14/ CITIZENS' CLIMATE RESPONSIBILITY AND HUMAN VALUES IN THE EUROPEAN UNION

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ABSTRACT

Using data from the European Social Survey for 17 countries in the European Union, we estimate models to predict personal responsibility to fight climate change and willingness to pay taxes on fossil fuels. This is the first study to research personal and fiscal responsibility simultaneously. It is also the first to use the details of all of Schwartz's basic human values to analyse pro-environmental behaviour. The study's main conclusions are the following. Firstly, human values in the self-protection dimension (*Conservation* and *Self-Enhancement*) tend to reduce responsibility, whereas values in the growth dimension (*Self-Transcendence* and *Openness to Change*) tend to increase it. Secondly, among *Self-Enhancement* values, *Power* has a negative effect, but *Achievement* tends to have a positive effect. Thirdly, among *Self-Transcendence* values, biospheric and other *universalist* values have a positive effect, but *Benevolence* reduces support for green taxes. Fourthly, *Hedonism* has negative effects on values of *Openness to Change* but *Stimulation* positive ones. Fifthly, the findings for control variables show that age is the most important individual factor explaining personal and fiscal responsibility, followed by political variables (left-right orientation, interest in politics, trust in politicians) and income. These results can help to design communication policies related to the European *Green Deal*.

Keywords: climate change; personal responsibility; fiscal responsibility; environmental behaviour; Schwartz.

1. INTRODUCTION

The *European Green Deal*[3] is an ambitious package of measures accompanied by a roadmap of key policies. Its goal is to make Europe the world's first climate-neutral continent by 2050. The success of these policies depends on public engagement and support (Poortinga *et al.*, 2019), which require proper design of communication policies. Ensuring success thus requires identification of social profiles with different motivations that affect perceptions and decisions about climate change. Ziegler (2017), for example, concludes that communication campaigns should focus on conservative and right-wing networks to foster support for climate change policies. In this respect, people are more likely to act pro-environmentally when they are more aware of the collective costs and benefits associated with their behaviour more strongly. As people are also more likely to act pro-environmentally when they strongly endorse specific human values (Steg, 2016), this paper uses Schwartz's (1992) scale of human values to analyse citizens' motivations.

Willingness to take pro-environmental action is a function of human values (Stern *et al.*, 1995). Two of the potential survey items most closely related to policy design are personal responsibility to fight climate change and willingness to pay taxes on fossil fuels. We summarize these two dependent variables under the following generic description: personal and fiscal responsibility for climate change. Some prior literature has included human values in studying variables such as climate concern (Poortinga *et al.*, 2019), which is related to willingness to pay to mitigate climate change (Dienes, 2015; Bouman *et al.*, 2020; Davidovic *et al.*, 2020). Boto-García and Bucciol (2020) analysed the role of four higher-order human values in shaping beliefs about personal responsibility. Fairbrother *et al.* (2019) focused on socio-political determinants of support for taxes on fossil fuels but not on human values. Ziegler (2017) studied the influence of environmental values on similar variables. No previous literature has, however, systematically analysed the role of Schwartz's basic values in personal and fiscal climate responsibility.

The aim of this paper is to analyse the role of Schwartz's (1992) ten basic human values in predicting personal and fiscal responsibility for climate change among citizens in 17 countries in the European Union. We study the effects[4] of the following human motivations: *Security*, *Conformity*, *Tradition*, *Achievement*, *Power*, *Benevolence*, *Universalism*, *Self-Direction*, *Stimulation* and *Hedonism*. The analysis ultimately includes eleven values because we divide universalism into the biospheric value 'care for nature' and other aspects of *Universalism*. Using the European Social Survey (ESS), we estimate models by weighted Ordinary Least Squares (OLS) with standard errors clustered by country, focusing on individual-level human values and controlling for several socio-demographic factors.

[3] *https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en*

[4] *For reasons of convenience, we use the word* effects *to refer to statistically significant results in our statistical model. Section 5 adds some thoughts on the issue of causality.*

This is the first study to research personal and fiscal responsibility simultaneously. It is also the first to use the details of all of Schwartz's basic human values to analyse pro-environmental behaviour. The study's main conclusions are the following. Firstly, human values in the self-protection dimension (*Conservation* and *Self-Enhancement*) tend to reduce responsibility, whereas values in the growth dimension (*Self-Transcendence* and *Openness to Change*) tend to increase it. Secondly, among values of *Self-Enhancement, Power* has a negative effect, but *Achievement* tends to have a positive effect. Thirdly, among values of *Self-Transcendence*, biospheric and other universalist values have a positive effect, but *Benevolence* reduces support for green taxes. Fourthly, regarding values of *Openness to Change, Hedonism* has negative effects, but *Stimulation* has positive ones. Fifthly, the findings for control variables show that age is the most important individual factor explaining personal and fiscal responsibility, followed by political variables (left-right orientation, interest in politics, trust in politicians) and income.

The rest of the chapter is organized as follows. Section 2 reviews the literature on human values and climate responsibility. Section 3 describes the methodology and data. Section 4 discusses the results. Finally, Section 5 draws conclusions and proposes some policy implications.

2. HUMAN VALUES AND CLIMATE RESPONSIBILITY: THEORETICAL FRAMEWORK

2.1. Schwartz's scale of individual human values and pro-environmental behaviour

Schwartz (1992) defines values as broad motivational goals that serve as guides to behaviour and as criteria for judging people and events. Each value is defined by the goals towards which it is directed—that is, by the motivation it expresses. *Figure 1* presents the ten basic values and the goals that define them. Values form a circular structure. The more compatible any two values are, the closer they are on the circle, and the more they conflict, the farther apart. *Table 1* shows additional details on Schwartz's scale of human values, as well as how these values are measured in the ESS. The ten basic values may be grouped into four higher-order values that summarize the opposition between competing values: *Conservation* vs. *Openness to Change* in the growth dimension and *Self-Enhancement* vs. *Self-transcendence* in the self-protection dimension. The growth dimension involves relation to self-restriction and order vs. novelty and independent thought. The self-protection dimension captures motivation towards personal interests vs. towards others. Moreover, *Conservation* and *Self-transcendence* are higher-order values with a social focus, whereas *Openness to change* and *Self-enhancement* have a personal focus. Among Schwartz's ten basic values, '*Universalism*' includes an ESS item about caring for nature

and environment, and this item is an indicator of biospheric values. Given the importance of this value, the empirical paper in this study analyses one indicator of *Universalism* (items v03 and v08) separately from the biospheric value (v19).

De Groot and Steg (2008) and Steg (2016) use an alternative classification of human values that is useful for understanding their relationship to pro-environmental behaviour. Steg (2016) concludes that both hedonic (feel good, reduce effort) and egotistical (focus on own resources, such as money and status) values lead people to focus on the personal costs and benefits of choice options. People are less likely to act pro-environmentally when they strongly endorse these values. Altruistic (benefit to others) and biospheric (nature) values, in contrast, lead people to focus on collective consequences of options. People are more likely to act pro-environmentally when they strongly endorse these values. Altruistic and biospheric values are sometimes considered as broadly equivalent to Schwartz's *Self-Transcendent* and *Conservation* groupings, whereas egotistical values appear to belong to the *Self-Enhancement* cluster (Corner *et al.*, 2014; Sagiv & Schwartz, 2022). These two classifications of human values do not, however, map on to each other precisely.

Our research hypothesizes that the most significant classification of Schwartz's four higher-order human values separates growth from self-protection values. Values that express self-expansive growth motivations (e.g., *Self-Direction*) contrast with values that express self-protection motivations (e.g., *Security*).

Figure 1. *Circular structure of the 10 basic values, four higher-order values and two underlying motivational sources.*

Source: *Sortheix and Schwartz (2017).*

Broadly speaking, we expect values in the growth dimension (*Self-Transcendence* and *Openness to Change*) to be more pro-environmental and values in the self-protection dimension (*Conservation* and *Self-Enhancement*) to be less pro-environmental. We must qualify this starting point, however, when we classify values into ten human values.

In *Figure 1* and *Table 1*, *Self-Transcendence* includes *Universalism* and Benevolence (values in the growth dimension and with social focus), related to altruistic and biospheric values. We thus expect a positive effect of those values on pro-environmental behaviour. As explained by Bruna (2022), however, items v12 (out-group value) and v18 (in-group value) could conflict with each other, partially due to the role family plays in each individual and culture. A similar conflict occurs in Hofstede's (1980) human values scale, in which prioritizing family over work is considered a sign of individualism. The expected effect of Benevolence on pro-environmental behaviour is thus unclear. One result below shows a negative effect.

In the self-protection dimension, *Self-Enhancement*, which includes *Achievement* and *Power*, opposes *Self-Transcendence*. While *Self-Enhancement* is an egotistical value with foreseeable negative effects on pro-environmental behaviour, *Achievement* is more complex. It mixes focus on relative social success with own abilities and achievements, which may be positively related to climate change challenges, as shown in one of our estimations below. Indeed, *Achievement* is considered both a growth and a self-protection value (*Figure 1*).

Moreover, Schwartz's scale understands *Hedonism* as part of *Openness to Change*, along with *Stimulation* and *Self-direction*. While we may expect *Hedonism* to affect pro-environmental behaviour negatively, the expected effects of *Stimulation* and *Self-direction* are unclear, as these values have a personal but not necessarily an egotistical focus. They motivate towards new ideas and challenges that could increase probability to act pro-environmentally. One of our later results reveals a positive effect of *Stimulation* on pro-environmental behaviour.

In the growth dimension, the term opposing *Openness to Change* is *Conservation*, which includes *Security*, *Conformity* and *Tradition*. These socially focused self-protection values cannot be simplified to a dichotomy between altruism and egoism. Details in *Table 1* show that these values are about order, self-restriction, and resistance to change. We thus anticipate that these values could generate a negative reaction against climate change challenges.

Table 1. *Four higher-order value dimensions, ten basic values with their motivational goals and the 21 items of the European Social Survey used to measure them.*

SELF-PROTECTION VALUES	
Conservation:	Values that emphasize order, self-restriction, and resistance to change.
Security -	Safety, harmony, and stability of society, of relationships and of self
v05 -	Important to live in secure and safe surroundings
v14 -	Important that government is strong and ensures safety
Conformity -	Restraint of actions likely to upset others and violate social expectations or norms
v07 -	Important to do what is told and follow rules
v16 -	Important to behave properly
Tradition -	Respect, commitment and acceptance of the customs and ideas of traditional culture or religion
v09 -	Important to be humble and modest, not draw attention
v20 -	Important to follow traditions and customs
Self-Enhacement :	Values that emphasize pursuit of one´s interests, relative success, and dominance.
Achievement -	Personal success through demonstrating competence according to social standards
v04 -	Important to show abilities and be admired
v13 -	Important to be successful and that people recognize achievements
Power -	Social status and prestige, control or dominance over people and resources
v02 -	Important to be rich, have money and expensive things
v17 -	Important to get respect from others
GROWTH VALUES	
Self-Trascendence:	Values that emphasize concern for the welfare and interests of others.
Benevolence -	Preservation and enhancement of welfare of people with whom one is in frequent personal contact
v12 -	Important to help people and care for others well-being
v18 -	Important to be loyal to friends and devote to people close
Universalism -	Understanding, and protection for the welfare of all and the environment
v03 -	Important that people are treated equally and have equal opportunities
v08 -	Important to understand different people
v19 -	Important to care for nature and environment (biospheric value)
Openness to Change:	Values that emphasize independence of thought, action and feeling, readiness for change.
Self-Direction -	Independent thought and action-choosing, creating, exploring
v01 -	Important to think new ideas and being creative
v11 -	Important to make own decisions and be free
Stimulation -	Excitement, novelty, and challenge in life
v06 -	Important to try new and different things in life
v15 -	Important to seek adventures and have an exciting life
Hedonism -	Pleasure and sensuous gratification for oneself
v10 -	Important to have a good time
v21 -	Important to seek fun and things that give pleasure

Source. *Prepared by the authors based on Sortheix and Schwartz (2017) and on ESS documentation.*

2.2 Human values and climate responsibility

Having generally assessed human values and pro-environmental behaviour in the previous subsection, we turn to the prior literature on our specific indicators of personal and fiscal responsibility for climate change. As that literature is minimal, we begin by summarizing the literature on a dependent variable related to ours, concern about climate change.

Using ESS data and considering a two-variable version of Schwartz's four higher-order value dimensions, Poortinga *et al.* (2019) found that *Self-transcendence* (vs. self-enhancement) increased climate concern, whereas *Conservation* (vs. openness-to-change) reduced it. For a small sample of students in Italy, Prati *et al.* (2018) found that *Self-Direction* increased concern, whereas *Hedonism* reduced it. Using the ESS, Bouman *et al.* (2020) showed a positive influence of biospheric values and climate concern on personal responsibility and support for climate taxes. Dienes (2015) and Davidovic *et al.* (2020) also showed a positive effect of concern on willingness to pay to mitigate climate change.

Also using ESS data and Schwartz's four-higher order value dimensions, Boto-García and Bucciol (2020) analysed the role of human values in shaping beliefs about personal responsibility to mitigate climate change and found that the four human values were statistically significant. Their effects align with our discussion above: values in the self-protection dimension (*Conservation* and *Self-Enhancement*) reduce personal responsibility, whereas values in the growth dimension (*Self-Transcendence* and *Openness to Change*) increase it.

Ziegler (2017) showed that environmental values increased support for publicly financed climate policy in the United States and Germany. Fairbrother et al. (2019) used ESS data to conduct a detailed analysis of determinants of support for taxes on fossil fuels but did not study the role of human values. They considered, however, egalitarian attitudes —related to Schwartz's *Universalism* (see *Table 1*)— as different from political orientation, to conclude that egalitarian individuals tend to favour climate taxes.

3. EMPIRICAL MODEL AND DATA DESCRIPTION

3.1 Methodology

We model personal responsibility to reduce climate change and willingness to support green taxes in the European Union (variables Y) as a function of individual socioeconomic characteristics (control variables X_c) and Schwartz's ten basic human values (X_{hv}), as follows:

$$Y=\beta_0+\beta_c X_c+\beta_{hv} X_{hv}+\varepsilon,$$

where β_0 is the intercept, β_c and β_{hv} are the sets of coefficients associated with the respective explanatory variable, and ε is a vector of individual error terms assumed to be independently and identically distributed. This model is estimated by OLS. As detailed below, our dependent variables are categorical, although we assume that they are linearly related to the explanatory variables. Additional estimations not reported here show that ordered probit models yield results qualitatively similar to linear models but harder to interpret.[5]

[5] *These results are available upon request. Literature summarized by Bruna and Rungo (2020) for categorical variables of well-being assume linearity for the same reason.*

Moreover, we realize the potential for many interaction effects among the control variables and between the control variables and the ten basic human values. We leave these issues for further research.

We use weighted estimation[6] and cluster the standard errors of the coefficients in *Table 3* by country. The results, not reported here but available upon request, show that weighted estimations with clustered standard errors are more demanding in evaluating the statistical significance of our explanatory variables. The results of the significant variables presented in *Table 3* are thus more robust than unweighted estimations or estimations with regular standard errors.

3.2 Data

Using the eighth round of the ESS,[7] we analysed a sample of 23,800 individuals from 17 countries in the European Union. Our two dependent variables are the following two questionnaire items:

- *'To what extent do you feel a personal responsibility to try to reduce climate change?', where the response scale ranges from 0 ('Not at all') to 10 ('A great deal').*

- *'To what extent are you in favour of or against the following policies of increasing taxes on fossil fuels, such as oil, gas and coal?', where the response scale ranges from 1 ('Strongly against') to 5 ('Strongly in favour').*

Schwartz's 'Computing Scores for the 10 Human Values'[8] explains methodological details for computing human values scores on the ESS. These values are calculated as arithmetic means from the 21 questionnaire items (see *Table 2*). For reasons discussed in Bruna (2021), we prefer raw calculation of human values to a version centred on the mean of the ten human values for each individual, as suggested by Schwartz. We do, however, introduce two additional transformations. Each of the 21 items is recoded so that possible responses range from 1 'Not like me at all' to 6 'Very much like me'. Additionally, the basic human values considered in the models in *Table 3* are defined as deviations from their country means and standardized.[9] As mentioned in subsection 2.1, Universalism is divided into two different variables.

Our control variables are the following (see also *Table 2*):

- *Age* and *Age*^{2}. Previous literature has shown a negative impact of age on pro-environmental behaviour. Poortinga *et al*. (2019) found this impact for concern about climate change. Dienes (2015) and Fairbrother *et al*. (2019) obtained the same result for intention to pay taxes to combat

[6] *We used the ESS analysis weights (anweight), which correct for different selection probabilities within each country, as specified by sample design for nonresponse, noncoverage and sampling error; and consider differences in population size across countries.*
[7] *https://www.europeansocialsurvey.org/data/round-index.html*
[8] *See also the following link: http://essedunet.nsd.uib.no/cms/topics/1/4/4.html.*
[9] *See note to Table 2 for further details on standardization of variables.*

climate change. Dienes (2015), however, found a positive influence of age when explaining whether the respondent had personally taken action to help fight climate change. We study the nonlinear effects of *Age* to consider additional complexity.

- Gender: coded 1 if the respondent is *Female*; 0 otherwise. Prior literature has shown that women engage in more pro-environmental behaviour (Wicker & Becken, 2013; Muttarak & Chankrajang, 2015).

- Education: coded 1 if the respondent affirms having *Tertiary education*; 0 otherwise. Education seems to promote pro-environmental behaviour, according to Dienes (2015), Muttarak & Chankrajang (2015) and Poortinga *et al*. (2019). Since preliminary unreported tests revealed tertiary education as the main discriminatory education level, we focus on this dichotomous variable.

- *Rural*: coded 1 if the respondent states that they live in a country village, on a farm or in the countryside; 0 otherwise. Living in an urban vs. rural setting could affect pro-environmental behaviour in different ways. Living in rural areas encourages a closer relationship to nature, but our model also controls for biospheric values. People in rural areas tend to be more conservative than urban populations, but other variables in our model also capture this difference, rendering the expected effect unclear.

- *Political orientation*. On a left (value 0)-right scale (10), *Centre* is coded 1 if the respondent chose scores between 4 and 6; 0 otherwise. Right is coded 1 if the respondent chose scores between 7 and 10; 0 otherwise. Hornsey *et al.'s* (2016) metanalysis shows that the largest correlation of a demographic characteristic with climate change belief is political affiliation. Further, Driscoll (2019) found that political polarization has caused a decline in sociodemographic predictors of climate change concern in recent decades. Due to the significance of political influences, we considered three political control variables. As to Political orientation, the literature shows that right-wing citizens tend to be less pro-environmentally inclined (Fielding *et al.*, 2012; Poortinga *et al.*, 2019; Duijndam & van Beukering, 2021).

- *Interest in politics. Quite interested* is coded 1 if the respondent affirmed being hardly or quite interested in politics on a four-category scale; 0 otherwise. *Very interested* is coded 1 if the respondent affirmed being very interested in politics; 0 otherwise. Apart from political orientation, we propose the hypothesis that political sophistication increases pro-environmental behaviour, as suggested by Fairbrother *et al.* (2019) for willingness to pay green taxes.

- *Trust in politicians*. On a scale from 0 (no trust at all) to 10 (complete trust), Medium is coded 1 if the respondent chose scores between 4 and 6; 0, otherwise. High is coded 1 if the respondent chose scores between 7 and 10; 0, otherwise. Tam and Chan (2017) found a weaker association of environmental concern with behaviour in societies with higher levels of distrust. Davidovic *et al.* (2020) show that perceived quality of government helps to explain willingness to pay environmental taxes. Fairbrother (2017) remarks that political distrust is key to explaining support for policy solutions to environmental problems.

- Relative household total net income. On a scale of 10 deciles, *Medium income* is coded 1 if the respondent affirmed an income level in the 4th to 7th deciles; 0 otherwise. *High income* is coded 1 if the respondent affirmed an income level in the 8th to 10th deciles; 0 otherwise. Despite some previous controversial results (McCright & Dunlap, 2011), for a sample of European countries, we follow Inglehart's postmaterialist thesis, predicting higher propensity to pro-environmental behaviour for people with higher relative income (Gelissen, 2007; Franzen & Meyer, 2010).

Table 2. *Summary statistics.*

Variable	Mean	Std. Dev
Personal responsibility	6.795	2.649
Favour taxes	2.793	1.238
Age	50.1	17.8
Female	0.512	0.500
Tertiary education	0.252	0.434
Rural	0.379	0.485
Political orientation: centre	0.534	0.499
Political orientation: right	0.246	0.431
Quite interested in politics	0.736	0.441
Very interested in politics	0.131	0.338
Trust in politicians: medium	0.418	0.493
Trust in politicians: high	0.123	0.328
Medium income	0.446	0.497
High income	0.270	0.444
Security	4.616	1.028
Conformity	3.994	1.095
Tradition	4.280	0.985
Achievement	3.699	1.204
Power	3.222	1.070
Benevolence	4.963	0.797
Universalism	4.767	0.859
Biospheric (v19)	4.883	0.998
Self-Direction	4.650	0.915
Stimulation	3.551	1.174
Hedonism	4.078	1.117

Note. *The table presents the descriptive statistics of the variables before transformations performed for the equations in Table 3. In those estimations, dependent variables and variable Age are centred globally and standardized. Human values are also centred on the national means and divided by the standard deviation. See the text for details on country dummy variables.*

- Country dummies are coded by regions of the European Union, as in Poortinga *et al.*'s (2019) study: *Northern* (Finland & Sweden), *Sourthern* (Italy, Portugal and Spain), *Western* (Austria, Belgium, France, Germany, Ireland & Netherlands) and *Eastern* (Czechia, Estonia, Hungary, Lithuania, Poland and Slovenia). *Eastern* is the reference group for *Table 3*.

4. RESULTS

4.1. Control variables

One contribution of this research is to show comparable differing effects of Age on personal and fiscal responsibility for climate change. Our results align with Boto-García and Bucciol (2020), who found that *Age* increased the feeling of personal responsibility to reduce climate change, although at a decreasing rate (the estimate for *Age squared* is negative). These results show an inverse U-shape relationship between personal responsibility and age, such that the middle-aged feel most personal involvement to fight climate change. The opposite is true for willingness to pay taxes to mitigate climate change. *Age* reduces willingness to pay taxes, although the oldest people are more willing to pay than are the middle-aged (U-shape).[10]

As to gender, our results confirm that *Female* has a positive effect on personal responsibility, a result also obtained by Boto-García and Bucciol (2020). In the weighted estimation with clustered standard errors shown in *Table 3*, *Female* is not significant for willingness to pay taxes, although alternative estimations not reported here reveal a positive significant effect, like that also found in Fairbrother *et al.* (2019).

Tertiary education has a strong positive effect on willingness to pay taxes (Fairbrother *et al.*, 2019) but is not significant in this restrictive estimation of personal responsibility.[11] In unreported alternative estimations, *Tertiary education* is also significant and positive for responsibility, as found by Boto-García and Bucciol (2020).

Although our results confirm the finding by Boto-García and Bucciol (2020) that living in a rural location is not significant in explaining personal responsibility, we obtain a significant negative estimate of *Rural* for willingness to pay taxes to fight climate change (see discussion in subsection 3.2).

As to political variables, right-leaning *Political orientation* reduces personal responsibility, as in Boto-García and Bucciol's (2020) results, and affects willingness to pay taxes even more strongly (Ziegler, 2017; Fairbrother *et al.*, 2019; Sivonen & Koivula, 2020).[12] Our results confirm the hypothesis that higher *Interest in politics* increases personal and fiscal responsibility. They also confirm

[10] *To avoid estimates with many zeros, we estimate the models presented in Table 3 with standardized Age and Age². The estimates in the table do not therefore permit calculation of the turn-around age of the non-linear relationships to the standardized dependent variables.*
[11] *For the United States, McCright and Dunlap (2011) report that the effects of education attainment on global warming beliefs and concern are positive for liberals and Democrats but weaker or negative for conservatives and Republicans.*

Table 3. *Weighted OLS with clustered standard errors by country (23,080 observations).*

		Personal responsability	Favour taxes
Sociodemographic variables			
Age		0.31*** (0.03)	-0.35** (0.10)
Age^2		-0.40*** (0.04)	0.28** (0.09)
Female		0.06* (0.02)	0.04 (0.02)
Tertiary education		0.03 (0.02)	0.19*** (0.03)
Rural		-0.01 (0.02)	-0.09*** (0.03)
Political orientation: centre		-0.04 (0.03)	-0.11* (0.04)
Political orientation: right		-0.05* (0.02)	-0.15*** (0.04)
Interest in politics: medium		0.21*** (0.04)	0.13*** (0.03)
Interest in politics: high		-0.31*** (0.06)	0.16** (0.05)
Trust in politicians: medium		0.05 (0.04)	0.23*** (0.02)
Trust in politicians: high		-0.11* (0.05)	0.36*** (0.03)
Income: medium		0.11** (0.03)	0.06** (0.02)
Income: high		0.13** (0.04)	0.15*** (0.02)
Northern		0.49* (0.19)	0.66*** (0.07)
Southern		0.32 (0.20)	0.07 (0.07)
Western		0.55* (0.20)	0.22* (0.09)
Self-Protection human values			
Conservation	Security	-0.03* (0.01)	-0.06*** (0.01)
	Conformity	-0.04** (0.01)	-0.00 (0.01)
	Tradition	-0.01 (0.01)	-0.04* (0.02)
Self-Enhancement	Achievement	0.02* (0.01)	0.01 (0.01)
	Power	-0.05** (0.02)	-0.01 (0.02)
Growth human values			
Self-Trascendence	Benevolence	-0.01 (0.02)	-0.04*** (0.01)
	Universalism	0.07*** (0.02)	0.02 (0.02)
	Biospheric value (v19)	0.24*** (0.02)	0.15*** (0.02)
Openess to change	Self-Direction	0.00 (0.01)	-0.02 (0.01)
	Stimulation	0.06** (0.01)	0.03 (0.02)
	Hedonism	-0.02* (0.01)	-0.03** (0.01)
R^2		0.18	0.12

Note. *Weighted OLS estimation using ESS analysis weights (anweight). Standard errors clustered by country are in brackets. Results for intercept are not shown. See note to Table 2. * p<0.05, ** p<0.01 and *** p<0.001.*

[12] *Davidovic et al. (2020) note that leftist political ideology is a more significant driver of public support for environmental taxes in countries with high quality of government.*

that high *Trust in politicians* has a strong positive effect on willingness to pay green taxes (Fairbrother *et al.*, 2019) and significantly influences personal responsibility.

In this sample of European countries, higher individual relative Income has strong positive significant effects on both personal responsibility (Boto-García & Bucciol, 2020) and favouring climate taxes (Fairbrother *et al.*, 2019).

Comparing the size of the standardized estimates shows that *Age* is the most important individual factor explaining personal and fiscal responsibility, although it does so differently for each dependent variable. Political sophistication, measured by *Interest in Politics*, is a key attribute explaining personal responsibility, while *Trust in politicians* plays a stronger role in support of green taxes. *Tertiary education* and *Political orientation* are more important for taxes than for personal responsibility. Relative *Income* is a significant variable, but political attributes dominate.

The country dummies' main significant positive effect is on *Northern* in willingness to pay taxes, a result also obtained by Fairbrother *et al.* (2019). The fixed effects of *Western* are also significant. Our results confirm lower personal and fiscal responsibility towards climate change in *Southern* and *Eastern* countries.

4.2. Human values

Our general results for personal responsibility are consistent with Boto-García and Bucciol's (2020) findings for the four higher-order human values: Self-protection values (*Conservation* and *Self-Enhancement*) tend to reduce personal responsibility, whereas growth values (*Self-Transcendence* and *Openness to Change*) tend to increase it. Our analysis of the ten basic values reveals, however, some particularities that are masked in studies of human values at a higher aggregation level.

On the self-protection axis, *Conformity* and *Security* seem to be the most significant Conservation values for personal responsibility and are estimated as negative. Similarly, *Power* is the most significant *Self-Enhancement* value and is estimated to be negative. The *Self-Enhancement* value of *Achievement*, in contrast, has a positive effect on personal responsibility due to its simultaneous attributes as a value of self-protection and growth, as discussed in subsection 2.1

Among the motivation towards growth, our results for personal responsibility confirm the positive effects of *Self-Transcendence* values, particularly for biospheric and other universalist values. Similarly, *Stimulation* is the most significant *Openness to Change* value explaining responsibility and is estimated

as positive. As expected, however, the estimate for *Hedonism* is negative (see discussion in subsection 2.1).

As to willingness to pay taxes on fossil fuels, our global assessment of the results resembles the previous assessment for personal responsibility, with some specific differences. In motivations for self-protection, *Security* and *Tradition* are the most significant *Conservation* values reducing support for green taxes. *Self-Enhancement* values are not significant in the weighted estimation with clustered standard errors, although *Achievement* has a significant positive estimate in some of our other unreported estimations.

On the growth axis, the biospheric value is again the most significant *Self-Transcendence* value for the variable taxes and has a positive effect. *Universalism* also has a significant positive effect in some of our estimations, but not in the one reported in *Table 3*. In this case, however, *Benevolence* seems to have a significant negative effect, consistent with our discussion of in-group priorities in subsection 2.1.

Only *Hedonism* is significant among the values of *Openness to Change* in this restrictive estimation of willingness to pay taxes, and the estimate is negative. *Stimulation* has a positive significant effect on other estimations not reported here.

Comparing the size of the standardized estimates shows that biospheric values are the most significant in explaining higher personal and fiscal responsibility. Other universalist values and *Stimulation* also increase personal responsibility, whereas *Power*, *Conformity* and *Security* reduce it. *Security*, *Tradition*, *Benevolence* and *Hedonism* reduce willingness to pay green taxes.

5. CONCLUSIONS

This study used the ESS to analyse the role of Schwartz's ten basic human values in predicting personal and fiscal responsibility to mitigate climate change. We estimated models by weighting OLS with standard errors clustered by country and considered additional sociodemographic control variables.

Our main results are the following. *Age* is the most significant individual factor explaining personal and fiscal responsibility, although the relationship to personal responsibility takes an inverse U-shape and the relationship to support for green taxes a U-shape. *Interest in Politics* is a key attribute explaining personal responsibility, whereas support for green taxes is more strongly affected by *Trust in politicians*. *Tertiary education* and *Political orientation* are more significant for taxes than for personal responsibility. Relative *Income* is significant but less relevant than political factors.

Human self-protection values (*Conservation* and *Self-Enhancement*) tend to reduce personal and fiscal responsibility, whereas growth-oriented human values (*Self-Transcendence* and *Openness to Change*) tend to increase it. Our results for Schwartz's ten basic values reveal, however, relevant particularities that are masked in analyses with higher-level human value dimensions. Among *Self-Enhancement* values, *Power* has a negative effect, but *Achievement* tends to have a positive effect due to its simultaneous characterization as a value of self-protection and growth. In the growth dimension of *Self-Transcendence*, biospheric and other universalist values have a positive effect, but *Benevolence* reduces support for green taxes, possibly due to the dominance of in-group effects in Schwartz's definition of this human value. As to values of *Openness to Change*, *Hedonism* has negative effects, whereas *Stimulation* tends to show positive estimates, possibly due to challenges associated with climate change for people who focus on the novelty of this issue.

These results have some limitations, which help to design a future research agenda. Potential endogeneity is always an issue in this type of research because the interplay between human values and socio-demographic factors generates unclear causal relationships. Due to this risk, we have omitted concern and other climate beliefs as explanatory variables of responsibility. More careful study is thus needed on variables related to responsibility. Further research is also needed to analyse the interactions between human values and other mediating factors. Additional models using time series or estimating random intercepts and slopes could also provide useful insights.

Our findings have direct implications for policy design. Following Steg's (2016) framework, institutions can motivate people or strengthen their motivation to adopt values associated with the growth dimension of human values, while also considering the specific motivations of people oriented to *Hedonism* or *Benevolence*. Further, communication policies should address people oriented to *Achievement* and *Stimulation*, even though these values are considered as self-protective in Schwartz's scheme. Policy makers should also develop strategies to empower and motivate people to act on their universalist values. Finally, they should recognize the motivations that decrease pro-environmental behaviour and try to change perceptions of costs and benefits among these citizens, while addressing specific communication policies oriented towards citizens with those orientations.

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