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Artjoms Ivlevs
Bristol Business School and IZA

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Does Emigration Affect Pro-Environmental Behaviour Back Home? A Long-Term, Local-Level Perspective

This study provides novel evidence on the effects of emigration on pro-environmental behaviour back home. Focusing on the seven successor states of former Yugoslavia, I explore the relationship between people's present-day pro-environmental action and the local-level intensity of a major guestworker emigration wave that occurred four decades earlier. I find that more intense local-level emigration is associated with a lower likelihood of pro-environmental action; the instrumental variable analysis supports the causal nature of this relationship. This finding supports the conjecture that emigration contributes to greater consumerism at home and therefore reduces pro-environmental behaviour. At the same time, controlling for the intensity of local-level emigration, a higher proportion of women in the local migrant population is associated with a greater likelihood of pro-environmental action. As women are generally more likely to undertake pro-environmental behaviour as well as transfer new norms and practices across borders, this finding supports the hypothesis that migration contributes to a cross-border transmission of pro-environmental norms and practices.

JEL Classification: F22, F24, F64, P28, R11, R23

Keywords: emigration, pro-environmental behaviour, former Yugoslavia, monetary remittances, social remittances, instrumental variable analysis, gender effects

Corresponding author:
Artjoms Ivlevs
Department of Accounting, Economics and Finance
Bristol Business School
University of the West of England
Bristol BS16 1QY
United Kingdom

E-mail: a.ivlevs@uwe.ac.uk

1. INTRODUCTION

Climate change and environmental degradation are important challenges faced by humanity today. Low- and middle-income countries are particularly affected: alongside extreme weather conditions causing floods and droughts, common environmental problems include air and water pollution, inefficient use of resources, unsustainable waste disposal, soil degradation and loss of biodiversity. Arguably, reversing the current trends of climate change and environmental degradation will not be possible without a change at the grassroots level: it is the pro-environmental awareness, values and, ultimately, behaviour of ordinary people that will help mitigate future environmental risks. However, when incomes are relatively low (as they tend to be in poorer countries), basic needs overtake environmental concerns, limiting people's ability to think and act in an environmentally sustainable way and lowering demand for environmental regulation. What might change people's environmental behaviours and norms in such contexts? This paper explores whether change can be brought about by international migration.

A burgeoning social science literature suggests that emigration can influence a multitude of political, social and institutional outcomes – government accountability, political participation, petty corruption, female empowerment, fertility, and land-use practices – in migrant communities and countries of origin (e.g., Montferio et al., 2014; Roosen and Siegel, 2018; see also Ivlevs and King (2017) for a summary of this literature). This literature, however, has overlooked the environmental domain. Little is known about the role of migration in shaping pro-environmentalism[1] in migrant-sending countries and, more

[1] Here and in what follows, pro-environmentalism is defined broadly, encompassing pro-environmental action, attitudes, beliefs and concerns.

generally, about the determinants of pro-environmentalism in developing countries, where migrants tend to originate. This project aims to fill these knowledge gaps. It contributes to the literature by seeking answers to the following questions: Do migrants act as agents of diffusion of environmental awareness, knowledge and practice in their communities of origin? Can the impact of emigration on pro-environmentalism back home be negative? Do the socio-demographic characteristics (gender, education) of migrants matter?

Answers to these questions are important as they can help design national and international migration policies that provide environmental benefits (or minimise environmental costs) to migrant-sending countries and communities; more generally, they may encourage policymakers to reconsider the broader social impact of emigration on the developing world. Also, with the increasing salience of both environmental and migration issues across the world, it is crucial to understand the linkages between the two. While the role of climate change and environmental degradation in driving migration has already received much attention in academic, public and policy debates (Beine and Parsons, 2015; Coniglio and Pesce, 2015; Hunter et al., 2015; Maurel and Tuccio, 2016; Millock, 2015; Rigaud et al., 2018; Xu and Sylwester, 2016), little is known about the effects of emigration on the environment and pro-environmentalism back home. This paper provides the first quantitative evidence on this question and delves into channels through which emigration may affect pro-environmental behaviour in sending countries.

To explore the links between emigration and pro-environmentalism back home, I focus on the countries of former Yugoslavia – an economically, politically and ethnically diverse region on the European periphery that is particularly well-suited for our analysis. The historical legacy of rapid post-WWII industrialisation, followed in the 1990s by the dissolution of the Yugoslav bloc, the transition from planned to market economy and war destruction, left the region with acute environmental problems – air pollution, poor

wastewater treatment, illegal waste disposal, and environmental risks from hazardous mining operations and improperly 'closed' mining sites (European Environmental Agency, 2010; United Nations Environment Programme, 2010). Due to the lack of resources, weak governance and low civic activity, little was done to address these issues. At the same time, former Yugoslavia has a rich and diverse migration history, the most prominent episode of which was the intense guestworker emigration to industrialised Western economies in the 1960s and 70s. We relate the local-level intensity and composition (by gender and education) of this major emigration wave to information on present-day environmental norms and behaviours, thus identifying the long-term relationship between international migration and people's pro-environmentalism in migrant-sending communities.

There are several ways in which this study advances scholarly dialogue. First, it contributes to the large literature on the links between the environment and migration. The bulk of this literature has focused on environmental factors as drivers of international and internal migration (see, e.g., Hunter et al. (2015) and Millock (2015) for recent reviews). A smaller strand has focused on the effects of migrant remittances on environmental outcomes in the migrant-sending countries. Specifically, scholars have suggested that emigration and the associated remittances can affect the environment through the consumption of non-essential, luxury and status goods that generally require the high use of energy (Amuedo-Dorantes, 2014; Davis and Lopez-Carr, 2010). In addition, depending on how migrant remittances are used, migration can lead to either an expansion of agricultural activities and depletion of local natural resources (Taylor et al., 2006; Jokisch, 2002; Davis and Lopez-Carr, 2014) or a lower reliance on land and agriculture, which is accompanied by the regrowth of native vegetation and preservation of biodiversity (Aide and Grau, 2004; Hecht and Saatchi, 2007). While the aforementioned studies are mainly concerned with migrant remittances and the outcomes capturing environmental quality and environmental risks, little

is known about the effects of emigration (which may or may not be accompanied by monetary remittances) on environmental attitudes, norms and behaviours in the migrants' countries/communities of origin. The present study takes the first step to understand this overlooked dimension of the migration-environment nexus.

Second, this study advances the growing literature on the social, institutional and political effects of emigration. This literature can be traced back to the seminal work on 'social remittances' by sociologist Peggy Levitt (Levitt, 1998); more recently, the question of how emigration affects people staying behind has also received much attention among economists and political scientists, who have looked at outcomes such as democracy, political participation and voting for particular parties, female empowerment, fertility, and bribing behaviour (see Ivlevs and King (2017) for a summary of this literature). In the study most related to ours, Montferio et al. (2014) use the framework of social remittances to show how migrants returning from Malaysia to the Philippines transfer ideas about more efficient palm oil cultivation and land use, which, the authors note, may result in environmental degradation at home. I contribute to this body of knowledge with the exploration of the effects of emigration on environmental attitudes and behaviours – an area that remains understudied (Carter et al., 2013; Montferio et al., 2014). Specifically, this study is the first to show that more intense historical local-level emigration reduces pro-environmental behaviour at the household level, implying that migrants may be transferring consumerism rather than pro-environmental behaviour. At the same time, keeping the local-level intensity of the emigration constant, a higher proportion of women among migrants is associated with more pro-environmental action. This finding supports the 'social remittances' hypothesis as women are more likely to absorb new norms and transfer them across borders.

Finally, I highlight the innovative use of the Yugoslav 1971 Population Census as a source of historical, community-level data on emigration, which I match with a large

household survey (Life in Transition-II), conducted in 2010. I argue that both the long-term and local-level perspectives are important and relevant for our analysis: the successful adoption, transfer, and establishment of environmental norms and practices takes time (hence, the focus on emigration flows that took place 40 years ago), and environmental norms and practices can be transferred not only from migrants to their family members back home but also from migrant to non-migrant households within local communities (hence, the focus on the effects of emigration on all households in a particular locality).

The remainder of this paper is organised as follows. Section two outlines theoretical mechanisms through which emigration may affect pro-environmentalism back home. Section three presents the datasets, variables, and the estimation strategy. Section four reports and discusses the results, followed by a conclusion.

2. *EMIGRATION AND PRO-ENVIRONMENTALISM BACK HOME: THEORETICAL FRAMEWORK AND HYPOTHESES TO BE TESTED*

One can think of at least two ways in which emigration may affect environmental norms and practices back home: 1) social remittances – the transmission of environmental norms and practices from migrant host to migrant home countries, and 2) the monetary-remittance-driven growth in consumerism, which is not compatible with pro-environmental norms and practices. In what follows, I discuss the two mechanisms and formulate hypotheses to be tested in the empirical analysis.

2.1. Theoretical framework

2.1.1. Social remittances

In her seminal work, Levitt (1998) defines social remittances as "ideas, practices, identities, and social capital that flow from receiving- to sending-country communities" (p. 927). The transmission of social remittances involves several stages. First, depending on the degree of social interaction among people in the host country, migrants become exposed to the norms and practices of the host society, challenge their original views, and ultimately adopt new ideas and behaviours. Then, through correspondence, visits and return migration, these new or modified norms and practices are transferred from migrant host to home communities. While one would expect most exchanges to happen at the family level – arguably, family is the most important bridge linking migrants to their home countries – Levitt emphasises that the range of social remittance recipients goes well beyond the migrant household.

Specifically, the diffusion of ideas, norms and practices can occur through local institutions, such as community centres and churches, as well as from migrant to non-migrant households. In fact, a community (rather than household) perspective is central to Levitt's analysis, as social remittances are defined as transfers of norms, ideas and practices between the migrant-receiving and migrant-sending *communities*.

I argue that the social remittances framework can be applied to the environmental domain. Following Levitt's approach, several conditions need to be satisfied for the migration-driven transfer of environmental norms and practices to happen. First, they must be different in the host and home countries. This is likely to be the case for the most common type of migration – from poorer to wealthier countries. Specifically, an influential thesis developed by Ronald Inglehart (see e.g. Inglehart, 1997; Inglehart and Welzel, 2005; Kidd and Lee, 1997), posits that people in high-income countries have higher levels of physical and economic security and are therefore more likely to hold post-materialistic values. Among other things, these values include concern about global environmental risks such as climate change, a recognition that high levels of consumption are detrimental to the environment, and

attempts to limit consumption-driven environmental degradation through household waste recycling, buying local products, saving water and energy, and choosing environmentally-friendly transport. By contrast, in poorer countries people are more likely to be concerned about the levels and quality of consumption rather than its effects on the environment; hence their generally lower awareness of and concern for environmental problems (especially at the global level) and lower levels of individual and collective pro-environmental action.[2]

Second, migrants have to be exposed to the host country's environmental norms and practices, challenge their original views and adopt the new practices and ways of thinking about the environment. There is some evidence to support this conjecture. For example, Carter et al. (2013) provide a detailed account of how Mexican immigrants in the US negotiate, internalise and adopt local environmental norms and behaviours. They also find that immigrants conform to the new environmental and social norms in an attempt to acculturate and become accepted in the host community.[3]

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[2] For example, in 2008 people in the EU member states with relatively low GDP per capita (Central and Eastern European countries that joined the bloc in 2004 and 2007) tended to be less worried about climate change, the depletion of natural resources, loss of biodiversity, and their own consumption habits, and were less likely to undertake pro-environmental action than their counterparts in high GDP per capita Western European countries (European Commission, 2008). It should also be noted here that higher levels of consumption of people in wealthier countries could be viewed as inconsistent with their more pronounced pro-environmental norms and behaviours.

[3] Note that, before internalising and adopting the environmental norms and practices of host countries, immigrants are likely to act upon the environmental norms of their home countries. For example, Kountouris and Remoundou (2016) show that immigrants from countries with greater pro-environmental beliefs are more willing to trade off income for environmental quality. It is an open question whether in such rather unusual

Third, there must be enough opportunities for information, norms and behaviours to be exchanged between the home and host communities – these include migrants visiting relatives back home, circular and return migration, friends and relatives visiting migrants in the host countries, calls, correspondence etc. This condition is likely to be satisfied, as for some time migration has been viewed as a transnational phenomenon (Levitt et al., 2005). Falling communication and travel costs make it easier to develop and maintain transnational spaces and communities (Vetrovec, 2004) and participate in social, economic and political life both at home and abroad.

It could also be argued that particular groups of migrants may be more receptive to the environmental views and practices encountered in their host countries and more willing to transfer or absorb them back home. It is, for example, well documented that women and the educated are more likely to hold pro-environmental attitudes and beliefs, be concerned about the environment, and act in an environmentally-friendly way (Gifford and Nilsson, 2014; Hunter et al., 2004; Meyer, 2015). In addition, migrant women may be more likely to absorb and transmit social remittances back home, and the stay-behind women are generally more receptive to new norms and ideas transmitted by migrants (Levitt, 2005; Vianello, 2013; Vlase, 2013). We may therefore expect that the gender and educational composition of the local emigration flows matters for the subsequent diffusion of pro-environmental norms and practices.

Finally, it should be noted that the migration-induced transmission of norms and practices may be unintentional or intentional. One the one hand, migrants may not intentionally seek to be exposed to, absorb or exchange the new norms with the home

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situations (migrant host countries being less 'pro-environmental' than home countries) immigrants will internalise and adopt 'inferior' environmental norms and practices of host countries.

country; yet, their transmission would take place nonetheless. On the other hand, migrants may wish – intentionally – to transfer particular practices to those staying behind, because migrants are convinced that these practices (for example, waste separation) are good and should be adopted in the home communities. In extreme cases, to ensure that new norms and practices are indeed adopted, migrant may, for example, threaten to stop sending monetary remittances (Ivlevs and King, 2017).

2.1.2. Migration-driven consumerism

It has often been argued, and shown empirically, that money sent home by migrants is disproportionately spent on status, luxury, non-essential and non-productive goods and services (Amuedo-Dorantes, 2014; Davis and Lopez-Carr, 2010; El-Sakka and McNabb, 1999; Stephenson and Wilsker, 2016; Strielkowski and Weyskrabova, 2014). This may happen for several reasons. First, according to the analytical framework of the New Economics of Labour Migration, one of the forces driving emigration is relative deprivation – a perception that one's personal or household status within a particular reference group (group of friends, a neighbourhood, village, town etc.) is relatively low (Stark and Taylor, 1991). In this context, emigration is an attempt to reduce the feeling of relative deprivation, for example by sending monetary remittances to household members back home or engaging in circular or return migration; in both cases money earned abroad can be spent on status goods at home and therefore increase the relative position of the migrant and his/her household.

Second, during their stay abroad emigrants get exposed to greater levels of consumerism relative to their home countries (Davis and Lopez-Carr, 2010; Carter et al., 2013). Migrants may therefore acquire a taste for consumerism and, following Levitt's social

remittances hypothesis, transfer to their communities of origin the willingness to consume more, bigger, newer, and often imported products. Such transfers occur when migrants engage in circular migration or return home, control the use of monetary remittances, or when migrants' family members make visits abroad. Less direct ways of transferring a taste for consumerism may include watching foreign television channels and getting exposed to foreign consumption patterns – an activity enabled by the purchase of a TV and satellite dish with money sent from abroad.

Notwithstanding the exact mechanism for growing consumerism among migrant households, it usually comes at a cost of higher energy consumption and a greater burden for the environment (Amuedo-Dorantes, 2014; Ivanova et al., 2016; Walker and Bellingham, 2011). One might also expect that, at least in the early stages of the expansion of consumerism, people have little realisation that their purchases are detrimental for the global environment. If anything, growing incomes and wealth may lead to less pro-environmental action – for example, in order to signal status, people will use their own car rather than public transportation or consume imported rather than local products; they will also have a less need to save water and electricity. Following this line of reasoning, we might expect that people in communities characterised by more intense out-migration undertake less pro-environmental action than their counterparts in communities with less intense emigration, although the greater pro-environmental action of the latter would be driven by necessity rather than choice (e.g., people are more likely to save water and electricity when they are poor).[4]

As for other, more subjective, environmental outcomes, such as concern, informedness and beliefs about climate change, it is *a priori* unclear how migration-driven

[4] See, e.g., Ivlevs (2019) showing that households hit by the economic crisis are more likely to undertake pro-environmental action.

consumerism may affect them. While a substantial rise in living standards for most people would lead to the development of post-materialistic values, including awareness of and concern for global environmental problems, it is questionable whether in a typical migrant-sending country monetary remittances would result in a rise in living standards that is ubiquitous and high enough to trigger such a value change.

2.2. Hypotheses

The previous section has outlined the norm transfer ('social remittances') and consumerism channels – specific theoretical frameworks in which emigration could affect in environmental norms and practices back home. Whether such changes takes place in reality is an empirical question. Based on the discussion above, I formulate the following hypotheses:

H1: More intense local emigration leads to greater pro-environmentalism among people staying behind.

H2a: A greater proportion of women among emigrants leads to greater gains in pro-environmentalism among people staying behind.

H2b: A greater proportion of educated people among emigrants leads to greater gains in pro-environmentalism among people staying behind.

In addition, I will test if local-level emigration in more important in shaping pro-environmental behaviour of women, the better educated and the better-off among those staying behind.

H3a: Local-level emigration has a greater influence on the pro-environmental behaviour of women staying behind

H3b: Local-level emigration has a greater influence on the pro-environmental behaviour of more educated people among those staying behind

H3b: Local-level emigration has a greater influence on the pro-environmental behaviour of wealthier people among those staying behind

3. DATA, VARIABLES, AND ESTIMATION STRATEGY

3.1. Data

Data for the empirical analysis come from the 'Life in Transition-II' survey, which I match with the emigration statistics from the 1971 Yugoslav Population Census. The "Life in Transition-II" survey was conducted by the European Bank for Reconstruction and Development and the World Bank in autumn 2010.[5] Twenty eight post-socialist economies of Central and Eastern Europe and Central Asia, Turkey, Mongolia, as well as five Western European countries (France, Germany, Italy, Sweden and the UK), participated in the survey. The nationally representative samples consisted of 1,000 respondents per country (1,500 respondents in the case of larger countries: Russia, Ukraine, Uzbekistan, Serbia, Poland and the UK). In each country, households were selected according to a two-stage clustered stratified sampling procedure. In the first stage, the frame of primary sampling units was established using information on geo-administrative or electoral units. In the second stage, a random walk fieldwork procedure was used to select households within primary sampling units. Respondents within households were selected randomly using a selection grid. A detailed account of the survey design and implementation methodology, as well as

[5] Two other waves of the survey were conducted in 2006 (Life in Transition-I) and 2015/16 (Life in Transition-III). I use the second wave (Life in Transition-II) as only it contains detailed questions on environmental behaviours and attitudes. Note that Life in Transition is not a longitudinal survey: different respondents were interviewed in different waves.

information on how to access the data, can be found on the survey website (http://microdata.worldbank.org/index.php/catalog/1533).

While the "Life in Transition-II" survey contains extensive information on the respondents' environmental beliefs, attitudes and behaviours (Section 4 of the survey), it included no questions that would allow for the capturing of emigration (either short or long-term) of household members. However, it is known in which municipalities, within each country, respondents reside. This allows merging the LITS-II dataset with external, municipality-level data on emigration. One such external data source is the 1971 Yugoslav Population Census, which provides historical, municipality-level emigration information for what are now seven successor states of former Yugoslavia: Bosnia and Herzegovina, Croatia, Former Yugoslav Republic of Macedonia (FYROM), Kosovo, Montenegro, Serbia, and Slovenia. The information provided by this census includes the number of emigrants at the municipality level (altogether 502 municipalities, of which 232 are represented in the Life in Transition-II survey), as well as various migrant characteristics, such as gender and education (Baucic, 1979). This information was supplied by migrants' family members and, when the whole household had emigrated, by neighbours. Emigrants were defined as "Yugoslav workers temporarily employed abroad". This means that the data only capture guest worker migration flows, which started in the mid-1960s and were close to their peak in 1971,[6] and underestimate the total stock of Yugoslav emigrants at that time.

[6] The guestworker migration stopped abruptly after the 1973 oil shock, but was continued by family reunification flows afterwards.

Given that all seven successor states of former Yugoslavia were represented in the Life in Transition-II survey, our working sample consists of over 7,700 observations/interviews.

3.2.Variables

Outcome variable(s). Section 4 of LITS-II survey contains a range of questions that we use to capture people's pro-environmental behaviours, environmental concerns, environmental beliefs, and informedness about climate change.[7] First, respondents were asked, "Have you personally taken actions aimed at helping to fight climate change?" If the answer was affirmative, the respondents were asked to specify, from a list of ten options, which actions they had taken (multiple answers were possible). Reduced energy consumption and reduced water consumption were the most common actions (indicated by 19 and 17% of respondents, respectively), followed by waste recycling (16%), reduced consumption of disposable items (14%), and choosing environmentally-friendly means of transportation (13%). Less common actions included buying seasonal and local produce (8%), reduced car use (7%), purchasing a more environmentally-friendly car (6%), avoiding taking short-haul flights (3%), and installing equipment that generates renewable energy (1%). Overall, 31% of respondents indicated they had undertaken at least one pro-environmental action. I created separate dummy variables to capture each of the ten actions. In addition, I constructed an index of pro-environmental behaviour by summing up the ten action variables. The index ranges from 0 to 10, with greater values indicating a greater range of pro-environmental actions undertaken.[8]

[7] Section 3 of the survey (Attitudes and values) also includes a question on willingness to pay for climate change mitigation. I have not included this variable into analysis and leave the exploration of its relationship with emigration for future research.

[8] As a robustness check, I also constructed a pro-environmental action index with principal components. This index, capturing the common variation among the ten pro-environmental dummies (we retained the first

Second, the respondents were asked, "How concerned are you about climate change? Please answer on a scale of 1 to 5, where 1 means that you are not at all concerned and 5 means you are extremely concerned." Using this information, I created a variable *concerned about climate change* with values of 1 to 5.

Third, respondents were asked to evaluate, on a scale of 1 to 4, how well they were informed about: 1) the causes of climate change; 2) the consequences of climate change; 3) ways in which one can slow down climate change; and 4) ways in which one can adapt to climate change, where 1 indicates "not at all informed" and 4 "very well informed". I summed respondents' answers to these four questions to create an index of *informedness/knowledge* about climate change, which ranges from 4 to 16.

Finally, respondents were asked to what extent they agreed with the following statements: "The seriousness of climate change has been exaggerated" and "Emission of CO^2 has a major impact on climate change", with five possible answers ranging from 1 (strongly disagree) to 5 (strongly agree). Reversing the answer value scale for the first statement and then adding together respondents' answers to the two statements, I obtained an index of pro-environmental beliefs, which ranges from 2 to 10. Higher values of this variable indicate lower levels of scepticism about the seriousness of climate change and a stronger conviction that greenhouse gas emissions have a major impact on climate change.[9]

Main regressor(s). The main regressors are the characteristics of local-level, historical migration flows, sourced from the 1971 Yugoslav Census (Baucic, 1973). First, to capture the

principal component with the eigenvalue of 4.03), produces the same results as the index constructed by summing up the action dummies (the correlation between the two indexes is 0.999).

[9] Note that all variables that I use to capture pro-environmentalism, including action taken to combat climate change, are not immune to desirability bias.

local-level emigration intensity, I constructed a variable "emigration rate", by dividing the number of emigrants in a municipality by its population (see Figure 1 in the Supplementary Information document for spatial distribution). Second, information is available on how many emigrants in each municipality 1) were women and 2) had at least a secondary (general or technical) education. This information was used to construct variables capturing the corresponding characteristics of emigration at the municipality level (all as % of total migrants).

Control variables. All regressions include the following control variables (see supplementary information for summary statistics): gender, age group (18-24, 25-34, 35-44, 45-54, 55-64, and 65+), marital status (single, married, divorced/separated, widowed), education level (primary, secondary, tertiary), household wealth index (constructed by extracting the first principle component from information on whether there is a car, secondary residence, bank account, debit card, credit card, mobile phone, computer, and internet access in the household), and type of residence (rural, urban).

In addition, I want to control for a potential confounder – the historical level of local economic development that might have influenced both the local emigration rates and local levels of pro-environmentalism (the latter might have persisted to the present day). As there are no publicly available data directly capturing local economic development for 1971, I proxy it with the share of illiterate people at the municipality level (these data are available in the Yugoslav Population Census 1971). In addition, I make use of the variable *average municipality income ("narodni dohodak")*, available for 1981 from the Geographical Atlas of Yugoslavia (Bertic, 1987); the variable is defined as an index relative to the Yugoslav average (100).

Finally, the inclusion of country-fixed effects (a dichotomous variable for each of the seven countries present in the analysis) will account for all country-wide influences on the intensity/characteristics of historical migration and/or present-day environmental attitudes/behaviours.

3.3. Estimation strategy

The main model to be estimated can be expressed as follows:

$$\begin{aligned} \textit{Pro-environmental}_{ijk} = \quad & \beta_0 + \beta_1 * (\textit{emigration rate})_{1971,\,jk} + \\ & \beta_2 * (\textit{individual controls})_{ijk} + \\ & \beta_3 * (\textit{municipality illiteracy rate})_{1971,\,jk} + \\ & \beta_4 * (\textit{average municipality income})_{1981,\,jk} + \\ & \beta_5 * (\textit{country-fixed effects})_{k} + \\ & \textit{idiosyncratic error term}_{ijk} \end{aligned} \tag{1}$$

where, for individual *i* living in municipality *j* and country *k*, *pro-environmental* stands for variables capturing environmental behaviours, concerns, beliefs or informedness, and *individual controls* are as described above.

To ascertain the role of the *composition* of historical emigration flows for present-day pro-environmentalism, I add to Model 1 the municipality-level variables capturing the gender and education composition of the emigration flows. Note the variable *emigration rate*, which captures the intensity of emigration flows, remains in the model. Formally:

$$\begin{aligned} \textit{Pro-environmental}_{ijk} = \quad & \beta_0 + \beta_1 * (\textit{emigration rate})_{1971,\,jk} + \\ & \beta_2 * (\textit{composition of emigration})_{1971,\,jk} + \\ & \beta_3 * (\textit{individual controls})_{ijk} + \\ & \beta_4 * (\textit{municipality illiteracy rate})_{1971,\,jk} + \\ & \beta_5 * (\textit{average municipality income})_{1981,\,jk} + \\ & \beta_6 * (\textit{country-fixed effects})_{k} + \end{aligned}$$

$$+ \textit{idiosyncratic error term}_{ijk} \quad (2)$$

The models are estimated with OLS (probit for binary outcomes variables), using heteroscedascicity-robust standard errors and accounting for clustering at the municipality level. In all models, I use the population weights provided by the survey.

Note that the estimated coefficients in Models 1 and 2 should be interpreted as (conditional) correlations rather than causal effects. In an attempt to move closer to causality, in section 4.2 I discuss and implement an instrumental variable strategy that helps address potential endogeneity of the main regressor.

4. RESULTS

4.1. Main results

Table 1 reports the results of models estimating the relationship between the local-level long-term emigration intensity and various environmental outcomes. Controlling for other factors (respondents' socio-demographic characteristics, historical levels of economic development and country-fixed effects), I find that a greater intensity of local-level emigration in 1971 is associated with less pro-environmental action undertaken in 2010 (Column 1); the coefficient is highly significant ($p = 0.007$). In terms of magnitude, an increase in the local emigration rate by one percentage point is associated with a decrease of 0.051 pro-environmental actions being undertaken by local residents; an increase in the local emigration rate from 0.5% to 18.6% – the lowest and the highest levels observed in our sample – would thus correspond to a reduction of close to one (0.92) pro-environmental action undertaken by local residents, which is a large effect relative to the average number of pro-environmental actions undertaken by an individual (1.05).

At the same time, the results show that the intensity of local emigration is 1971 is not correlated with the three other environmental outcomes: concern about climate change, being informed about climate change, and pro-environmental beliefs (Columns 2-4 of Table 1). As these outcomes are generally considered important determinants of pro-environmental action (Ivlevs, 2019), these findings imply, among other things, that the negative association between the local emigration rate and pro-environmental action (Column 1) is not driven by a possible effect of emigration on environmental concern, informedness or beliefs. For a formal test, I have added environmental concern, informedness and beliefs to the model explaining pro-environmental action. The results, reported in Column 5 of Table 1, do indeed suggest that they are strong predictors of pro-environmental action; however, accounting for these factors, the coefficient of the local emigration rate is close to one reported in Column 1.

Concerning control variables, the results point to the important role of gender and education for pro-environmentalism: women are more likely to undertake pro-environmental action and be more concerned about climate change, and higher levels of education are associated with greater levels of all environmental variables; these findings are consistent with earlier studies (Gifford and Nilsson, 2014; Meyer, 2015). The wealth index is also a positive and statistically significant predictor of all environmental outcomes. This result is consistent with the affluence/prosperity hypothesis (Diekmann and Fransen, 1999), that posits that environmental quality not only as a public but also a normal private good meaning that people with higher income can 'afford' pro-environmental attitudes and behaviour, and the associated empirical evidence from both wealthier and poorer nations that greater household income/wealth is associated with greater pro-environmentalism (see e.g. Ivlevs (2019) for an

overview).[10] Among other controls, younger people are somewhat less likely to undertake pro-environmental action, the single tend to be less concerned about climate change, the widowed undertake less pro-environmental action and are less informed about climate change, and rural dwellers are both less concerned and less informed about climate change. Concerning the two contextual controls, the average municipality income of 1981 and the municipality illiteracy rate of 1971 are negatively associated with concern for and informedness about climate change, respectively.[11]

I also checked if the obtained coefficients of the local migration rate variable might be due to omitted variable bias (especially in Columns 1 and 5, where they are statistically significant). Implementing the Oster test of selection on unobservables (Oster 2019), I found

[10] It is important to consider potential links between household wealth and historical local-level emigration levels, as the latter may increase the former through receipt of monetary remittances. The correlation between the two variables is positive but relatively low (0.028, significant at the 95% level). Estimating models 1-5 of Table 1 without the local-level emigration rate still yields a coefficient of the wealth index that is positive and statistically significant; when the wealth index is excluded, the local-level emigration rate also remains negative and statistically significant in models 1 and 5 and statistically insignificant in models 2-4. In all cases, the absolute values of the estimates of the wealth index and the local-level emigration rate are somewhat lower, reflecting (the relatively low) correlation between the two. It also should be remembered that households with similar wealth levels (as defined in this study) may have different environmental impacts. For example, households in high-migration areas may have bigger houses and less economical cars and thus a greater carbon footprint than households in low-migration areas with smaller houses and economical cars, even if the wealth indexes of the two, based on whether the household possesses (any) house and car, would be the same.

[11] I have experimented with excluding the two contextual controls from the models and did not obtain any change in the coefficients of the 1971 emigration rate.

delta values[12] of -2.19 and -2.82 for the emigration rate in Specifications 1 and 5 of Table 1, respectively. Negative delta values indicate that adding controls to the model strengthens the magnitude of the effect of the local migration rate, also meaning that is it unlikely that the unobservables are driving the results (Graham et al. 2017).

[Insert Table 1 about here]

Overall, given that most Yugoslav migrants went to wealthy industrialised economies (Germany, Switzerland, France, Sweden etc.), where environmental awareness and pro-environmental activism is among the highest in the world, the results presented in Table 1 would contradict the conjecture that migrants in Yugoslavia transfer environmental norms and behaviours from host to home countries. However, the results support the conjecture that emigration has a negative effect on pro-environmental action in the communities of origin because migrant remittances are often invested in status and luxury goods that require a high energy consumption. To explore this point further, I look at the links between the local-level emigration rate of 1971 and specific pro-environmental actions. The results are reported in Table 2 (for brevity, I only show the coefficients of interest; the same control variables as in

[12] This measure indicates how large selection on unobservable variables should be, relative to selection on observables, to nullify the estimated effect of a regressor. Formally, $\delta = \frac{\beta^C(R^C - R^U)}{(\beta^U - \beta^C)(R^{max} - R^C)}$, where β^C and R^C are the variable's estimate and the R^2 from a regression with a full set of (observable) controls, β^U and R^U the variable's estimate and the R^2 from a regression where (observable) controls are not included, and R^{max} is the R^2 from a hypothetical regression that controls for all observed and unobserved covariates (Oster (2019) recommends a value of $1.3*R^C$, which I have also used in this paper).

specifications 1-4 of Table 1 are included in all regressions,[13] and complete econometric output is available in the supplementary information document). The coefficient of the emigration rate is negative in all specifications and statistically significant for five out of ten environmental actions: other things equal, more intense local emigration in 1971 is associated with a lower likelihood of reducing the use of one's own car, reducing energy and water consumption, reducing disposable items, as well as buying local/seasonal produce in 2010.[14] Most of these outcomes – the use of one's own car, high energy and water consumption, and the use of disposable items – are concomitant with increased material comfort and the possession of status/luxury goods such as big cars and houses. This further supports the idea that emigration reduces pro-environmental action through the use of monetary remittances.

[Insert Table 2 about here]

Next, I explore the links between the environmental outcomes and the characteristics of local historical emigration. To this end, I add two variables to the main model: the share of women among migrants and the share of the educated among migrants. Note that the municipality emigration rate in 1971 is also included in all regressions. The results, reported in Table 3, suggest that, controlling for the overall intensity of local emigration, a greater proportion of women among migrants is associated with a greater probability of undertaking pro-environmental action (Specifications 1 and 5); the coefficient is significant at the 99%

[13] The results presented in Table 2 are also robust for the inclusion of the three environmental controls (concern, informedness and beliefs about climate change).

[14] The Oster test deltas for the local migration rate variable, calculated on the corresponding OLS regressions, range between -2.05 and -3.29, meaning that the estimates are unlikely to be driven by omitted variables.

level.[15] In terms of magnitude, an increase of one percentage point in the share of women among migrants is associated with 0.019 more pro-environmental actions; in other words, in municipalities with the highest share of women among 1971 migrants (54.8%), people undertake approximately one more pro-environmental action than in municipalities with the lowest share of women among migrants (0.6%). Note that the overall intensity of emigration in 1971 remains negative and statistically significant. This implies that people living in municipalities with more intense emigration in 1971 are on average less likely to undertake pro-environmental action; however, a greater share of women among these migrants mitigates this negative effect and potentially overturns it. Specifically, if we substitute the actual values of the local emigration intensity and the share of women among migrants into the estimated equation 5 of Table 3, the joint effect of the two variables on pro-environmental action is negative for only 15% of municipalities (comprising 16% of the respondent sample) and positive for the remaining 85% (comprising 84% of the respondent sample). It is worth mentioning here that the correlation between the overall emigration rate and the share of women among migrants is positive but relatively low (0.17).

At the same time, the gender composition of the 1971 emigration flows is not a statistically significant predictor of environmental concern, informedness or beliefs (columns 2-4 of Table 3). Also, the share of the educated among migrants is statistically significant in all specifications, with the exception of the environmental concern model, where it is negative and significant at the 10% level. To check whether these results could be due to

[15] The Oster test deltas for the proportion of women variable are equal to 2.07 and 2.17 in specifications 1 and 5, respectively. This implies that the omitted variables would have to be at least twice as important determinants of pro-environmental action than the included controls to nullify the estimates of the share of women variable. In other words, the results are unlikely to suffer from the omitted variable bias.

multicollinearity, I have estimated three sets of models including only one compositional dimension at a time (and always keeping the overall emigration rate in the models). I obtained the same picture: when included separately, only the gender variable was significant (and positive) in the pro-environmental action specification; the educational variable was negative and marginally significant in the concern specification.

[Insert Table 3 about here]

Given that it is the emigration of women that appears to contribute to pro-environmental action back home, I checked how it is related to specific pro-environmental activities (Table 4). Estimating Model 2 with the variable capturing the proportion of women among the 1971 migrants, I found that more women among migrants is associated with a greater likelihood of recycling waste and reducing the use of disposable items (in both cases, the variable is significant at the 1% level; Columns 1 and 8 of Table 4), using environmentally-friendly transport (significant at 5%; Column 4 of Table 4) and buying local and seasonal produce (significant at 10%; Column 9 of Table 4).[16] Most of these outcomes represent a genuine effort to care for the environment, suggesting that female migration results in the transfer of pro-environmental behaviours. This is consistent with Levitt (2005) arguing that migrant women are more likely to absorb new norms and behaviours of their host countries and transfer them back home.

[Insert Table 4 about here]

Finally, to check whether local-level emigration is more important in shaping pro-environmentalism of stay-behind women, those with higher education and higher wealth, I

[16] The Oster test deltas, calculated on the corresponding OLS regressions, range from 1.86 to 8.28, meaning the results are unlikely to suffer from the omitted variable bias.

interact the emigration rate with the respondents' gender, education and wealth. The results suggest that the interaction terms between gender (female) and the emigration rate is positive and significant at the 99% level in the pro-environmental beliefs specification (Column 4 of Table 5). This means that women staying behind are more likely to hold pro-environmental beliefs if the local-level historical emigration intensity is high, which lends additional support for the Levitt's social remittances hypothesis, as women are more receptive to new norms and practices (Levitt, 2005). The interaction term between the local-level emigration intensity and primary education is also statistically significant (at the 90% level) and negative in the environmental concern specification (Column 2 of Table 5), implying that people with lower levels of education are less concerned about climate change in high-migration areas. While it is still the case that people with primary education are on average less concerned about climate change, which conforms to the literature (e.g. Meyer, 2015), our results suggest that the lack of environmental concern is amplified with the intensity of the local-level emigration.

4.2. Instrumental variable results

The Yugoslav emigration of the 1960s and 70s was the outcome of bilateral guestworker agreements between Yugoslavia and Western countries, with foreign companies involved in the direct recruitment of workers on the Yugoslav territory (Novinscak, 2009; Ivlevs and King, 2017). While this type of migration can, at least to some extent, be viewed as 'managed' and thus would mitigate certain selection biases, the decision of the Yugoslav workers to go abroad was by no means forced or random. It is therefore still possible that some local-level characteristics influenced both the intensity of emigration in 1971 and pro-environmentalism in 2010 (an example of such a confounder could be historical economic

development at the local level, and this has already been included as a control in the analysis). If local-level confounders exist and remain unaccounted for, the correlational results will be biased relative to the underlying causal effects.

To deal with potential endogeneity and move closer to causal effects, I employ the instrumental variable approach. In a nutshell, the method relies on finding an instrument – a variable highly correlated with the endogenous regressor (in our case, the intensity of 1971 emigration at the local level) and having no direct effect on the outcome (pro-environmentalism in 2010). The estimation consists of two stages: first, the endogenous regressor is regressed on the instrument(s) and the complete set of control variables; second, the outcome is regressed on the predicted values of the first-stage-regression alongside the full set of controls.

The proposed instrument for the local-level emigration intensity in 1971 is the local-level emigration intensity for 1901-1910. It is documented that, in the countries of ex-Yugoslavia, there are strong links between successive waves of emigration at the local level: in particular, the intensity of the local-level emigration at the turn of the 20th century and the interwar period can explain the local-level intensity of guestworker emigration of the 1960s and 70s (Brunnbauer, 2009, p. 34).[17] More broadly, there is a strong consensus that diasporas facilitate further migration through the reduction of migration costs (Beine, 2011; Collier and Hoeffler, 2018; Massey et al., 1998) and the links between successive migration waves are particularly strong at the local level (Comola and Mendola, 2015). Local- and regional-level emigrant intensity has indeed been widely used as an instrument for subsequent emigration waves in studies addressing the effects of emigration on sending country outcomes (see e.g.

[17] In turn, guestworker migration can explain the local-level intensity of the subsequent family reunification migration of the 1980s and the refugee migration of the 1990s and 2000s (Novinscak, 2009).

Anelli and Peri, 2017; Hildebrandt and McKenzie, 2005; Ivlevs and King, 2017; MacKenzie and Sasin, 2007).

I expect that the local-level emigration rates of the early 20th century will be a sufficiently strong predictor of the local-level guestworker emigration rates of 1971. There is also no reason to expect that the emigration that took place in 1901-1910 would directly affect people's pro-environmental norms and behaviours more than a century later (in 2010); i.e., the instrument is likely to be exogenous to the outcomes I study.

The data for the 1901-1910 local-level emigration rates come from Table XLI of the Statistical Atlas of the Kingdom of Croatia and Slavonia 1875-1915 (*Statistički atlas kraljevina Hrvatske i Slavonije 1875.- 1915.*, published in 1915). The Atlas covers only the territory of the Kingdom of Croatia and Slavonia Kingdom, which, at the turn of the century, was an autonomous territory of the Austro-Hungarian Empire and corresponded to the present-day Croatia (excluding the Istrian peninsula west of Rijeka and the Dalmatian coast south of Zadar) and a handful of municipalities in Serbia's region of Vojvodina (see Figure 2 in the Supplementary Information document). Therefore, to be able to use the instrument, I will need to limit our original sample of seven Yugoslav countries to the households that were interviewed on the territory of the former Kingdom of Croatia and Slavonia. This amounts to a sub-sample of 691 respondents, distributed across 20 municipalities in Croatia (there are altogether 28 Croatian municipalities included in the LITS-2 dataset) and three municipalities in Serbia.

The emigration rate in the Atlas is defined as the percentage of people who moved abroad from a particular municipality (*kotar*)[18] during the period 1901-1910 relative to the

[18] There were 70 kotars in the Kingdom of Croatia and Slavonia. The 1901-1910 administrative division by *kotars* closely corresponds to the municipal division of 1971 on the same territory.

average yearly population level in this municipality in 1890-1910. For the municipalities included in our sample, it ranges from 1 to 13%, with an average of 5%. I match these data with the LITS-2 survey through the municipality identifier.

The 1st stage instrumental variable results suggest that, controlling for the same variables as in Table 1, an increase of one percentage point in the emigration rate of 1901-10 is associated with a 0.082 percentage point increase in the emigration rate of 1971 ($\beta = 0.082$; $p < 0.001$). The 1901-10 emigration rate is thus a positive (as expected) and statistically significant predictor of the emigration rate of 1971. Its relevance is confirmed by the F (Kleibergen-Paap) test of excluded instruments, the values of which in all specifications exceed the commonly accepted threshold of 10 (Table 6).

The 2nd stage instrumental variable results, reported in Table 6, show that the higher intensity of local emigration in 1971 (as predicted by the local emigration rates of 1901-10), led to less pro-environmental action and lower concern for the environment in 2010.[19] The instrumental variable results thus reinforce the correlational results presented in Table 1, confirming that long-term emigration reduces pro-environmental outcomes as well as environmental concern.

[Insert Table 5 about here]

4.3.Limitations and directions for future research

[19] It should be noted that both the magnitude of the coefficients and the standard errors of the instrumented regressor are relatively large. The latter could be an indication of a weak instrument, and the results should be treated with caution.

While this study provides the first evidence of the effects of emigration on pro-environmentalism in the migrant communities of origin, it is not without limitations. First, given data constraints, the only feasible way to test the hypotheses was to combine local-level explanatory variables (historical emigration rates) with individual/household-level outcomes (pro-environmental actions, attitudes and beliefs). Depending on the availability of appropriate data, future research could verify whether the evidence obtained in this study also holds if the analysis is conducted purely at the household level, at the regional level, and at the country level. Second, while I have argued that there has to be sufficient time for emigration to be able to affect pro-environmental norms and behaviours in the communities of origin, and hence looked at the effects of a historical (four decades old) emigration wave, one could argue that more recent emigration dynamics at the local level also have an additional effect on the pro-environmentalism of those staying behind. Subject to data availability, future research could look at how more recent local-, as well as household-level, emigration relates to the pro-environmental norms and behaviours of those staying behind; in the context of post-Yugoslav countries, particular attention could also be paid to refugee outflows and returns. Third, I have tried to establish causality using the instrumental variable technique, using more than a century old local migration intensity as a source of variation for local emigration rates that is exogenous to present-day pro-environmentalism. Another way to deal with the endogeneity due to omitted variables would be to use longitudinal data which would allow relating the changes in environmental outcomes of the same units of analysis (households, communities, countries) to changes in emigration. Again, data constraints have not allowed me to carry out this type of analysis, and I leave it for future research. Finally, the evidence offered by this study to support the consumerism and social remittances channels is indirect. Future research should could delve into exact reasons for how emigration affects pro-environmental behaviour and norms back home, for example by conducting

qualitative in-depth interviews or designing surveys that would allow uncover the effects directly.

5. CONCLUSION

This paper set out to determine whether emigration has an impact on the environmental norms and behaviours of people staying in the migrant communities of origin. Focusing on former Yugoslavia, I found that the present-day likelihood of undertaking pro-environmental action is negatively associated with the local-level intensity of a major emigration wave that took place four decades earlier; instrumental variable results support the causal nature of this relationship. A possible explanation for this finding is the conjecture that migrant remittances are disproportionately spent on status and luxury goods, the possession of which is rarely compatible with pro-environmentalism. At the same time, we found that a higher proportion of women among migrants is associated with a greater likelihood of undertaking pro-environmental action, supporting the gendered social remittances hypothesis. Overall, this study highlights the role of emigration in shaping pro-environmental practices back home and contributes to the recent literature showing that emigration affects social, institutional and political outcomes in the communities and countries of origin.

A message of this study for policymakers is that emigration can result in less pro-environmental back home – most likely, through greater consumerism. If policymakers are interested in minimising the adverse environmental impacts of emigration, they could restrict emigration or, more realistically, focus on high-emigration areas to promote pro-environmental action, for example through information campaigns. At the same time, emigration of women is associated with greater pro-environmental action back home – most likely, through transfer of pro-environmental norms and behaviours. Policymakers could

therefore encourage the mobility of women, and facilitate travel and communication between female migrants and their home communities to ensure a more effective transfer of pro-environmental norms and practices.

REFERENCES

Aide, T.M., and Grau, H.R. 2004. Globalization, migration, and Latin American ecosystems. Science 305: 1915–6.

Amuedo-Dorantes, C. 2014. The good and the bad in remittance flows. IZA World of Labor 2014: 97.

Anelli, M., and Peri, G. 2017. Does emigration delay political change? Evidence from Italy during the great recession. Economic Policy 32(91): 551-596.

Baucic, I. 1973. Radnici u inozemstvu prema popisu stanovništva Jugoslavije 1971 [Yugoslav workers abroad according to the 1971 Yugoslav census]. Zagreb: Institut za Geofrafiju Sveučilišta.

Beine, M., Docquier, F., and Özden, Ç. 2011. Diasporas. Journal of Development Economics, 95(1): 30-41.

Beine, M., and Parsons, C. 2015. Climatic factors as determinants of international migration. Scandinavian Journal of Economics, 117(2): 723-767.

Brunnbauer, U. (2009). Labour Emigration from the Yugoslav Region from the late 19th Century until the End of Socialism: Continuities and Changes. In Brunnbauer, U. (ed.), *Transnational Societies, Transterritorial Politics. Migrations in the (Post-)Yugoslav Region, 19th–21st Century*. Munich: R. Oldenbourg Verlag.

Carter, E. D., Silva, B., and Guzmán, G. 2013. Migration, Acculturation, and Environmental Values: The Case of Mexican Immigrants in Central Iowa. Annals of the Association of American Geographers 103(1): 129-147

Coniglio, N.D., and Pesce, G. 2015. Climate variability and international migration: An empirical analysis. Environment and Development Economics, 20(4): 434-468.

Collier, P., and Hoeffler, A. 2018. Migration, Diasporas and Culture: An Empirical Investigation. Kyklos 71(1): 86-109.

Comola, M., and Mendola, M. 2015. Formation of Migrant Networks. The Scandinavian Journal of Economics 117(2): 592-618.

Davis, J., and Lopez-Carr, D. 2010. The effects of migrant remittances on population-environment dynamics in migrant origin areas: international migration, fertility, and consumption in highland Guatemala. Population and Environment 32(2/3): 216-237.

Davis, J., and Lopez-Carr, D. 2014. Migration, Remittances and Smallholder Decision-Making: Implications for Land Use and Livelihood Change in Central America. Land Use Policy 36: 319-29.

Diekmann, A., and Franzen, A. (1999) The wealth of nations and environmental concern. Environment and Behavior 31(4): 540–549.

El-Sakka, M.I.T., and McNabb, R. 1999. The Macroeconomic Determinants of Emigrant Remittances. World Development 27(8): 1493-1502.

European Commission. 2008. Attitudes of European citizens towards the environment report, Brussels: TNS Opinion & Social. Special Eurobarometer 295/Wave 68.2.

Gifford, R., and Nilsson, A. 2014. Personal and social factors that influence pro-environmental concern and behaviour: A review. International Journal of Psychology 49(3): 141-157.

Graham, B.A.T., Miller, M.K., and Strom, K.W. 2017. Safeguarding Democracy: Powersharing and Democratic Survival. American Political Science Review 111(4): 686-704.

Hecht, S., and Saatchi, S. 2007. Globalization and Forest Resurgence: Changes in Forest Cover in El Salvador, BioScience 57(8): 663–672.

Hildebrandt, N. and McKenzie, D. 2005. The effects of migration on child health in Mexico. *Economia* 6(1): 257–289

Hunter , L. M. , A. Hatch , and Johnson A. 2004. Cross-national gender variation in environmental behaviors. Social Science Quarterly 85: 677–694.

Hunter, L.M., Luna, J.K., and Norton, R.M. 2015. Environmental Dimensions of Migration. Annual Review of Sociology 41(1): 377-397.

Inglehart, R. 1997. Modernization and Postmodernization: Cultural, Economic, and Political Change in 43 Societies. Princeton University Press, Chichester; Princeton, N.J.

Inglehart, R. and Welzel, C. 2005. Modernization, cultural change, and democracy: the human development sequence. New York: Cambridge UP.

Ivanova, D., Stadler, K., Steen-Olsen, K., Wood, R., Vita, G., Tukker, A., and Hertwich, E.G. 2016. Environmental Impact Assessment of Household Consumption. Journal of Industrial Ecology 20(3): 526-536.

Ivlevs, A. 2019. Adverse welfare shocks and pro-environmental behaviour: Evidence from the global economic crisis. Review of Income and Wealth 65(2): 293-311.

Ivlevs, A. and King, R. 2017. Does emigration reduce corruption? Public Choice 171 (3-4): 389–408.

Jokisch, B.D. 2002. Migration and Agricultural Change: The Case of Smallholder Agriculture in Highland Ecuador. Human Ecology 30(4): 523-550.

Kidd, Q., and A. R. Lee. 1997. Post-materialist values and the environment: A critique and reappraisal. *Social Science Quarterly* 78:1–15.

Kountouris, Y., and Remoundou, K. 2016. Cultural Influence on Preferences and Attitudes for Environmental Quality. Kyklos 69 (2): 369-397.

Levitt, P. 1998. Social Remittances: Migration Driven Local-Level Forms of Cultural Diffusion. International Migration Review 32: 926-948.

Levitt, P. 2005. Social remittances – culture as a development tool. Inter-American Development Bank 1–6.

Maurel, M., and Tuccio, M. 2016. Climate Instability, Urbanisation and International Migration. The Journal of Development Studies 52, 735-752.

McKenzie, D. and Sasin, M. 2007. Migration, remittances, poverty, and human capital : conceptual and empirical challenges. World Bank Policy Research Working Paper 4272. Washington, DC: World Bank.

Meyer, A. 2015. Does education increase pro-environmental behavior? Evidence from Europe. Ecological Economics 116: 108-121.

Millock, K. 2015. Migration and Environment. Annual Reviews of Resource Economics 7: 35-60.

Montefrio, M., Ortiga, Y., and Josol, M. 2014. Inducing Development: Social Remittances and the Expansion of Oil Palm. International Migration Review 48(1): 216-242.

Novinscak, K. 2009. The recruiting and sending of Yugoslav 'gastarbeiter' to Germany: Between socialist demands and economic needs. In U. Brunnbauer (Ed.), Transnational societies, trans territorial politics. Migrations in the (post-)Yugoslav region, 19th–21st century. Munich: R. Oldenbourg Verlag.

Oster, E. 2019. Unobservable Selection and Coefficient Stability: Theory and Evidence. Journal of Business & Economic Statistics 37(2): 187-204.

Rigaud, K., de Sherbinin, A., Jones, B., Bergmann, J., Clement, V., Ober, K., Schewe, J., Adamo, S., McCusker, B., Heuser, S., and Midgley, A. 2018. Groundswell : Preparing for Internal Climate Migration. World Bank, Washington, DC.

Roosen, I., and Siegel, M. 2018. Migration and its influence on the knowledge and usage of birth control methods among Afghan women who stay behind, Public Health, vol. 158, pp. 183-197.

Statistički atlas kraljevina Hrvatske i Slavonije 1875-1915. 1915. Kr. Zemaljski statistički ured, Zagreb.

Stephenson, A.V., and Wilsker, A. 2016. Consumption Effects of Foreign Remittances in Jamaica. International Advances in Economic Research 22(3) 309-320.

Strielkowski, W., and Weyskrabova, B. 2014. Ukrainian Labour Migration and Remittances in the Czech Republic, Tijdschrift voor economische en sociale geografie, 105: 30-45.

Taylor, M., Moran-Taylor, M., and Rodman Ruiz, D. 2006. Land, Ethnic, and Gender Change: Transnational Migration and its Effects on Guatemalan Lives and Landscapes. Geoforum, 37(1): 41-61.

Vertovec, S. 2004. Migrant Transnationalism and Modes of Transformation. International Migration Review 38(3): 970–1001.

Vianello, F.A. 2013. Ukrainian migrant women's social remittances: Contents and effects on families left behind. Migration Letters 10(1): 91-100.

Vlase, I. 2013. Women's social remittances and their implications at household level: A case study of Romanian migration to Italy. Migration Letters 10(1): 81-90.

Walker, L., and Bellingham, P. 2011. Island Environments in a Changing World. Cambridge and New York: Cambridge University Press.

Xu, X., and Sylwester, K. 2016. Environmental Quality and International Migration. Kyklos, 69(1): 157-180.

Table 1. Long-term local emigration and present-day pro-environmentalism, OLS coefficients

	Pro-environmental action	Concerned about climate change	Informed about climate change	Pro-environmental beliefs	Pro-environmental action
	1	2	3	4	5
Municipality emigration rate 1971	-0.051***	0.005	-0.017	-0.013	-0.053***
	(0.019)	(0.016)	(0.024)	(0.012)	(0.019)
Women	0.124***	0.109***	-0.108	0.048	0.111***
	(0.042)	(0.029)	(0.080)	(0.037)	(0.040)
Age 18-24	-0.136	-0.030	0.034	-0.063	-0.120
	(0.101)	(0.056)	(0.153)	(0.067)	(0.098)
Age 25-34	-0.131*	-0.065	-0.066	-0.080	-0.114
	(0.077)	(0.042)	(0.104)	(0.058)	(0.077)
Age 45-54	0.112	0.026	0.022	-0.003	0.122
	(0.071)	(0.043)	(0.114)	(0.058)	(0.079)
Age 55-64	0.149*	0.090*	0.064	-0.015	0.111
	(0.085)	(0.052)	(0.122)	(0.061)	(0.097)
Age 65+	0.153	-0.049	-0.102	0.001	0.143
	(0.096)	(0.069)	(0.147)	(0.075)	(0.096)
Single	-0.040	-0.099**	0.049	-0.022	-0.019
	(0.075)	(0.044)	(0.118)	(0.056)	(0.075)
Divorced/separated	-0.034	-0.019	0.081	0.063	-0.037
	(0.094)	(0.075)	(0.168)	(0.084)	(0.105)
Widowed	-0.222***	-0.076	-0.248*	-0.066	-0.190**
	(0.077)	(0.057)	(0.141)	(0.081)	(0.084)
Primary education	-0.166***	-0.206***	-0.922***	-0.150***	0.025
	(0.061)	(0.042)	(0.106)	(0.050)	(0.060)
Tertiary education	0.431***	0.090*	0.977***	0.162***	0.271***
	(0.099)	(0.052)	(0.120)	(0.055)	(0.100)
Wealth index	0.132***	0.038**	0.279***	0.031*	0.084***
	(0.023)	(0.015)	(0.036)	(0.017)	(0.023)
Rural area	-0.134	-0.106*	-0.363**	-0.065	-0.076
	(0.093)	(0.061)	(0.168)	(0.077)	(0.093)
Average municipality income 1981	-0.000	-0.002**	-0.003	-0.001	-0.000
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Municipality illiteracy rate 1971	0.007	-0.011	-0.035*	-0.003	0.013
	(0.013)	(0.009)	(0.021)	(0.011)	(0.013)
Concerned about climate change	-	-	-	-	0.236***
					(0.035)
Informed about climate change	-	-	-	-	0.114***
					(0.014)
Pro-environmental beliefs	-	-	-	-	0.109***
					(0.025)
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,478	7,370	6,667	6,450
R-squared	0.254	0.062	0.168	0.051	0.320
Prob > F	0.000	0.000	0.000	0.000	0.000
Delta (Oster test)					

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered at the municipality level, in parentheses. Reference groups for categorical regressors are: men, age 35-44, married/living with a partner, secondary education, urban area.

Table 2. Long-term local emigration and different types of present-day pro-environmentalism, probit marginal effects

	Waste recycling	Bought an efficient car	Reduced use of own car	Chosen pro-environmental transport	Reduced energy consumption
	(1)	(2)	(3)	(4)	(5)
Municipality emigration rate 1971	-0.005	-0.000	-0.003**	-0.001	-0.011**
	(0.004)	(0.001)	(0.001)	(0.003)	(0.004)
DIndividual-level controls	Yes	Yes	Yes	Yes	Yes
Municipality-level controls	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,707	7,707	7,707	7,707
Pseudo R^2	0.304	0.148	0.158	0.119	0.179
Prob > Chi^2	0.000	0.000	0.000	0.000	0.000

	Reduced water consumption	Avoid flights	Fewer disposable items	Buy local and seasonal products	Installed renewable energy equipment
	(6)	(7)	(8)	(9)	(10)
Municipality emigration rate 1971	-0.011***	-0.001	-0.006*	-0.003*	-0.000
	(0.004)	(0.001)	(0.003)	(0.002)	(0.000)
Individual-level controls	Yes	Yes	Yes	Yes	Yes
Municipality-level controls	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,707	7,707	7,707	7,707
Pseudo R^2	0.188	0.134	0.160	0.121	0.245
Prob > Chi^2	0.000	0.000	0.000	0.000	0.000

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors, clustered at the municipality level, in parentheses. All regressions include the same control variables as in Specifications 1-4 of Table 1. See Table S2 of Supplementary Information for complete econometric output.

Table 3. Gender and education composition of the 1971 municipality-level emigration flows and pro-environmentalism in 2010, OLS coefficients

	Pro-environmental action	Concerned about climate change	Informed about climate change	Pro-environmental beliefs	Pro-environmental action
	(1)	(2)	(3)	(4)	(5)
Municipality emigration rate 1971	-0.052**	-0.003	-0.013	-0.010	-0.053**
	(0.021)	(0.016)	(0.025)	(0.014)	(0.022)
Share of women among migrants	0.019***	0.000	-0.005	-0.006	0.018***
	(0.006)	(0.005)	(0.013)	(0.006)	(0.006)
Share of educated among migrants	0.004	-0.006*	0.002	0.000	0.005
	(0.006)	(0.004)	(0.009)	(0.004)	(0.006)
Individual-level controls	Yes	Yes	Yes	Yes	Yes
Municipality-level controls	Yes	Yes	Yes	Yes	Yes
Environmental controls	No	-	-	-	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,478	7,370	6,667	6,450
R-squared	0.261	0.070	0.169	0.056	0.323
Prob > F	0.000	0.000	0.000	0.000	0.000

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors, clustered at the municipality level, in parentheses. All regressions include the same control variables as in Table 1. See Table S3 of Supplementary Information for complete econometric output.

Table 4. Long-term local emigration, share of women among emigrants, and different types of present-day pro-environmentalism, probit marginal effects

	Waste recycling	Bought an efficient car	Reduced use of own car	Chosen pro-environmental transport	Reduced energy consumption
	(1)	(2)	(3)	(4)	(5)
Municipality emigration rate 1971	-0.007**	-0.000	-0.003**	-0.002	-0.011**
	(0.003)	(0.001)	(0.001)	(0.003)	(0.005)
Share of women among emigrants 1971	0.005***	0.000	0.000	0.002**	0.002
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Individual-level controls	Yes	Yes	Yes	Yes	Yes
Municipality-level controls	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,707	7,707	7,707	7,707
Pseudo R^2	0.313	0.148	0.158	0.121	0.179
Prob > Chi^2	0.000	0.000	0.000	0.000	0.000

	Reduced water consumption	Avoid flights	Fewer disposable items	Buy local and seasonal products	Installed renewable energy equipment
	(6)	(7)	(8)	(9)	(10)
Municipality emigration rate 1971	-0.011***	-0.001	-0.007**	-0.004**	-0.000
	(0.004)	(0.001)	(0.003)	(0.002)	(0.000)
Share of women among emigrants 1971	0.001	-0.000	0.004***	0.001*	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Individual-level controls	Yes	Yes	Yes	Yes	Yes
Municipality-level controls	Yes	Yes	Yes	Yes	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,707	7,707	7,707	7,707
Pseudo R^2	0.189	0.134	0.166	0.123	0.245
Prob > Chi^2	0.000	0.000	0.000	0.000	0.000

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors, clustered at the municipality level, in parentheses. All regressions include the same control variables as in Specifications 1-4 of Table 1. See Table S4 of Supplementary Information for complete econometric output.

Table 5. Long-term local emigration interacted with gender, education and wealth, and present-day pro-environmentalism, OLS coefficients

	Pro-environmental action	Concerned about climate change	Informed about climate change	Pro-environmental beliefs	Pro-environmental action
	(1)	(2)	(3)	(4)	(5)
Municipality emigration rate 1971	-0.058***	0.017	0.009	-0.022	-0.065***
	(0.021)	(0.017)	(0.034)	(0.016)	(0.022)
Municipality emigration rate 1971*woman	0.008	-0.006	-0.020	0.028***	0.008
	(0.017)	(0.008)	(0.027)	(0.009)	(0.015)
Municipality emigration rate 1971*primary education	0.008	-0.022*	-0.043	-0.011	0.024
	(0.024)	(0.012)	(0.040)	(0.016)	(0.023)
Municipality emigration rate 1971*tertiary education	-0.012	-0.005	-0.009	-0.018	-0.012
	(0.030)	(0.015)	(0.036)	(0.018)	(0.029)
Municipality emigration rate 1971*wealth index	0.002	0.002	0.006	-0.002	-0.000
	(0.008)	(0.004)	(0.010)	(0.006)	(0.009)
Women	0.102*	0.127***	-0.049	-0.039	0.087
	(0.062)	(0.043)	(0.118)	(0.048)	(0.058)
Primary education	-0.189**	-0.141**	-0.792***	-0.116	-0.050
	(0.091)	(0.061)	(0.166)	(0.073)	(0.091)
Tertiary education	0.469***	0.105	1.005***	0.216***	0.310**
	(0.151)	(0.069)	(0.172)	(0.079)	(0.151)
Wealth index	0.126***	0.032	0.259***	0.036	0.086***
	(0.027)	(0.020)	(0.051)	(0.024)	(0.029)
Individual-level controls	Yes	Yes	Yes	Yes	Yes
Municipality-level controls	Yes	Yes	Yes	Yes	Yes
Environmental controls	No	-	-	-	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,478	7,370	6,667	6,450
R-squared	0.254	0.063	0.168	0.051	0.320
Prob > F	0.000	0.000	0.000	0.000	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered at the municipality level, in parentheses. All regressions include the same control variables as in Specifications 1-4 of Table 1. See Table S5 of Supplementary Information for complete econometric output.

Table 6. Long-term local emigration and present-day pro-environmentalism, 2nd stage results of instrumental variable estimations

	Pro-environmental action	Concerned about climate change	Informed about climate change	Pro-environmental beliefs	Pro-environmental action
Emigration rate 1971	-2.168***	-0.742***	-0.648	-0.101	-2.712**
	(0.687)	(0.234)	(0.606)	(0.461)	(0.990)
Individual-level controls	Yes	Yes	Yes	Yes	Yes
Municipality-level controls	Yes	Yes	Yes	Yes	Yes
Environmental controls	No	-	-	-	Yes
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Instrument: Emigration rate 1901-1910					
Instrument relevance test					
Kleibergen-Paap F statistic	26.78***	25.10***	25.99***	17.46***	11.39***
Observations	691	682	676	613	602
R-squared	0.227	0.111	0.256	0.070	0.257
Prob > F	0.000	0.000	0.000	0.000	0.000

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Robust standard errors, clustered at the municipality level, in parentheses. All regressions include the same control variables as in Table 1. See Table S6 of Supplementary Information for complete econometric output.

SUPPLEMENTARY INFORMATION DOCUMENT

Contents

Table S1. Summary statistics of variables included in the analysis

	Observations	Mean	Standard deviation	Min	Max
Pro-environmental action	7707	1.054	1.908	0	10
Concerned about climate change	7478	2.986	2.585	1	5
Informed about climate change	7370	25.709	13.134	4	16
Pro-environmental beliefs	6667	3.295	1.156	2	10
Municipality emigration rate 1971	232*	9.480	3.033	0.5	18.6
Share of women among migrants 1971	232*	6.996	1.408	0.6	54.8
Share of educated among migrants 1971	232*	25.212	17.150	0.7	72.8
Municipality emigration rate 1901-1910	23*	5.433	3.399	1.28	12.76
Female	7707	0.561	0.496	0	1
Age 18-24	7707	0.131	0.337	0	1
Age 25-34	7707	0.217	0.412	0	1
Age 35-44	7707	0.179	0.383	0	1
Age 45-54	7707	0.167	0.373	0	1
Age 55-64	7707	0.150	0.357	0	1
Age 65+	7707	0.157	0.364	0	1
Married	7707	0.608	0.488	0	1
Single	7707	0.238	0.426	0	1
Divorced/separated	7707	0.048	0.213	0	1
Widowed	7707	0.106	0.307	0	1
Primary education	7707	0.372	0.483	0	1
Secondary education	7707	0.501	0.500	0	1
Tertiary education	7707	0.127	0.333	0	1
Wealth index	7707	0.425	1.649	-2.711	3.328
Rural area	7707	0.438	0.496	0	1
Average municipality income 1981	232*	95.064	54.702	10.2	255.3
Municipality illiteracy rate 1971	232*	12.335	7.370	0.365	31.934

Note: * indicates the number of municipalities

Figure 1. Intensity of local-level, guestworker emigration in Yugoslav communes in 1971

Source: Baucic (1973)

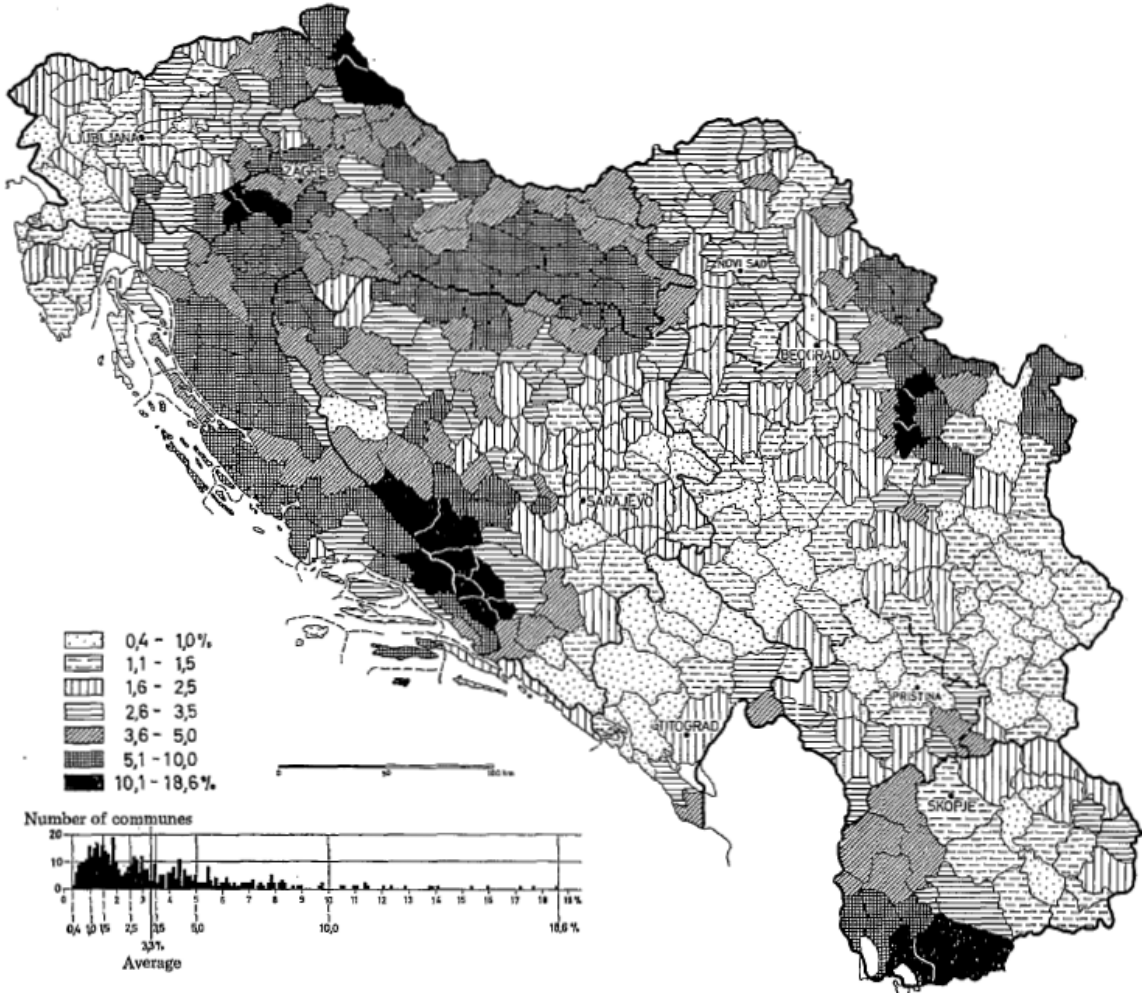

Figure 2. Local-level emigration from the Kingdom of Croatia and Slavonia in 1901-10.

Source: Statistički atlas kraljevina Hrvatske i Slavonije 1875-1915 (1915)

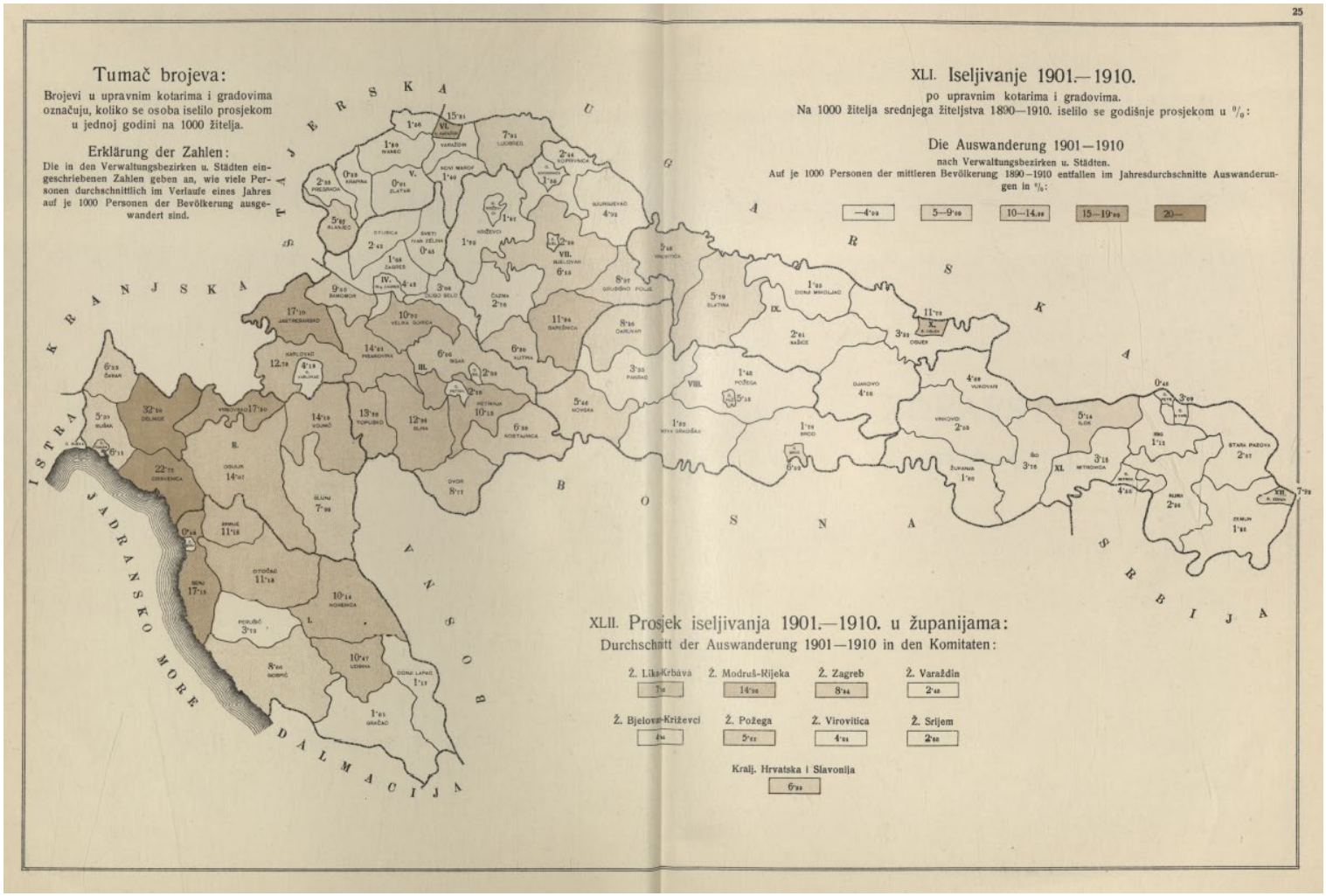

Table S2. Long-term local emigration and different types of present-day pro-environmentalism, probit marginal effects; corresponds to Table 2 in the article

	Waste recycling	Bought an efficient car	Reduced use of own car	Chosen pro-environmental transport	Reduced energy consumption	Reduced water consumption	Avoid flights	Fewer disposable items	Buy local and seasonal products	Installed renewable energy equipment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Municipality emigration rate 1971	-0.005	-0.000	-0.003**	-0.001	-0.011**	-0.011***	-0.001	-0.006*	-0.003*	-0.000
	(0.004)	(0.001)	(0.001)	(0.003)	(0.004)	(0.004)	(0.001)	(0.003)	(0.002)	(0.000)
Women	0.023***	-0.008**	0.003	0.010	0.026***	0.021**	0.001	0.027***	0.014***	-0.000
	(0.007)	(0.004)	(0.004)	(0.007)	(0.009)	(0.009)	(0.003)	(0.007)	(0.005)	(0.000)
Age 18-24	-0.035**	-0.005	-0.022**	0.005	-0.040**	-0.021	0.010	-0.018	-0.010	-0.000
	(0.016)	(0.009)	(0.010)	(0.017)	(0.018)	(0.019)	(0.006)	(0.016)	(0.011)	(0.000)
Age 25-34	-0.029**	0.007	-0.000	-0.013	-0.025	-0.008	0.001	-0.008	-0.022***	-0.000*
	(0.012)	(0.006)	(0.009)	(0.012)	(0.016)	(0.015)	(0.004)	(0.013)	(0.008)	(0.000)
Age 45-54	0.004	0.010	0.010	0.024*	0.012	0.012	0.008*	0.001	0.008	0.000
	(0.011)	(0.006)	(0.007)	(0.013)	(0.015)	(0.014)	(0.004)	(0.011)	(0.009)	(0.000)
Age 55-64	0.008	0.019***	0.013	0.037***	0.002	0.010	-0.000	0.016	0.010	0.001
	(0.012)	(0.006)	(0.009)	(0.014)	(0.018)	(0.018)	(0.004)	(0.012)	(0.009)	(0.000)
Age 65+	0.005	0.010	0.010	0.033**	0.009	0.015	0.000	0.031**	0.027**	0.000
	(0.015)	(0.007)	(0.010)	(0.016)	(0.021)	(0.020)	(0.005)	(0.014)	(0.012)	(0.000)
Single	-0.012	-0.007	0.006	0.021**	-0.012	-0.007	-0.001	-0.005	0.002	-0.000
	(0.014)	(0.006)	(0.007)	(0.010)	(0.015)	(0.014)	(0.003)	(0.011)	(0.009)	(0.000)
Divorced/separated	0.015	-0.014**	-0.006	0.028*	-0.001	0.013	-0.012**	0.001	-0.016	-0.000
	(0.016)	(0.007)	(0.009)	(0.016)	(0.019)	(0.020)	(0.005)	(0.018)	(0.010)	(0.000)
Widowed	-0.012	-0.036***	-0.026***	-0.031**	-0.009	-0.008	-0.005	-0.015	-0.023**	-0.000
	(0.012)	(0.009)	(0.008)	(0.013)	(0.017)	(0.017)	(0.004)	(0.013)	(0.009)	(0.000)
Primary education	-0.034***	-0.008*	-0.017***	-0.012	-0.032**	-0.018	-0.002	-0.020*	-0.010	-0.001***
	(0.010)	(0.004)	(0.006)	(0.011)	(0.013)	(0.013)	(0.003)	(0.011)	(0.008)	(0.000)

Tertiary education	0.057***	0.011**	0.013	0.045***	0.053***	0.049***	0.005	0.036***	0.045***	0.000
	(0.014)	(0.005)	(0.008)	(0.011)	(0.015)	(0.015)	(0.004)	(0.012)	(0.010)	(0.000)
Wealth index	0.018***	0.015***	0.013***	0.010***	0.021***	0.010**	0.001	0.015***	0.011***	0.000***
	(0.004)	(0.002)	(0.002)	(0.003)	(0.005)	(0.004)	(0.001)	(0.003)	(0.002)	(0.000)
Rural area	-0.020	0.003	-0.015*	-0.035**	-0.021	-0.019	-0.001	-0.027*	-0.008	0.000
	(0.015)	(0.006)	(0.008)	(0.014)	(0.021)	(0.018)	(0.003)	(0.016)	(0.012)	(0.000)
Municipality illiteracy rate 1971	-0.001**	0.000*	0.000	-0.000	-0.000	-0.000	0.000*	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average municipality income 1981	-0.002	0.001	0.000	-0.000	0.002	0.005	0.002***	0.000	0.000	-0.000
	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.001)	(0.003)	(0.001)	(0.000)
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,707	7,707	7,707	7,707	7,707	7,707	7,707	7,707	7,707
Pseudo R^2	0.304	0.148	0.158	0.119	0.179	0.188	0.134	0.160	0.121	0.245
Prob > Chi^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered at the municipality level, in parentheses. Reference groups are: men, age 35-44, married/living with a partner, secondary education, urban area.

Table S3. Gender and education composition of the 1971 municipality-level emigration flows and pro-environmentalism in 2010, OLS coefficients; corresponds to Table 3 in the article

	Pro-environmental action	Concerned about climate change	Informed about climate change	Pro-environmental beliefs	Pro-environmental action
	(1)	(2)	(3)	(4)	(5)
Municipality emigration rate 1971	-0.052**	-0.003	-0.013	-0.010	-0.053**
	(0.021)	(0.016)	(0.025)	(0.014)	(0.022)
Share of women among migrants	0.019***	0.000	-0.005	-0.006	0.018***
	(0.006)	(0.005)	(0.013)	(0.006)	(0.006)
Share of educated among migrants	0.004	-0.006*	0.002	0.000	0.005
	(0.006)	(0.004)	(0.009)	(0.004)	(0.006)
Women	0.126***	0.109***	-0.109	0.047	0.113***

	(0.042)	(0.029)	(0.080)	(0.037)	(0.039)
Age 18-24	-0.136	-0.032	0.035	-0.062	-0.121
	(0.101)	(0.057)	(0.153)	(0.067)	(0.098)
Age 25-34	-0.127*	-0.066	-0.066	-0.081	-0.111
	(0.076)	(0.042)	(0.104)	(0.058)	(0.077)
Age 45-54	0.110	0.022	0.024	-0.001	0.121
	(0.071)	(0.044)	(0.114)	(0.058)	(0.080)
Age 55-64	0.142*	0.088*	0.067	-0.012	0.103
	(0.084)	(0.052)	(0.121)	(0.061)	(0.095)
Age 65+	0.143	-0.042	-0.103	0.001	0.131
	(0.092)	(0.070)	(0.146)	(0.075)	(0.093)
Single	-0.043	-0.098**	0.050	-0.021	-0.022
	(0.074)	(0.044)	(0.118)	(0.056)	(0.075)
Divorced/separated	-0.040	-0.016	0.081	0.064	-0.047
	(0.094)	(0.075)	(0.168)	(0.084)	(0.105)
Widowed	-0.232***	-0.075	-0.246*	-0.063	-0.199**
	(0.078)	(0.057)	(0.141)	(0.082)	(0.084)
Primary education	-0.161***	-0.212***	-0.921***	-0.150***	0.031
	(0.061)	(0.043)	(0.106)	(0.050)	(0.060)
Tertiary education	0.440***	0.097*	0.972***	0.157***	0.280***
	(0.098)	(0.051)	(0.119)	(0.056)	(0.100)
Wealth index	0.130***	0.038**	0.279***	0.032*	0.082***
	(0.022)	(0.015)	(0.036)	(0.017)	(0.022)
Rural area	-0.162*	-0.104*	-0.357**	-0.057	-0.104
	(0.093)	(0.062)	(0.172)	(0.077)	(0.093)
Average municipality income 1981	-0.001	-0.001	-0.004	-0.001	-0.001
	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)
Municipality illiteracy rate 1971	0.025	-0.019*	-0.036	-0.007	0.032*
	(0.017)	(0.011)	(0.026)	(0.013)	(0.018)
Concerned about climate change	-	-	-	-	0.238***
					(0.035)
Informed about climate change	-	-	-	-	0.114***
					(0.014)
Pro-environmental beliefs	-	-	-	-	0.111***
					(0.025)

Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,478	7,370	6,667	6,450
R-squared	0.257	0.064	0.168	0.051	0.323
Prob > F	0.000	0.000	0.000	0.000	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered at the municipality level, in parentheses. Reference groups are: men, age 35-44, married/living with a partner, secondary education, urban area.

Table S4. Long-term local emigration, share of women among emigrants, and different types of present-day pro-environmentalism, probit marginal effects; corresponds to Table 4 in the article

	Waste recycling	Bought an efficient car	Reduced use of own car	Chosen pro-environmental transport	Reduced energy consumption	Reduced water consumption	Avoid flights	Fewer disposable items	Buy local and seasonal products	Installed renewable energy equipment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Municipality emigration rate 1971	-0.007**	-0.000	-0.003**	-0.002	-0.011**	-0.011***	-0.001	-0.007**	-0.004**	-0.000
	(0.003)	(0.001)	(0.001)	(0.003)	(0.005)	(0.004)	(0.001)	(0.003)	(0.002)	(0.000)
Share of women among emigrants 1971	0.005***	0.000	0.000	0.002**	0.002	0.001	-0.000	0.004***	0.001*	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Women	0.024***	-0.008**	0.003	0.010	0.026***	0.021**	0.001	0.028***	0.014***	-0.000
	(0.007)	(0.004)	(0.004)	(0.007)	(0.009)	(0.009)	(0.003)	(0.007)	(0.005)	(0.000)
Age 18-24	-0.034**	-0.005	-0.022**	0.005	-0.040**	-0.021	0.010	-0.017	-0.009	-0.000
	(0.017)	(0.009)	(0.010)	(0.017)	(0.018)	(0.019)	(0.006)	(0.016)	(0.011)	(0.000)
Age 25-34	-0.027**	0.007	-0.000	-0.012	-0.025	-0.008	0.001	-0.007	-0.022***	-0.000*
	(0.012)	(0.006)	(0.009)	(0.012)	(0.016)	(0.015)	(0.004)	(0.013)	(0.008)	(0.000)
Age 45-54	0.004	0.010	0.010	0.023*	0.012	0.012	0.008*	0.001	0.008	0.000
	(0.011)	(0.007)	(0.007)	(0.013)	(0.015)	(0.014)	(0.004)	(0.011)	(0.009)	(0.000)
Age 55-64	0.005	0.019***	0.013	0.035***	0.001	0.009	-0.000	0.013	0.009	0.001
	(0.011)	(0.006)	(0.009)	(0.014)	(0.017)	(0.018)	(0.004)	(0.012)	(0.009)	(0.000)
Age 65+	0.003	0.010	0.010	0.032**	0.008	0.014	0.000	0.029**	0.026**	0.000
	(0.014)	(0.007)	(0.010)	(0.016)	(0.021)	(0.020)	(0.005)	(0.014)	(0.011)	(0.000)
Single	-0.014	-0.007	0.006	0.020**	-0.013	-0.007	-0.001	-0.006	0.002	-0.000
	(0.013)	(0.006)	(0.007)	(0.010)	(0.015)	(0.014)	(0.003)	(0.011)	(0.009)	(0.000)
Divorced/separated	0.012	-0.015**	-0.006	0.027*	-0.002	0.012	-0.012**	-0.001	-0.016	-0.000
	(0.016)	(0.007)	(0.009)	(0.016)	(0.019)	(0.020)	(0.005)	(0.017)	(0.010)	(0.000)
Widowed	-0.014	-0.036***	-0.026***	-0.032**	-0.010	-0.009	-0.005	-0.018	-0.023**	-0.000
	(0.011)	(0.009)	(0.008)	(0.013)	(0.017)	(0.017)	(0.004)	(0.013)	(0.009)	(0.000)
Primary education	-0.033***	-0.008*	-0.017***	-0.011	-0.032**	-0.018	-0.002	-0.019*	-0.010	-0.001***

	(0.010)	(0.004)	(0.006)	(0.011)	(0.013)	(0.013)	(0.003)	(0.011)	(0.008)	(0.000)
Tertiary education	0.061***	0.011**	0.013	0.047***	0.054***	0.050***	0.005	0.039***	0.047***	0.000
	(0.014)	(0.005)	(0.008)	(0.011)	(0.015)	(0.015)	(0.004)	(0.012)	(0.010)	(0.000)
Wealth index	0.017***	0.015***	0.013***	0.010***	0.020***	0.010**	0.001	0.014***	0.011***	0.000***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)	(0.004)	(0.001)	(0.003)	(0.002)	(0.000)
Rural area	-0.028*	0.003	-0.015*	-0.038***	-0.024	-0.021	-0.001	-0.033**	-0.010	0.000
	(0.015)	(0.006)	(0.008)	(0.014)	(0.021)	(0.018)	(0.003)	(0.016)	(0.012)	(0.000)
Average municipality income 1981	-0.000*	0.000*	0.000	-0.000	-0.000	-0.000	0.000*	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Municipality illiteracy rate 1971	0.001	0.001	0.000	0.002	0.003	0.005	0.002**	0.003	0.001	-0.000
	(0.002)	(0.001)	(0.001)	(0.002)	(0.004)	(0.003)	(0.001)	(0.003)	(0.002)	(0.000)
Country-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,707	7,707	7,707	7,707	7,707	7,707	7,707	7,707	7,707
Pseudo R^2	0.313	0.148	0.158	0.121	0.179	0.189	0.134	0.166	0.123	0.245
Prob > Chi^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered at the municipality level, in parentheses. Reference groups are: men, age 35-44, married/living with a partner, secondary education, urban area.

Table S5. Long-term local emigration interacted with gender, education and wealth, and present-day pro-environmentalism, OLS coefficients; corresponds to Table 5 in the article

	Pro-environmental action	Concerned about climate change	Informed about climate change	Pro-environmental beliefs	Pro-environmental action
VARIABLES	(1)	(2)	(3)	(4)	(5)
Municipality emigration rate 1971	-0.058***	0.017	0.009	-0.022	-0.065***
	(0.021)	(0.017)	(0.034)	(0.016)	(0.022)
Municipality emigration rate 1971*woman	0.008	-0.006	-0.020	0.028***	0.008
	(0.017)	(0.008)	(0.027)	(0.009)	(0.015)
Municipality emigration rate 1971*primary education	0.008	-0.022*	-0.043	-0.011	0.024
	(0.024)	(0.012)	(0.040)	(0.016)	(0.023)
Municipality emigration rate 1971*tertiary education	-0.012	-0.005	-0.009	-0.018	-0.012
	(0.030)	(0.015)	(0.036)	(0.018)	(0.029)
Municipality emigration rate 1971*wealth index	0.002	0.002	0.006	-0.002	-0.000
	(0.008)	(0.004)	(0.010)	(0.006)	(0.009)
Women	0.102*	0.127***	-0.049	-0.039	0.087
	(0.062)	(0.043)	(0.118)	(0.048)	(0.058)
Age 18-24	-0.134	-0.030	0.033	-0.063	-0.118
	(0.101)	(0.056)	(0.153)	(0.067)	(0.098)
Age 25-34	-0.131*	-0.065	-0.066	-0.082	-0.114
	(0.076)	(0.042)	(0.104)	(0.059)	(0.077)
Age 45-54	0.111	0.027	0.027	-0.004	0.120
	(0.070)	(0.043)	(0.114)	(0.058)	(0.079)
Age 55-64	0.150*	0.090*	0.064	-0.015	0.112
	(0.085)	(0.052)	(0.122)	(0.062)	(0.097)
Age 65+	0.151	-0.043	-0.086	-0.002	0.136
	(0.096)	(0.069)	(0.147)	(0.075)	(0.096)
Single	-0.040	-0.097**	0.055	-0.021	-0.021
	(0.074)	(0.044)	(0.118)	(0.056)	(0.074)
Divorced/separated	-0.036	-0.018	0.086	0.061	-0.039
	(0.094)	(0.075)	(0.167)	(0.085)	(0.105)

Widowed	-0.224***	-0.072	-0.236*	-0.069	-0.195**
	(0.076)	(0.057)	(0.141)	(0.081)	(0.083)
Primary education	-0.189**	-0.141**	-0.792***	-0.116	-0.050
	(0.091)	(0.061)	(0.166)	(0.073)	(0.091)
Tertiary education	0.469***	0.105	1.005***	0.216***	0.310**
	(0.151)	(0.069)	(0.172)	(0.079)	(0.151)
Wealth index	0.126***	0.032	0.259***	0.036	0.086***
	(0.027)	(0.020)	(0.051)	(0.024)	(0.029)
Rural area	-0.135	-0.106*	-0.361**	-0.068	-0.077
	(0.093)	(0.061)	(0.168)	(0.076)	(0.093)
Average municipality income 1981	-0.000	-0.002**	-0.003	-0.001	-0.000
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Municipality illiteracy rate 1971	0.007	-0.010	-0.034	-0.003	0.013
	(0.012)	(0.009)	(0.021)	(0.011)	(0.013)
Concerned about climate change	-	-	-	-	0.237***
					(0.035)
Informed about climate change	-	-	-	-	0.115***
					(0.014)
Pro-environmental beliefs	-	-	-	-	0.108***
					(0.025)
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	7,707	7,478	7,370	6,667	6,450
R-squared	0.254	0.063	0.168	0.051	0.320
Prob > F	0.000	0.000	0.000	0.000	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered at the municipality level, in parentheses. Reference groups are: men, age 35-44, married/living with a partner, secondary education, urban area.

Table S6. Long-term local emigration and present-day pro-environmentalism, 2nd stage results of instrumental variable estimations; corresponds to Table 6 in the article

	Pro-environmental action	Concerned about climate change	Informed about climate change	Pro-environmental beliefs	Pro-environmental action
	(1)	(2)	(3)	(4)	(5)
Municipality emigration rate 1971	-2.168***	-0.742***	-0.648	-0.101	-2.712**
	(0.687)	(0.234)	(0.606)	(0.461)	(0.990)
Women	0.536***	0.207**	-0.384	0.276***	0.631***
	(0.159)	(0.095)	(0.227)	(0.095)	(0.144)
Age 18-24	-0.763**	-0.005	-0.798	0.188	-0.766**
	(0.328)	(0.215)	(0.501)	(0.153)	(0.328)
Age 25-34	-0.593***	-0.005	-0.941***	-0.188	-0.477**
	(0.183)	(0.167)	(0.322)	(0.211)	(0.199)
Age 45-54	0.100	0.080	-0.320	0.009	-0.098
	(0.327)	(0.152)	(0.405)	(0.157)	(0.356)
Age 55-64	-0.184	0.008	0.040	-0.251	-0.078
	(0.261)	(0.101)	(0.378)	(0.172)	(0.337)
Age 65+	1.294***	0.233**	0.201	0.063	1.437***
	(0.330)	(0.093)	(0.370)	(0.211)	(0.377)
Single	0.431*	-0.010	0.773**	-0.022	0.482
	(0.210)	(0.132)	(0.314)	(0.168)	(0.304)
Divorced/separated	0.056	0.099	0.275	-0.075	-0.156
	(0.263)	(0.157)	(0.360)	(0.247)	(0.330)
Widowed	-0.747**	-0.182	0.028	-0.293	-0.577**
	(0.276)	(0.125)	(0.403)	(0.251)	(0.228)
Primary education	0.206	-0.279**	-1.152**	-0.368***	0.229
	(0.225)	(0.130)	(0.420)	(0.118)	(0.210)
Tertiary education	0.905***	0.150	0.700**	0.301	0.953**
	(0.307)	(0.160)	(0.305)	(0.185)	(0.415)
Wealth index	0.250**	-0.018	0.288**	-0.065	0.212**
	(0.093)	(0.048)	(0.113)	(0.048)	(0.094)
Rural area	-1.713***	-0.670***	-1.024*	-0.176	-1.788***
	(0.458)	(0.202)	(0.508)	(0.335)	(0.554)
Average municipality income 1981	-0.034**	-0.018***	-0.016	0.003	-0.044**

	(0.013)	(0.004)	(0.012)	(0.009)	(0.017)
Municipality illiteracy rate 1971	0.023	-0.063***	-0.120***	0.021	0.102
	(0.102)	(0.011)	(0.042)	(0.043)	(0.105)
Concerned about climate change	-	-	-	-	0.069
					(0.073)
Informed about climate change	-	-	-	-	0.017
					(0.087)
Pro-environmental beliefs	-	-	-	-	0.008
					(0.080)
Country-fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	691	682	676	613	602
R-squared	0.227	0.111	0.256	0.070	0.257
Prob > F	0.000	0.000	0.000	0.000	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors, clustered at the municipality level, in parentheses. Reference groups are: men, age 35-44, married/living with a partner, secondary education, urban area.