0.06)
Origin country: % extreme left	-0.07 (0.17)				
Origin country: % extreme right	0.08 (0.52)				
Origin country: Pupils-to-Teachers ratio, primary		-0.00 (0.01)			
Origin country: Expenditure in education (% of GDP)		0.02 (0.02)			
Democracy in the origin country: ≤ 10 years			0.06 (0.04)		
Democracy in the origin country: 10 to 20 years			-0.00 (0.09)		
Democracy in the origin country: 20 to 30 years			-0.04 (0.06)		
Age of parties in the origin country: ≤ 10 years				0.02 (0.03)	
Age of parties in the origin country: 10 to 20 years				0.04 (0.06)	
Age of parties in the origin country: 20 to 30 years				-0.00 (0.06)	
Origin country: Trust for environmental organizations					0.04 (0.10)
Origin country: % volunteering for the environment					0.17 (0.24)
R sq.	0.12	0.12	0.12	0.12	0.12
N	3030	1838	3030	3030	3030

Notes: The % Volunteering for the environment in the country of origin is constructed as the share of respondents that either work unpaid for the environment or belong to environmental organizations. Regressions on the entire set of immigrants. All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

TABLE 8: Cultural transmission of other environmental values

Mean in the origin country / Individual Migrants Prefs	[1]	[1a]	[1b]	[1c]	[1d]	[2]	[2a]	[2b]
Panel 1: Environmental beliefs								
(1a) Human interference is disastrous	0.18*** (0.06)	0.22*** (0.07)						
(1b) Human ingenuity is good			0.04 (0.11)					
(1c) Humans are not meant to rule				0.18*** (0.06)				
(1d) Environmental catastrophe					0.18*** (0.05)			
Panel 2: Volunteering for environment								
(2a) Belong to environmental organization						0.17*** (0.05)	0.20*** (0.07)	
(2b) Serve unpaid work for environment								-0.00 (0.02)
R sq.	0.11	0.09	0.06	0.10	0.10	0.08	0.09	0.06
N	2416	2719	2593	2855	2874	3090	3063	3030

Notes: Columns denote mean values in the country of origin in each selected dimension, while rows denote the corresponding individual value of migrants. Individual environmental beliefs is measured as the score of the first component, in a principal component analysis performed on variables listed in (1a)-(1d). Volunteering for the environment is constructed as a dummy equal to 1 if the respondent either works unpaid for the environment or belongs to environmental organizations. All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

TABLE 9: Alternative specifications

	First Generation				Second Generation			
	MWP coef. (Origin)	(SE)	R sq.	Obs	MWP coef. (Origin)	(SE)	R sq.	Obs
(1) Linear Probability Model	0.188*	(0.101)	0.113	1674	0.228*	(0.100)	0.134	1181
(2) Probit Model	0.563*	(0.321)	0.084	1647	0.655**	(0.316)	0.111	1165
(3) Without Parental Controls	0.257***	(0.084)	0.121	1674	0.179**	(0.083)	0.179	1181
(4) Without Spouse Controls	0.282***	(0.080)	0.109	1674	0.120	(0.087)	0.181	1181
(5) Controls for City Size	0.268***	(0.090)	0.128	1631	0.196**	(0.089)	0.189	1160
(6) NUTS 1 FE (Host Country)	0.228**	(0.097)	0.159	1668	0.180*	(0.103)	0.217	1174

Notes: In Row (1) and (2) we include the same set of controls as in our preferred specification (compare Table 4 columns (4),(6),(8)). In Row (3) and (4) we exclude parental and spouse controls, respectively. In Row (5), we add controls for residence city size. In Row (6) we replace host country dummies with host NUTS1 regional dummies. Standard errors clustered at the country of origin level in parentheses. ***, 1% **,5% *,10%

TABLE 10: Heterogeneity: cultural integration of migrants

	All Migrants		
	MWP coef. (Origin)	(SE)	R sq. Obs
(i) By Citizenship			
<i>Citizen in the Host Country</i>	0.255***	(0.060)	0.125 2855
<i>Non-Citizen in the Host Country</i>	0.097	(0.071)	
p-value on test of equal coefficients	0.037		
(ii) ≤ 20 years spent in the Host country			
<i>More than 20 years in the Host country</i>	0.244***	(0.07)	0.124 2855
<i>Less than 20 years in the Host country</i>	0.05	(0.12)	
p-value on test of equal coefficients	0.18		
(iii) By Importance Attached to Speaking the Host Language			
<i>Language is Important</i>	0.205***	(0.055)	0.124 2855
<i>Language is not Important</i>	0.165	(0.149)	
p-value on test of equal coefficients	0.798		
(iv) By Importance Attached to Having Lived Long in a Country			
<i>Living Long in a Country is Important</i>	0.225***	(0.056)	0.124 2855
<i>Living Long in a Country is not Important</i>	0.150*	(0.080)	
p-value on test of equal coefficients	0.484		2
(v) By Importance Attached to Respecting a Country's Law			
<i>Respecting a Country's Law is Important</i>	0.221***	(0.055)	0.125 2855
<i>Respecting a Country's Law is not Important</i>	-0.029	(0.195)	
p-value on test of equal coefficients	0.205		
(vi) By Importance Attached to Ancestry			
<i>Ancestry is Important</i>	0.247***	(0.080)	0.124 2855
<i>Ancestry is not Important</i>	0.171**	(0.068)	
p-value on test of equal coefficients	0.798		

Notes: All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

TABLE 11: Heterogeneity: type and quality of cultural transmission

	All Migrants			
	MWP coef. (Origin)	(SE)	R sq.	Obs
(1) By Importance Attached to Friends				
<i>Friends are Important</i>	0.198***	(0.054)	0.125	2855
<i>Friends are not Important</i>	0.223	(0.189)		
p-value on test of equal coefficients		0.901		
(2) By Importance Attached to Family				
<i>Family is Important</i>	0.209***	(0.056)	0.126	2855
<i>Family is not Important</i>	0.074	(0.150)		
p-value on test of equal coefficients		0.394		
(3) By Father's Pleasure of Reading Books				
<i>Father Likes Reading Books</i>	0.224**	(0.092)	0.128	2855
<i>Father Dislikes Reading Books</i>	0.202**	(0.092)		
p-value on test of equal coefficients		0.878		
(4) By Occurrence of Political Discussions with Father				
<i>Discuss Politics with Father</i>	0.194**	(0.094)	0.125	2855
<i>Never Discuss Politics with Father</i>	0.225**	(0.092)		
p-value on test of equal coefficients		0.828		
(5) By Father's Pleasure about Following the News				
<i>Father Likes Following the News</i>	0.197***	(0.062)	0.125	2855
<i>Father Dislikes Following the News</i>	0.292	(0.282)		
p-value on test of equal coefficients		0.751		
(6) By Experience of Parent's Divorce				
<i>Experienced Divorce of Parents</i>	-0.162	(0.150)	0.125	2855
<i>Did not Experience Divorce of Parents</i>	0.266***	(0.056)		
p-value on test of equal coefficients		0.010		
(7) By Experience of Father's Death				
<i>Experienced Death of Father</i>	0.308***	(0.072)	0.125	2855
<i>Did not Experience Death of Father</i>	0.083	(0.081)		
p-value on test of equal coefficients		0.048		

Notes: All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

TABLE 12: Heterogeneity: parental birth place

	All Migrants			
	MWP coef. (Origin)	(SE)	R sq.	Obs
(A) Baseline Specification (Origin Country=Father's Birth Country)	0.210***	(0.052)	0.125	2855
(A.1) By Mother's Birth in the Host Country				
<i>Mother is Born in the Host Country</i>	0.287**	(0.110)	0.126	2855
<i>Mother is not Born in the Host Country</i>	0.186***	(0.053)		
p-value on test of equal coefficients		0.403		
(A.2) By Mother's Birth in the Origin Country				
<i>Mother is Born in the Origin Country</i>	0.156**	(0.061)	0.126	2855
<i>Mother is not Born in the Origin Country</i>	0.366*	(0.185)		
p-value on test of equal coefficients		0.310		
B. Baseline Specification (Origin Country=Mother's Birth Country)	0.130**	(0.056)	0.114	2855
1. By Father's Birth in the Origin Country				
<i>Father is Born in the Origin Country</i>	0.140**	(0.064)	0.114	2150
<i>Father is not Born in the Origin Country</i>	0.058	(0.160)		
p-value on test of equal coefficients		0.659		

Notes: All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

Appendix

In this section, we develop the model described in Section 3. Consider two countries whose populations are mixed due to migration flows. It follows that each population encompasses two different communities, migrants M and natives N . Communities, composed of families of one parent and one child, have specific environmental values. These values determine parents' preferences given by

$$u(c) - h_i(p) + (P_{ii}V_{ii} + P_{ij}V_{ij}), \quad i, j = M, N, \quad i \neq j$$

where c is consumption and p is pollution, $u(\cdot), u'(\cdot) > 0$, is the subutility from consumption and $h_i(\cdot), i = M, N, h'_i(\cdot) > 0$, captures the community-specific disutility from pollution. Production of the consumption good(s) generates emissions as a by-product. We assume that each unit of consumption good produced emits $f(c)$, units of pollution. Thus, pollution technology writes as $p = f(c), f'(c) > 0$. Each individual in the destination country has an endowment of income equal to R . The last part of the utility function, $P_{ii}V_{ii} + P_{ij}V_{ij}$, concerns the cultural transmission of the environmental culture. The incentive to transmit one's own preferences comes from imperfect altruism. Indeed, V_{ii} denotes the utility to the parent if the child shows the same culture as the parent with $V_{ii} \equiv u(c^*) - h_i(p^*)$ where c^* and p^* are given by $c^* = \operatorname{argmax}_c [u(c) - h_i(p)]$ and $p^* = f(c^*)$. Mutatis mutandis for V_{ij} . Imperfect altruism implies that $V_{ii} > V_{ij}$. P_{ii} and P_{ij} are the probabilities that a child from a family with trait i acquires trait i and trait j , respectively. Family cultivation is an investment with $I_i(e), I'_i(e) > 0, I''_i(e) > 0$, where e denotes resources devoted to within-family education.

Migration takes place from one country to the other because of income differences. A fraction $q_i, i = M, N$ of the population in country j shows a trait i which is different from the native's population trait j . A second generation migrant family receives the same trait as the parent through the socialization within the family with probability $d_i(e)$, where $d'_i(e) > 0$. If the family cultivation within the migrant family is not successful, with probability $1 - d_i(e)$, then with probability q_i the trait i is acquired by the socialization within the migrant minority,

and trait j with probability $q_j = 1 - q_i$. Then, a child of a migrant family shows the trait of his family with probability $d_i(e)$, when the trait is acquired at home, plus $(1 - d_i(e)) q_i$, when the trait is acquired within the migrant minority. Hence, $P_{ii} = d_i(e) + (1 - d_i(e)) q_i$. A second generation migrant will not show the same trait as his family with probability $P_{ij} = 1 - P_{ii}$.

The key question in this model is whether in the future periods of time, the migrant group will be assimilated within the native population (or the natives will all require the trait of migrants). More specifically, in the future periods, will the second generation of migrants show a disutility from pollution $h_i(p)$ or will they acquire the disutility from pollution of natives i.e. $h_j(p)$ (similarly, will future generation of natives, keep their original trait or will they acquire the trait of the new comers).

The migrant families (a similar problem writes for native families), with trait i (resp. trait j), maximize the following utility function

$$\begin{aligned} \max_e u(c) - h_i(p) + (P_{ii}V_{ii} + P_{ij}V_{ij}) - I_i(e) & \quad (2) \\ \text{s.t. } c + e \leq R & \\ p = f(c) & \end{aligned}$$

The first order condition now obtains as

$$\frac{h'_i(p)}{u'(c)} + d'_i(e) (1 - q_i) \frac{(V_{ii} - V_{ij})}{u'(c)f'_j(c)} = \frac{I'_i(e) + u'(c)}{u'(c)f'(c)} \quad (3)$$

The optimal choice of a migrant family equates, in the RHS of the equation, the marginal willingness to pay for the environment of the parent, $\frac{h'_i(p)}{u'(c)}$, plus the marginal benefit from an increases in the probability that the child acquires the same trait, $d'(e) (1 - q_i) \frac{(V_{ii} - V_{ij})}{u'(c)f'_j(c)}$, with the LHS of the equation, namely, the marginal cost of within family cultivation weighted by the marginal productivity of the polluting technology (since a unit of income spent in education implies a unit of income less in consumption and pollution). This first order condition gives the implicit solutions $c_i^*(R, q_i)$, $p^*(R, q_i)$ and $e^*(R, q_i)$.

A well-known result in the cultural transmission literature is that a heterogeneous population composed of individuals that successfully transmit their trait to their prole is a stable outcome if family cultivation activity and outdoor socialization are substitutes. This occurs when parents are less keen to invest in family education the larger the number of families sharing the same trait, in our case, the larger the number of migrant families. This is so because, in case family indoctrination is unsuccessful, the higher the number of migrant families, the higher the chances that the child will nonetheless acquire the migrant trait from friend socialization. It remains to be shown under which conditions, in our environmental setup, the environmental trait will be successfully transmitted. Totally differentiating (3), we find that

Proposition 1 (Bisin and Verdier (2001)) *Environmental preferences are determined by a cultural component that is inter-generationally transmitted either within families or among peers under cultural substitutability between direct and indirect transmission.*

Proof. Totally differentiating the first order condition 3 with respect to e_i and q_i , yields:

$$\frac{de_i^*}{dq_i} = - \frac{-d'_i(e) (V_{ii} - V_{ij})}{\frac{\partial^2 [u'(c) - h'_i(p)f'_j(c) + d'(e)(V_{ii} - V_{ij}) - d'_i(e)q_i(V_{ii} - V_{ij}) - I'(e)]}{\partial e_i}}$$

In an interior solution, guaranteed by standard concavity conditions, the denominator is negative for the second order condition. Then, a sufficient condition for $\frac{de_i^*}{dq_i}$ to be negative is that $d'_i(e) > 0$ and $V_{ii} - V_{ij} > 0$. The first condition is satisfied by assumption, and the second condition is satisfied due to imperfect altruism of parents. ■

On Line Appendix of “The Cultural Transmission of Environmental Values: A Comparative Approach”

(Not for publication)

Appendix A Variable Definitions and Sources

Appendix A.1 EVS Variables

Main definitions and variables of interest

Marginal Willingness to Pay for the Environment. Respondents are given the statement “I am now going to read out some statements about the environment. For each one read out, can you tell me whether you agree strongly, agree, disagree or strongly disagree? I would give part of my income if I were certain that the money would be used to prevent environmental pollution”. The variable takes values from 1-4 with 1 denoting “Strongly Disagree”, 2-“Disagree”, 3-“Agree” and 4-“Strongly Agree”.

Marginal Willingness to Pay for the Environment (Origin Country). The variable is constructed by computing the mean marginal willingness to pay at the origin country. Migrants are excluded from the sample. Moreover individual weights are taken into account. Respondents are given the statement “I am now going to read out some statements about the environment. For each one read out, can you tell me whether you agree strongly, agree, disagree or strongly disagree? I would give part of my income if I were certain that the money would be used to prevent environmental pollution”. The variable takes values from 1-4 with 1 denoting “Strongly Disagree”, 2-“Disagree”, 3-“Agree” and 4-“Strongly Agree”.

In our sample there are some migrants that declare as country of origin (or parental origin) countries that do not currently exist in the same format. In these case we have assigned to them the mean value of the marginal willingness to pay (MWP) for the environment of the political successor of the origin country. Migrants coming from Czechoslovakia are assigned the mean MWP of the Czech Republic and Slovakia. Migrants coming from Kosovo are assigned the MWP of Albania.

Migrants coming from the Soviet Union are assigned the mean MWP of Russia. Migrants stating that they come from the German Democratic Republic are assigned the mean MWP of Germany. Migrants denoting that they are of Yugoslavian origin are assigned the MWP in Serbian. Return migrants i.e. migrants born in a foreign country but resident in the country of origin of the father are excluded from the sample

First Generation Migrants. First generation migrants are identified using the question "Were you born in [COUNTRY]?". The variable is binary with 1 denoting "yes" and 0 denoting "no".

Second Generation Migrants. Second generation migrants are identified using the questions "Was your father/mother born in [COUNTRY]?". The variable is binary with 1 denoting "yes" and 0 denoting "no"

Origin Country. To identify the origin country of the first and second generation migrants the following questions are used "In which country was your father (mother) born?". The migrant is associated with his father's (mother's) country of origin.

Country of Origin: other controls

Income per Capita. GDP per capita is gross domestic product divided by midyear population. GDP (current 2000%\$) is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. The data comes from the 2000 World Development Indicators dataset.

% Extreme left The variable is constructed based on the question "Which political party would you vote for? Left/right scale". The variable is the share of respondents answering values from 1-3

% Extreme right The variable is constructed based on the question "Which political party would you vote for? Left/right scale". The variable is the share of respondents answering values from 8-10

education expenditure, % of GDP: total public expenditure (current and capital) on education expressed as a percentage of GDP in a given year. Public expenditure on education includes government spending on educational institutions (both public and private), education administration, and transfers/subsidies for private entities (students/households

and other private entities) (Source: World Bank, World Development Indicators).

Pupils to Teachers ratio, primary (secondary) school: Number of pupils enrolled in primary (secondary) school divided by the number of primary (secondary) school teachers, computed by the UNESCO Institute for Statistics (Source: World Bank, World Development Indicators).

% Democracy in the origin country These are constructed as binary variables based on the duration of political system tenure (*tensys*) in the country of origin provided that democracy guarantees executive electoral competitiveness ($eiec \leq 6$) (Source: World Bank, Database for Political Institutions)

Age of parties in the origin country These are constructed as binary variables based on the age of parties in the country of origin, *partyage* (Source: World Bank, Database for Political Institutions).

Average trust for environmental organization in the origin country The variable is an average in the country of origin of the answer to the question "Please look at this card and tell me, for each item listed, how much confidence you have in them, is it a great deal, quite a lot, not very much or none at all? Environmental Organizations". The variable takes values from 1-4 with 1 denoting "A great deal", 2-"quite a lot", 3-"not very much" and 4-"None at all".

% volunteering for the environment in the origin country The variable is the % of native respondents that belong to an environmental organization or work unpaid for the environment in the country of origin.

Nitrous Oxide Emissions. Nitrous oxide emissions is measured as thousand metric tons of CO₂ equivalent. It measures emissions from agricultural biomass burning, industrial activities, and livestock management. The data comes from the 2000 World Development Indicators dataset.

Individual Controls

Age. The age of the respondent.

Female. A binary variable taking the value of 1 if the individual is a female and 0 if the individual is a man.

Education. Education is an ordered variable taking values from 1-3 with 1 denoting "tertiary completed", 2 denoting "secondary completed" and 3 denoting "primary completed". The same classification is used for the controls of paternal, maternal and spouse education.

Income. Denotes the monthly household income (x1000), corrected for ppp in euros

Employment Status. The employment status of the respondent is a categorical variable taking values from 1-4 as follows: 1-"full-time", 2-"part-time or self-employed", 3-"not participant (student, hw, retired, other)", 4-"unemployed".

Occupation Status. The occupation status of the respondent is a categorical variable taking values from 1-4 as follows: 1-"managers, professionals, technical wks" 2-"clerks" 3-"service" 4-"skilled manuals" 5-"unskilled". The same classification is used for the controls of paternal, maternal and spouse education.

Marital Status. The marital status of the respondent is categorical variable taking values from 1-3 classified as follows: 3 "married", 2 "divorced/separated/widowed" and 1 "single".

Child. Child is a binary variable taking the value 1 if there is "at least one child in the household" and 0 otherwise.

Employment Status. The employment status of the respondent is an ordered variable taking values from 1-4 as follows: 1 "full-time" 2 "part-time or self-employed" 3 "not participant (student, hw, retired, other)" 4 "unemployed".

Town Size. The variable denotes the town size in thousand inhabitants classified as follows: 1-"below 5", 2-"5-20" , 3-"20-100" ,4 -100-500" ,5-"over 500".

Years Since Migration. Denotes the year since the migrant moved to the host country.

Individual Preferences Controls

Belong to Environmental Organization. The variable is derived from the question "Do you belong to an environmental organization?". The variable is binary and takes the value 1 if the answer is "yes" and 0 otherwise.

Work Unpaid for the Environment. The variable is derived from the question "Do you work unpaid for the environment ". The variable is binary and takes the value 1 if the answer is "yes" and 0 otherwise.

Work Unpaid for any Organization. The variable is derived from the question "Do you work unpaid for any organization? ". The variable is binary and takes the value 1 if the answer is "yes" and 0 otherwise.

Trust. The variable is derived from the question "Do you think most people can be trusted or one can't be too careful? ". The variable is binary and takes the value of 0 if the answer is "most people can be trusted" and 1 if the answer is "cannot be too careful".

Left-Right Orientation. The variable is constructed based on the question "Which political party would you vote for? Left/right scale". The variable takes values from 1-10 with 1 denoting "left" and 10 denoting "right".

Distrust in Environmental Organizations. The variable is derived from the question "Please look at this card and tell me, for each item listed, how much confidence you have in them, is it a great deal, quite a lot, not very much or none at all? Environmental Organizations". The variable takes values from 1-4 with 1 denoting "A great deal", 2-"quite a lot", 3-"not very much" and 4-"None at all".

Volunteering for the environment. The variable is binary and takes the value of 0 if the respondent belongs to an environmental organization or works unpaid for the environment, 0 otherwise.

Human interference is disastrous. Respondents are given the statement "I am now going to read out some statements about the environment. For each one read out, can you tell me whether you agree strongly, agree, disagree or strongly disagree? environment: human interference — produces disastrous consequences". The variable takes values from 1-4 with 1 denoting "Strongly Disagree", 2-"Disagree", 3-"Agree" and 4-"Strongly Agree".

Human ingenuity is good. Respondents are given the statement "I am now going to read out some statements about the environment. For each one read out, can you tell me whether you agree strongly, agree, disagree or strongly disagree? Human ingenuity insures earth remaining fit". The variable takes values from 1-4 with 1 denoting "Strongly Disagree", 2-"Disagree", 3-"Agree" and 4-"Strongly Agree".

Humans are meant to rule over nature. Respondents are given the statement "I am now going to read out some statements about the environment. For each one read out, can you tell me whether you agree strongly, agree, disagree or strongly disagree? Humans were meant to rule over nature". The variable takes values from 1-4 with 1 denoting "Strongly Disagree", 2-"Disagree", 3-"Agree" and 4-"Strongly Agree".

Environmental catastrophe. Respondents are given the statement "I am now going to read out some statements about the environment. For each one read out, can you tell me whether you agree strongly, agree, disagree or strongly disagree? Environment: if things continue like this we will experience a catastrophe". The variable takes values from 1-4 with 1 denoting "Strongly Disagree", 2-"Disagree", 3-"Agree" and 4-"Strongly Agree".

Heterogeneity

Citizenship. A binary variable that takes the value 1 if the individual is a citizen of the host country and 0 otherwise.

More than 20 years in the Host country. A binary variable that takes the value 1 if the individual lived more than 20 years in a country, 0 otherwise.

Importance Attached to Speaking the Host Language. The variable is derived from the question "Some people say the following things are important for being truly [NATIONALITY]. Others say they are not important. How important do you think each of the following is? To be able to speak [THE NATIONAL LANGUAGE]". The variable takes values from 1-4 with 1 denoting "Very Important", 2-"Quite Important", 3-"Not Important", and 4-"Not Important at All".

Importance Attached to Having a Country's Ancestry. The variable is derived from the question "Some people say the following things are important for being truly [NATIONALITY].

Others say they are not important. How important do you think each of the following is? To have been born in [COUNTRY]". The variable takes values from 1–4 with 1 denoting "Very Important", 2-"Quite Important", 3-"Not Important", and 4-"Not Important at All".

Importance Attached to Having Lived Long in a Country. The variable is derived from the question "Some people say the following things are important for being truly [NATIONALITY]. Others say they are not important. How important do you think each of the following is? To have lived for a long time in [COUNTRY]". The variable takes values from 1–4 with 1 denoting "Very Important", 2-"Quite Important", 3-"Not Important", and 4-"Not Important at All".

Importance Attached to Respecting a Host Country's Law. The variable is derived from the question "Some people say the following things are important for being truly [NATIONALITY]. Others say they are not important. How important do you think each of the following is? To respect [COUNTRY]'s political institutions and laws". The variable takes values from 1–4 with 1 denoting "Very Important", 2-"Quite Important", 3-"Not Important", and 4-"Not Important at All".

Importance Attached to Friends. The variable is constructed based on the question "Please say, for each of the following, how important it is in your life. Friends and Acquaintances". The variable is classified as follows: 1-"very important", 2-"quite important", 3-"not important", 4-"not important at all".

Importance Attached to Family. The variable is constructed based on the question "Please say, for each of the following, how important it is in your life. Family". The variable is classified as follows: 1-"very important", 2-"quite important", 3-"not important", 4-"not important at all".

Father Reading Books. The variable is constructed based on the question "When you think about your parents when you were about 14 years old, could you say whether these statements correctly describe your parents? My father liked to read books". The variable is classified as follows: 1-"yes", 2-"to some extent", 3-"don't know", 4-"no".

Occurrence of Political Discussions with Father. The variable is constructed based on the question "When you think about your parents when you were about 14 years old, could you say

whether these statements correctly describe your parents? I discussed politics at home with my father". The variable is classified as follows: 1-"yes", 2-"to some extent", 3-"don't know", 4-"no".

Father's Pleasure about Following the News. The variable is constructed based on the question "When you think about your parents when you were about 14 years old, could you say whether these statements correctly describe your parents? My father liked to follow the news". The variable is classified as follows: 1-"yes", 2-"to some extent", 3-"don't know", 4-"no".

Experience a Parent's Divorce. The variable is derived from the question "Did you even experience a parent's divorce? ". The variable is binary and takes the value 1 if the answer is "yes" and 0 otherwise.

Experience a Father's Death. The variable is derived from the question "Did you even experience a father's death? ". The variable is binary and takes the value the value 1 if the answer is "yes" and 0 otherwise.

Alternative Environmental Quality Measures

Organic Water Pollutant (BOD) Emissions (kg per day). Emissions of organic water pollutants are measured by biochemical oxygen demand, which refers to the amount of oxygen that bacteria in water will consume in breaking down waste. This is a standard water-treatment test for the presence of organic pollutants. Source: World Bank Indicators (2000).

Agricultural methane emissions. Agricultural methane emissions are emissions from animals, animal waste, rice production, agricultural waste burning (nonenergy, on-site), and savannah burning. Source: World Bank Indicators (2000).

CO2 Emissions (kt). Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring. Source: World Bank Indicators (2000).

PM10-Particulate Matter Concentrations Particulate matter concentrations refer to fine suspended particulates less than 10 microns in diameter (PM10) that are capable of penetrating deep into the respiratory tract and causing significant health damage. Data for countries and aggregates

for regions and income groups are urban-population weighted PM10 levels in residential areas of cities with more than 100,000 residents. The estimates represent the average annual exposure level of the average urban resident to outdoor particulate matter. The state of a country's technology and pollution controls is an important determinant of particulate matter concentrations. Source: World Bank Indicators (2000).

EPI Index It is a composite index of environmental quality reflecting environmental health, ecosystem vitality and climate and energy. We use the 2002 index which is the earliest available index. Source: <http://epi.yale.edu>.

Low-High Income Dummy. To construct this measure we used the World Bank classification (<http://data.worldbank.org/news/new-country-classifications> accessed on 17/09/2015). We construct a binary variable that takes the value of 0 if per capita GNI is lower than \$12,615 and the value of 1 otherwise.

Eastern-Western Dummy. The dummy takes the value of 1 if the country belonged to the Western Block and 0 otherwise.

Appendix B Summary Statistics

TABLE APPENDIX B.1: Classification of Migrants

Country of Origin	(1) All Migrants	(2) First Gen. Migrants	(3) Second Gen. Migrants
Albania	32	28	4
Armenia	35	20	14
Austria	17	8	8
Azerbaijan	50	36	14
Belarus	98	60	38
Belgium	74	53	21
Bosnia-Herzegovina	153	95	56
Bulgaria	21	14	6
Croatia	67	42	24
Cyprus	2	2	15
Czech Republic	33	17	3
Czechoslovakia	6	3	9
Denmark	20	11	6
Estonia	9	3	14
Finland	33	19	30
France	93	63	12
Georgia	30	18	56
Germany	168	107	61
Great Britain	54	14	9
Greece	29	14	15
Hungary	46	15	31
Iceland	4	3	1
Ireland	7	7	0

Summary: The table presents the number of migrants coming from each EVS country.

TABLE APPENDIX B.2: Heterogeneity: Alternative Migration cohorts

	All Migrants			
	MWP coef. (Origin)	(SE)	R sq.	Obs
(i) ≤ 10 years spent in the Host country				
<i>More than 10 years in the Host country</i>	0.21***	(0.06)	0.12	2855
<i>Less than 10 years in the Host Country</i>	0.14	(0.48)		
p-value on test of equal coefficients		0.75		
(ii) ≤ 30 years spent in the Host country				
<i>More than 30 years in the Host country</i>	0.25***	(0.062)	0.124	2855
<i>Less than 30 years in the Host country</i>	0.11	(0.085)		
p-value on test of equal coefficients		0.19		
(iii) ≤ 40 years spent in the Host country				
<i>More than 40 years in the Host country</i>	0.26***	(0.065)	0.125	2855
<i>Less than 40 years in the Host country</i>	0.11	(0.08)		
p-value on test of equal coefficients		0.12		

Notes: All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

TABLE APPENDIX B.3: Migrants coming from Eastern-Western BLock/ Rich-Poor Countries

	All Migrants			
	MWP coef. (Origin)	(SE)	R sq.	Obs
(1) Eastern-Western Country				
<i>Country belonged to the Western Block</i>	0.220***	(0.056)	0.123	2855
<i>Country belonged to the Eastern Block</i>	0.224***	(0.060)		
(2) Rich-Poor Country				
<i>Poor country (per capita GNI ≤ 12.615 \$)</i>	0.212***	(0.061)	0.123	2833
<i>Rich country (per capita GNI ≤ 12.615 \$)</i>	0.198***	(0.067)		
(3) Eastern-Western/Rich-Poor Country				
<i>Western-Poor</i>	0.205***	(0.063)	0.123	2833
<i>Western-Rich</i>	0.201***	(0.065)		
<i>Eastern-Poor</i>	0.221***	(0.064)		
<i>Eastern-Rich</i>	0.199***	(0.342)		

Notes: All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%

TABLE APPENDIX B.4: Cohort Analysis

	(1)	(2)	(3)	(4)
	Cohort Marginal Willingness to Pay for the Environment			
	1916-1970 Cohort	1971-2008 Cohort	All Immigrants	
Mean WTP (Origin Country)	0.278*** (0.100)	0.197* (0.103)	0.273*** (0.082)	
Mean WTP (Origin Country) X 1916-1970 Cohort				0.245*** (0.085)
Mean WTP (Origin Country) X 1971-2008 Cohort				0.279*** (0.082)
Host Country FE	Yes	Yes	Yes	Yes
Full Set of Controls	Yes	Yes	Yes	Yes
R-Squared	0.415	0.658	0.484	0.504
Observations	1111	469	1580	1580

Notes: The table establishes that current MWP at the origin country is a good proxy of the culture of immigrants belonging either to the 1916-1970 cohort, or to the 1971-2008 cohort. All specifications include the usual set of controls. Standard errors clustered at the country of origin level in parentheses. ***: 1% **:5% *:10%