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Abstract:
Economic theory has invoked moral motivation as an explanation for the voluntary provision of public goods but is vague with regard to the specific moral concerns involved. Using climate change as a case study, this paper relates morally-motivated public good provision to the six moral foundations (MFs) identified by moral psychologists: Care, Fairness and Liberty (individual-focused), and Loyalty, Authority and Sanctity (group-focused). Using data from the European Social Surveys it is found that using the MFs in addition to standard explanatory variables improves the explanation of climate-friendly behaviors and endorsement of climate-friendly regulations by 44 percent. While the Fairness and Care foundations are strong and robust predictors of the dependent variables, the Loyalty foundation contributes positively only when neglecting the nature of climate change mitigation as a *global* public good. More generally, in contrast to the individual-focused MFs (that apply to all individuals), the group-focused MFs are of little direct relevance for climate change mitigation, as the benefit from mitigation extends beyond the in-group (family, neighborhood, region, or nation) to which these MFs refer. Group-focused MFs are only of indirect relevance as their endorsement fosters general environmental concern.

Keywords: voluntary public good provision; climate change; moral motivation; moral foundations
JEL code: H41; H23; Q54; D91

Key messages:

- Voluntary public good provision is frequently explained by moral motivation, but the specific moral concerns involved remain unspecified.
- Moral psychologists have identified six fundamental moral concerns potentially relevant to public good provision: Care, Fairness, Liberty, Loyalty, Authority, and Sanctity.
- Using the six moral foundations (MFs) in addition to standard explanatory variables improves the explanation of climate-friendly behaviors and endorsement of climate-friendly regulations by 44 percent.
- While the individual-focused (universalist) MFs are significantly positively related to the global public good of climate change mitigation, group-focused MFs seem to be more relevant to local or regional environmental issues.

1. Introduction

The functionalist conception of human morality maintains that moral systems serve as a means for enhancing cooperation and facilitating the voluntary provision of public goods by suppressing or regulating selfishness (e.g. Graham et al. 2011, Haidt 2012, Tomasello 2016). Moral psychology has identified a distinct set of moral foundations on which various moral systems rely: Care, Fairness, Liberty, Loyalty, Authority, and Sanctity (Graham et al., Haidt 2012). Endorsement of these moral foundations can be found across various cultures, societies, and socio-economic groups, though to different degrees. In particular, cultural differences exist with respect to endorsement of the individual-focused moral foundations (Care, Fairness, Liberty), which apply to all individuals independent of their membership to one's group and the group-focused foundations (Loyalty, Authority, Sanctity), the former being endorsed more in Western than in other societies (Haidt 2012).

One of the arguably most important public goods to which morality may be relevant is the natural environment, notably the climate system. Indeed, protection of the environment is a major concern of individuals and organizations worldwide. For example, in Western Europe, 2016, 66.2 percent of the adult population belonged to the two top categories (out of six) who considered care for the environment to be important, and 70.2 percent said that they "do things to reduce energy use" for environmental reasons "often", "very often" or "always" (European Social Surveys Round 8).[1]

From the perspective of functionalist morality theory, acting pro-environmentally is a case of morally motivated behavior aimed at protecting environmental public goods. Consistent with

[1] People were asked to what extent they self-identify with a person characterized as follows: "She/he strongly believes that people should care for nature. Looking after the environment is important to her/him." Response options were "very much like me, like me, somewhat like me, a little like me, not like me, not like me at all". 66.2 of the respondents chose "very much like me" or "like me".

this view, moral motivation has been invoked in a number of models of voluntary public good provision. Brekke et al. (2003) developed a theoretical model of moral motivation that provides a framework for formal analysis of the relationship between moral motivation, economic incentives, public policy and private contributions to public goods. Environment-related empirical applications of moral-motivation models focused on issues such as environmental offsets and individuals' recycling decisions.[2]

While a comprehensive review of studies involving moral motivation is beyond the scope of this paper (see Chorus 2015 for a review), it can be noted that the pertinent studies typically capture moral motivation in a purely formal fashion, by postulating that individuals obtain some kind of utility gain from behaving morally. As noted by Nyborg (2018), utility gains from acting morally arise through the individual's recognition of doing what she finds to be ethically right, that is, in conformity with her moral norms.[3] Yet, the specific ethical or moral concerns actually involved in morally motivated public good provision remain indeterminate.

The present paper addresses this research gap by relating voluntary contributions to an environmental public good, the climate, to the moral foundations identified by moral psychologists. This way, the paper contributes to a better understanding of exactly which of the fundamental moral concerns underlie climate-friendly behaviors. In addition, the paper studies how approval or disapproval of several regulatory approaches to climate change relate to the endorsement of the various moral foundations.

[2] For instance, Blasch and Ohndorf (2015) provided an analysis of individual offset behavior which explicitly accounts for various motivations, drawing on theories for public good provision such as pure and impure altruism, internalized moral norms and social approval. Czajkowski et al. (2017) looked jointly at social pressures, moral motives and the costs of recycling actions in a stated preference, random utility perspective. Chorus (2015) reviews the literature on moral decision making and the potential of discrete choice analysis for the study of moral decisions.

[3] Conformity with moral norms yields utility or disutility through inner feelings of guilt or conscience. This differentiates moral (internal) norms from social (external) norms, whose utility benefit relies on social approval/disapproval, and from altruism, whose utility benefit relies on directly furthering the well-being of others (Nyborg 2018).

Rather than considering moral motivation, another strand of the pertinent literature has focused on individuals' values. For instance, the post-materialism hypothesis (Inglehart 1990) and the objective-conditions/subjective-values paradigm (Inglehart 1995) attribute an important role to value change as a source of increasing environmental concern, where values can be understood as "trans-situational goals that vary in importance and serve as guiding principles in the life of a person or a group" (Schwartz 2007, 712).[4] Notwithstanding the role of values, however, moral psychologists have noted that the values typically studied in values research (e.g. Rokeach 1973, Schwartz 1992) are *moral* values and that they can be traced to the moral foundations mentioned above (Graham et al. 2011). In this sense, moral foundations shape issue-specific values, and the latter shape the corresponding preferences and behaviors.

The present paper accounts for this idea by assuming that moral foundations may shape climate-friendly behaviors and regulation endorsements both directly, at given levels of general environmental concern, and indirectly through those concerns. By using such a framework, it is possible to differentiate between moral foundations that are specific to the global public good of climate change mitigation, through the direct channel, from others that refer to the environment more generally and affect climate-friendliness indirectly through general concern for the environment.

Our empirical analysis uses data from Round 8 of the European Social Surveys, as this data base offers proxies for all our variables of main interest, that is, endorsement of the moral foundations, climate-friendly behaviors and approval/disapproval of alternative approaches to climate-related regulation, and environmental concern. Using control variables typically considered in the literature on pro-environmental behavior, it is found that inclusion of the moral

[4] The post-materialism hypothesis entails a shift in people's priorities towards the quality of life, including environmental quality, as societies become wealthier whereas the objective-conditions/subjective-values paradigm acknowledges a complementary role of poor environmental conditions as a factor that drives environmental concern.

foundations improves the explanation of climate-friendly behaviors and endorsement of climate-friendly regulations by 44 percent on average. Comparing different behaviors, it is found that more costly behavior is more morally-motivated than less costly one. While the Fairness and Care foundations are strong and robust predictors of the dependent variables, the Loyalty foundation contributes positively only when neglecting the nature of climate change mitigation as a *global* public good. More generally, in contrast to the individual-focused (universalist) moral foundations that apply to all individuals, the group-focused foundations are of little direct relevance for climate change mitigation, as the benefit from mitigation extends beyond the in-group (family, neighborhood, region, or nation) to which these moral foundations refer. Group-focused foundations are only of indirect relevance as their endorsement fosters general environmental concern.

The remainder of the paper is organized as follows. Sections 2 and 3 present the conceptual and empirical frameworks, respectively. Section 4 presents and discusses the results. Section 5 concludes.

2. Conceptual Background

2.1 Moral Foundations Theory

Moral Foundations Theory, as originally developed by Haidt and Joseph (2007), aims at identifying "the universal cognitive modules upon which cultures construct moral matrices" (Haidt 2012, 146). Moral Foundations Theory was created by identifying the adaptive challenges of social life that evolutionary psychologists have described and connecting those challenges to virtues that are found – in some form or another – in many cultures.

The underlying adaptive challenges, to which natural selection responded by favoring appropriate cognitive modules, are: caring for vulnerable children, reaping the benefits of

cooperation, constraining the power of individuals to dominate and bully others, forming coalitions to compete with other coalitions, forging beneficial status hierarchies, and protection against contaminants. The Moral Foundations (MFs) corresponding to those adaptive challenges are labelled Care, Fairness, Liberty, Loyalty, Authority, and Sanctity (Haidt 2012).[5]

Table 1 describes the Moral Foundations. In addition to the underlying adaptive challenges, the table shows the virtue words typically associated with the various MFs and the triggers that activate the respective cognitive modules. Considering the virtue words is helpful for understanding the contents of the respective MFs. For instance, the virtues of chastity or piety associated with the Sanctity foundation suggest that endorsement of this MF involves an esteem for traditions and customs. Considering the triggers may give us a clue as to which of them may be relevant for public good provision in general and environmental protection in particular.

Table 1: Moral Foundations Theory

	Care (Harm)	Fairness	Liberty	Loyalty (Ingroup)	Authority	Sanctity (Purity)
Adaptive challenges	Caring for vulnerable children	Reaping benefits from cooperation	Constraining domination and bullying	Forming cohesive coalitions	Forging beneficial status hierarchies	Avoiding contaminants
Relevant virtues	Caring, kindness	Fairness, justice,	Sovereignty	Loyalty, patriotism, self-sacrifice	Obedience, deference	Temperance, chastity, piety, cleanliness
Original triggers	Suffering, distress, neediness	Cheating, cooperation, deception	Bullies, tyrants	Threat or challenge to group	Signs of dominance and submission	Waste products, diseased people

Note: Adapted from Haidt (2012), p.146 and pp. 200-211.

[5] The terminology differs somewhat between sources. Graham et al. (2011) refer to Care as Harm, to Loyalty as Ingroup and to Sanctity as Purity.

In psychological research, endorsement of the MFs is measured by means of a specially designed Moral Foundations Questionnaire (Graham et al. 2011).

2.2 Relevance to Environmental Public Good Provision

With respect to the social patterns or situations that trigger the various MFs, it can be noted that human morality as such emerged as a response to the challenge of free riding on public goods (Graham et al. 2011, Haidt 2012, Tomasello 2016). This is was makes Moral Foundations Theory potentially relevant to the study of environmental public good provision. Yet, it can be argued that some of the individual MFs are more relevant to the private provision of environmental public goods than others, particularly so in developed Western societies. While the protection of liberty, the (non-violent) allocation of authority and the protection of "sacred" values (e.g. life and property) have been institutionalized as state tasks in Western societies from the 18th century onwards, the need for cooperatively minimizing threats from environmental distress has been recognized as a government task comparatively more recently and less firmly. With respect to the public good of protection against environmental distress, there may thus be a stronger moral motivation for private action than with respect to other public goods, and this motivation may involve in particular Care, Fairness and Loyalty, as these explicitly relate to distress, voluntary cooperation and threats or challenges to the group.

It should also be noted that, according to factor analysis, Care, Fairness and Liberty differ from Loyalty, Authority and Sanctity, the former ones being individual-focused in the sense that they refer to individuals independent of their group membership whereas the latter ones are group-focused (Graham et al. 2011).[6] This difference will turn out relevant in the case of climate change,

[6] The difference between individual-focused MFs and group-focused MFs should not be confused with the political left-right dichotomy. In the data used in this study (subsection 3.1), a more right-leaning self-placement correlates

as climate change mitigation is a *global* public good whose benefits are not restricted to particular groups such as the family, neighborhood, region or nation.

Finally, it should be noted that MFs are related to but distinct from values (Graham et al. 2011). MFs and values differ in two important ways. First, MFs are general whereas values are typically domain- or issue-specific (e.g. environmental concern or income equality). Second, from early adulthood, an individual's MF profile is rather stable (Haidt 2012) whereas the values endorsed by an individual are more malleable. Both of these features of MFs constitute their nature as "foundations" and suggest that MFs may shape values rather than the other way round. Consistent with this idea, we will treat MFs as belonging to the determinants of environmental concern and environmental concern as a mediating variable in the relationship between MFs and climate change mitigation.

While a major focus of this study is on the relationship between MFs and individual climate-friendly behaviors, endorsement of climate-friendly regulations also constitutes a form of voluntary contribution to a public good since it involves a commitment to acting climate-friendly conditional on corresponding actions of the other members of the constituency. It is intuitive that not only behaviors in the narrow sense but also the degree of endorsement of climate-friendly regulations may be shaped by the MFs. The empirical analysis in this study will therefore refer to both individual behaviors and the endorsement of climate-friendly regulations.

3. Empirical Framework

3.1 Data and Sample Characteristics

with endorsement of Fairness at r = -0.165 and with endorsement of Sanctity at r = 0.127. The correlations with the other MFs are of negligible magnitude (less than r = 0.01).

Our data are taken from the European Social Survey (ESS); see www.europeansocialsurvey.org. The ESS is a cross-sectional, multi-country survey covering over 30 nations. ESS data are obtained using random (probability) samples, where the sampling strategies are designed to ensure representativeness and comparability across European countries. We use data from Round 8 (2016) for a set of West-European countries including Austria, Belgium, Finland, France, UK, Iceland, Ireland, Israel, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the UK. Restriction to Western Europe is motivated by the circumstance that the moral matrix (that is, the configuration of the six moral foundations) is relatively homogeneous in Western societies but is different in other cultures (Haidt 2012).

Round 8 of the ESS is unique in that it offers proxies for all our variables of main interest, that is, endorsement of the moral foundations, environmental concern, climate-friendly behaviors, and approval/disapproval of alternative regulatory approaches to climate change mitigation. It should be noted, however, that the survey variables used to measure endorsement of the moral foundations Care, Fairness, Liberty, Loyalty, Authority, and Sanctity do not explicitly refer to these concepts. Rather, the correspondence of the variables to these concepts is established on the basis of the verbal formulations used in the survey. For instance, the degree to which a respondent self-identifies as a person for whom it is "important to help people and care for others' well-being" is taken to be an indication of her endorsement of the Care foundation. Similarly, in the light of the virtues noted in Table 1, people who consider it "important to follow traditions and customs" are taken to score high on the Sanctity dimension.

The relevant formulations for the moral foundation variables are displayed in Table 2, along with the definitions and summary statistics of all main variables used in the empirical analysis. For the regulatory instruments (tax, subsidy, and ban), environmental concern, and the moral

foundations, the original coding of the data was inverted such that higher values correspond to greater approval (instruments) or greater importance (concern, moral foundations).

Table 2: Main Variables

Variable	Definition	Scale	Mean	Standard Deviation
Buy Efficient Appliances	How likely to buy most energy efficient home appliances	"Not at all likely" = 0 to "extremely likely" = 10	7.78	2.28
Reduce Energy Use	How often do things to reduce energy use	"Never" = 1 to "always" = 6	4.29	2.84
Tax Fossil Fuels	Favor increase taxes on fossil fuels to reduce climate change	"Strongly against" = 1 to "strongly in favor" = 5	2.84	1.24
Subsidize Renewables	Favor subsidize renewable energy to reduce climate change	"Strongly against" = 1 to "strongly in favor" = 5	3.96	1.04
Ban Inefficient Appliances	Favor ban sale of least energy efficient household appliances to reduce climate change	"Strongly against" = 1 to "strongly in favor" = 5	3.55	1.16
Environmental Concern	Important to care for nature and environment	"Not important at all" = 1 to "very important" = 6	4.79	1.07
Care	Important to help people and care for others' well-being	"Not important at all" = 1 to "very important" = 6	4.87	0.99
Fairness	Important that people are treated equally and have equal opportunities	"Not important at all" = 1 to "very important" = 6	4.86	1.07
Liberty	Important to make own decisions and be free	"Not important at all" = 1 to "very important" = 6	4.82	1.11
Loyalty	Important to be loyal to friends and devote to people close	"Not important at all" = 1 to "very important" = 6	5.09	0.92
Authority	Important to do what is told and follow rules	"Not important at all" = 1 to "very important" = 6	3.70	1.41
Sanctity	Important to follow traditions and customs	"Not important at all" = 1 to "very important" = 6	4.13	1.40

Source: European Social Surveys. Data are coded such that higher values indicate greater approval or importance.

With respect to climate-friendly behavior, the mean self-rated likelihood of buying energy efficient appliances is 7.78 on the 0-10 scale (which may be interpreted as rather likely, though no verbal response categories other than the end points of the numerical scale are offered), whereas the mean reported frequency of doing things to reduce energy use is 4.29 on the 6-point scale (which corresponds to the response category "often"). Considering the regulatory instruments, subsidies for renewable energies enjoy the greatest approval (3.96 on the 1-5 scale) whereas taxes on fossil fuels are least favored (2.84). Mean environmental concern amounts to 4.79 on the 1-6 scale.

Turning to the moral foundations, Loyalty is found to be the most important (the mean score being 5.09 on the 6-point scale) and least controversial as measured by dispersion (the standard deviation being 0.92). Care, Fairness, and Liberty are of slightly lower importance (with mean scores of 4.87, 4.86 and 4.82, respectively) and show slightly more dispersion (with standard deviations between 0.99 and 1.11). The Authority and Sanctity foundations are on average considered less important (with mean scores of 3.70 and 4.13, respectively), and they are less unanimously endorsed (the standard deviation being about 1.4).

3.2 Empirical Strategy

We will estimate regression models of the following form for the dependent variable *Climate Friendly =* (*Buy Energy Efficient Appliances, Reduce Energy Use, Tax Fossil Fuels, Subsidize Renewables, Ban Inefficient Appliances)*:

$$ClimateFriendly = \alpha_1 + \beta_{11}Care + \beta_{12}Fairness + \beta_{13}Liberty + \beta_{14}Loyalty + \beta_{15}Authority + \beta_{16}Sanctity + \gamma_1 Controls + \varepsilon_1 \quad (1)$$

The controls comprise the covariates usually considered in the literature on pro-environmental behaviors and attitudes (e.g. Gelissen 2007, Welsch and Kühling 2009): household income, level of education, placement on the left-right scale, health status, household size, gender, age, family status, unemployed status, domicile (urban/rural) as well as country fixed effects. Of particular interest is the placement on the left right-scale, which is included in order not to confound individuals' moral profile – specifically their endorsement of individual-focused and group-focused MFs – with their political orientation.

In addition to the models specified in equation (1), models will be estimated that include *Environmental Concern* as an additional independent variable

$$ClimateFriendly = \alpha_2 + \beta_{21}Care + \beta_{22}Fairness + \beta_{23}Liberty + \beta_{24}Loyalty + \beta_{25}Authority + \beta_{26}Sanctity + \gamma_2 Controls + \delta_2 EnvironmentalConcern + \varepsilon_2 \quad (2)$$

These models serve to study the role of environmental concern as a potentially mediating variable in the relationship between the MFs and climate-friendly behaviors and regulation endorsements. Since *Environmental Concern* does not specifically focus on climate change but rather refers to environmental issues in general, controlling for this variable in equation (2) permits to capture the role of the MFs for climate change mitigation more specifically than does equation (1). By comparing the results of equations (1) and (2) it will be possible to more accurately identify those MFs that are relevant to a global public good – the climate – as opposed to more local or regional public goods, such as clean water, soil and air.

Finally, a model will be estimated that treats *Environmental Concern* as the dependent variable, using the same set of independent variables as in equation (1):

$$EnvironmentalConcern = \alpha_3 + \beta_{31}Care + \beta_{32}Fairness + \beta_{33}Liberty + \beta_{34}Loyalty + \beta_{35}Authority + \beta_{36}Sanctity + \gamma_3 Controls + \varepsilon_3 \quad (3)$$

This model serves to study the role of the MFs for environmental concern.

Following Angrist and Pischke (2009) all models will be estimated using ordinary least squares.[7]

4. Results and Discussion

4.1 Moral Foundations and Climate Change Mitigation

Table 3 shows the estimation results for the specification without environmental concern as a mediating variable (equation 2). With respect to the controls we note that household income is significantly positively related to the likelihood of buying energy efficient appliances, significantly negatively related to engaging in activities to reduce energy use, and significantly positively related to endorsement of all three types of environmental regulation. The level of education is significantly positively related to both behaviors as well as to endorsement of all three types of regulation whereas the opposite applies to a more right-leaning political orientation.

Turning to the relationship between morals and climate-friendly behaviors and regulations, we first note that inclusion of the MFs leads to a considerable improvement of explanatory power (coefficient of determination, R^2) in comparison to counterpart regressions that omit the MFs (not shown). The improvement amounts to 45 percent (purchase of efficient appliances), 23 percent (activities to save energy), 16 percent (fuel tax), 71 percent (subsidy for renewables) and 63 percent (ban on inefficient appliances).

[7] Angrist and Pischke (2009, section 3.4.2) have shown that OLS and Probit and Logit models yield very similar marginal effects even in models with ordinal limited dependent variables and advocate using least squares in such cases rather than "more fanciful" methods.

Table 3: Estimation Results without Environmental Concern

	(1) Buy Efficient Appliances	(2) Reduce Energy Use	(3) Tax Fossil Fuels	(4) Subsidize Renewables	(5) Ban Inefficient Appliances
Care	0.11***	0.04**	0.02*	0.03***	0.04***
	(6.32)	(2.07)	(2.15)	(4.37)	(4.22)
Fairness	0.13***	0.07***	0.08***	0.08***	0.08***
	(9.57)	(4.60)	(10.89)	(12.83)	(10.66)
Liberty	0.07***	0.01	-0.01*	0.01*	0.02***
	(5.29)	(0.30)	(1.95)	(2.06)	(3.16)
Loyalty	0.05***	0.07***	-0.01	0.06***	0.03***
	(2.64)	(3.84)	(1.49)	(7.09)	(2.68)
Authority	0.01	0.01	0.02***	-0.01***	-0.01
	(1.44)	(0.60)	(4.01)	(3.12)	(0.57)
Sanctity	0.09***	0.03**	-0.05***	-0.01**	0.01
	(8.53)	(2.52)	(9.02)	(2.09)	(1.52)
Household Income	0.03***	-0.02***	0.06***	0.03***	0.02***
	(5.50)	(2.59)	(17.95)	(9.55)	(5.69)
Education Level	0.01***	0.01	0.01***	0.01***	0.01***
	(4.74)	(1.41)	(8.58)	(6.31)	(2.63)
Left-Right Scale	-0.03***	-0.03***	-0.05***	-0.04***	-0.04***
	(4.49)	(4.48)	(9.02)	(13.03)	(12.23)
Poor Health	-0.05***	0.01	-0.10***	-0.02***	-0.02**
	(3.24)	(0.31)	(10.60)	(2.95)	(2.06)
Household size	-0.01	-0.04***	-0.04***	-0.02***	0.01
	(0.86)	(3.62)	(5.63)	(3.48)	(0.59)
Female	0.17 ***	0.11***	0.04***	0.01	0.10***
	(6.26)	(3.89)	(2.51)	(0.74)	(6.75)
Age	0.02***	0.01***	-0.01***	-0.01***	0.01***
	(18.86)	(10.98)	(4.19)	(6.10)	(5.64)
Living with partner	0.43***	0.03	-0.11***	0.01	0.07***
	(13.18)	(0.99)	(6.16)	(0.47)	(3.99)
Unemployed	0.06	0.25***	-0.10***	-0.07**	-0.04
	(0.88)	(3.37)	(2.61)	(2.14)	(1.07)
Urban-rural scale	0.03***	0.02	-0.06***	-0.01	-0.01
	(2.86)	(1.55)	(9.67)	(0.27)	(1.19)
Constant	8.21	4.30	3.20	4.54	3.88
Observations	25363	25510	25109	25266	25236
Adj. R^2	0.058	0.016	0.058	0.041	0.026
Adj. R^2 controls only	0.040	0.013	0.050	0.024	0.016

OLS regressions based on ESS Round 8. The t-statistics in parantheses are based on standard errors clustered at the country level. *p<0.1. **p<0.05, ***p<0.01. Main variables are defined in Table 2. Household Income: deciles. Education Level: primary education not completed = 0 to doctoral degree = 8. Left-Right Scale: left = 0 to 10 = right. Poor Health: very good =1 to very bad = 5. Urban-Rural Scale: big city =1 to countryside = 5.

Considering the MFs in more detail it is seen that the likelihood of buying energy efficient appliances (regression 1) is significantly positively related to all MFs except Authority, for which the relationship is insignificant. The largest coefficients are those of the Fairness and Care foundations. In the case of activities to reduce energy use (regression 2), all MFs except Liberty and Authority, which are insignificant, attract significantly positive coefficients, the largest being those on Fairness and Loyalty.

While the relationships between the MFs and the behaviors are positive or insignificant, a more differentiated picture emerges with respect to endorsement of alternative regulatory approaches. In the case of taxes on fossil fuels (regression 3), there are significantly positive associations with Fairness, Care and Authority, whereas the associations with Liberty and Sanctity are significantly negative. The largest positive coefficient is that on Fairness whereas the largest negative coefficient is that on Sanctity. For subsidization of renewable energies (regression 4), we find significantly positive coefficients on Fairness, Care and Loyalty, a marginally significant positive coefficient on Liberty, and significantly negative, though small, negative coefficients on Authority and Sanctity. For a ban on inefficient appliances (regression 5), there are again significantly positive coefficients on Fairness, Care, Loyalty, and Liberty whereas those on Authority and Sanctity are insignificant.

What do these results reveal with respect to the individual MFs? Endorsement of the Care foundation is a significantly positive predictor of the two climate friendly behaviors and the three types of regulatory approach. To compare with the other MFs, it can be noted that the sum of the coefficients on Care across the behaviors and regulations is 0.24. Fairness is also a significant predictor of all behaviors and regulations, the sum of coefficients being 0.44. The Liberty foundation is different in that significantly positive coefficients are obtained only with respect to the purchase of energy efficient appliances, a ban on inefficient appliances, and subsidies for

renewables (marginally significant) whereas there is no significant relationship to activities to save energy and a marginally significant *negative* relationship to taxes on fossil fuels. For the Liberty foundation, the sum of (at least marginally) significant coefficients is 0.09. The Loyalty foundation attracts significantly positive coefficients except with respect to the fuel tax (insignificant coefficient), the sum amounting to 0.21. People endorsing the Authority foundation are pro-tax and anti-subsidy whereas all other coefficients on Authority are insignificant. Finally, endorsement of the Sanctity foundation is associated with favoring the purchase of energy efficient appliances and doing things to save energy while being opposed to climate-related taxes and subsidies.

Overall, the strongest moral predictors of climate-friendly behaviors and endorsement of climate-related regulations are Fairness, Care, and Loyalty, whereas the other MFs play a minor role. The findings reported in this subsection will be discussed in subsection 4.3.

4.2 Controlling for Environmental Concern

Corresponding to equations 2 and 3, respectively, Table 4 reports regressions of the behaviors and regulation endorsements on the MFs controlling for environmental concern (regressions 1 to 5) and a regression of environmental concern on the MFs (regression 6). All regressions control for the same variables as before and yield similar results with respect to those controls. According to regressions 1 to 5, the two behaviors and endorsement of all three regulatory instruments are significantly positively related to environmental concern. According to regression 6, environmental concern is significantly positively related to all MFs, the largest coefficients being those on Loyalty and Fairness and the smallest coefficient being that on Authority.

Regarding the MFs included in regressions 1 to 5, it should be noted that – by controlling for general environmental concern – these regressions differ from their counterparts in Table 3 by more specifically focusing on the MFs' role with respect to climate change mitigation rather than

with respect to environmental conservation more generally. This difference will play a role in interpreting the following results.

Table 4: Estimation Results with Environmental Concern

	(1) Buy Efficient Appliances	(2) Reduce Energy Use	(3) Tax Fossil Fuels	(4) Subsidize Renewables	(5) Ban Inefficient Appliances	(6) Env-ironmental Concern
Environmental Concern	0.44*** (30.45)	0.25*** (16.30)	0.16*** (19.69)	0.12*** (17.61)	0.20*** (26.13)	
Care	0.05 *** (3.16)	0.01 (0.38)	0.01 (0.05)	0.02*** (2.56)	0.01 (1.49)	0.12*** (17.11)
Fairness	0.06*** (4.68)	0.03* (1.88)	0.06*** (7.64)	0.06*** (9.79)	0.05*** (6.33)	0.16*** (26.29)
Liberty	0.02* (1.70)	-0.03** (2.31)	-0.03*** (4.35)	-0.01 (0.03)	0.01 (0.02)	0.11*** (19.47)
Loyalty	-0.04** (2.04)	0.03 (1.49)	-0.05*** (4.58)	0.04*** (4.23)	-0.01 (1.38)	0.19*** (25.21)
Authority	-0.03*** (2.68)	-0.01 (1.24)	0.02*** (3.29)	-0.02*** (3.84)	-0.01* (1.65)	0.03*** (6.48)
Sanctity	0.05*** (4.37)	0.013 (0.10)	-0.07*** (11.84)	-0.02*** (4.60)	-0.01** (2.27)	0.10*** (23.01)
Household Income	0.03*** (5.34)	-0.02*** (2.75)	0.06*** (17.81)	0.02*** (9.46)	0.02*** (5.52)	0.01 (1.39)
Education Level	0.01*** (3.88)	0.01 (0.62)	0.01*** (7.94)	0.01*** (5.49)	0.01 (1.36)	0.01*** (7.35)
Left-Right Scale	-0.01 (1.51)	-0.02*** (2.90)	-0.04*** (11.44)	-0.03*** (11.34)	-0.03*** (9.79)	-0.04*** (15.99)
Poor Health	-0.04*** (2.69)	0.01 (0.39)	-0.09*** (10.35)	-0.02*** (2.72)	-0.02* (1.74)	-0.02** (2.45)
Household size	-0.01 (1.51)	-0.04*** (3.14)	-0.03*** (5.14)	-0.02*** (3.15)	0.01 (1.11)	-0.02*** (4.36)
Female	0.18 *** (6.59)	0.12*** (3.98)	0.04*** (2.67)	0.01 (0.94)	0.10*** (7.11)	-0.01 (1.11)
Age	0.01*** (14.46)	0.01*** (8.58)	-0.01*** (7.05)	-0.01*** (8.74)	0.01* (1.80)	0.01*** (23.59
Living with partner	0.42*** (13.13)	0.03 (0.87)	-0.12*** (6.45)	0.01 (0.26)	0.06*** (3.74)	0.03** (2.11)
Unemployed	-0.01 (0.10)	0.21*** (2.89)	-0.13*** (3.30)	-0.08*** (2.68)	-0.07** (1.99)	0.16*** (5.40)
Urban-rural scale	0.03*** (2.70)	0.02 (1.44)	-0.06*** (9.87)	-0.01 (0.31)	-0.01 (1.26)	0.01 (0.83)
Constant	8.56	4.52	3.32	4.63	4.03	5.33
Observations	25345	25345	25089	25249	25214	25537
Adj. R^2	0.092	0.092	0.073	0.052	0.052	0.225

OLS regressions based on ESS Round 8. The t-statistics in parantheses are based on standard errors clustered at the country level. *p<0.1. **p<0.05, ***p<0.01. Main variables are defined in Table 2. Household Income: deciles. Education Level: primary education not completed = 0 to doctoral degree = 8. Left-Right Scale: left = 0 to 10 = right. Poor Health: very good =1 to very bad = 5. Urban-Rural Scale: big city =1 to countryside = 5.

Taking environmental concern as given, the purchase of energy efficient appliances is significantly positively related to Care, Fairness, Sanctity and, with a considerably smaller coefficient, to Liberty, whereas the relationship to Loyalty and Authority is significantly negative (regression 1). Activities to reduce energy use are significantly positively related to Fairness and significantly negatively related to Liberty while being not significantly related to the other MFs (regression 2). Endorsement of a fuel tax is significantly positively related to Fairness and Authority, significantly negatively related to Liberty, Loyalty and Sanctity and not significantly related to Care (regression 3). Endorsement of subsidies for renewable energies is significantly positively related to Care, Fairness and Loyalty, significantly negatively related to Authority and Sanctity, and insignificantly related to Liberty (regression 4). Finally, endorsement of a ban on inefficient appliances is significantly positively related to Fairness, significantly negatively related to Authority and Sanctity, and insignificantly related to the other MFs (regression 5).

Similar to the discussion concerning Table 3, we can ask what these results reveal with respect to the individual MFs? Endorsement of the Care foundation is a significantly positive predictor of the purchase of energy efficient appliances and endorsement of a subsidy for renewables, but otherwise insignificant. Summing across the significant coefficients yields a value of 0.07. Fairness is a (at least marginally) significant predictor of all behaviors and regulations, the sum of coefficients being 0.21. The Liberty foundation is marginally significantly positively related to the purchase of energy efficient appliances and significantly negatively related to reducing energy use and endorsement of fossil fuel taxes, the sum across the (marginally) significant coefficients amounting to -0.04. The Loyalty foundation attracts one significantly positive

coefficient ((subsidy for renewables) and two significantly negative coefficients (purchase of energy efficient appliances and fuel tax), the sum amounting to -0.05. Endorsement of the Authority foundation attracts one significantly positive coefficient (tax) and three significantly negative coefficients (purchase of efficient appliances, subsidy for renewables, and ban on inefficient appliances), summing to -0.04. Finally, endorsement of the Sanctity foundation attracts one significantly positive coefficient (purchase of energy efficient appliances) and three significantly negative coefficients, (fuel tax, subsidy for renewables, ban on inefficient appliances), summing to -0.05.

Overall, controlling for general environmental concern, the strongest moral predictor of climate-friendly behaviors and endorsement of climate-related regulation is Fairness, whereas the role of the Care foundation is considerably smaller. Remarkably, the other MFs are, on balance, negatively related to behaviors and regulations aimed at mitigating climate change once general environmental concern is controlled for. These findings will be discussed in the next subsection.

4.3 Summary and Discussion

A key message from the preceding analysis is that including the MFs substantially contributes to explaining climate-friendly behaviors and the endorsement of climate-related regulations. By including the MFs, the coefficient of determination improves by 44 percent, on average, compared to specifications that involve only the standard set of explanatory variables, (including the levels of income and education, and political orientation on the left-right scale).

With respect to the behaviors, the improvement is larger in the case of purchasing energy efficient appliances (45 percent) than in the case of activities to save energy (23 percent). This finding makes sense as the former behavior is more costly than the latter and thus potentially more relying on moral (rather than utilitarian) concerns. With respect to the endorsement of regulations,

we found a stronger role of the MFs in the case of subsidies for renewables ((71 percent) and a ban on inefficient appliances (63 percent) than in the case of taxes on fossil fuels (16 percent). The smaller role of morals with respect to environmental taxes is explicable in terms of people's attitude towards taxes being strongly tied to their political orientation and the level of income rather than their moral profile. Indeed, the coefficients on political orientation and on income are larger (in absolute terms) with respect to the tax than with respect to subsidies for renewables and the ban on inefficient appliances. These findings provide a first indication that the empirical results are intuitively sound.

Turning to the individual moral foundations, Table 5 summarizes the strength of the relationships between endorsement of the MFs and the climate-friendly behaviors and regulations. For each MF, entries are the sum of (at least marginally) significant coefficients across the behaviors and regulation endorsement (reported in Tables 3 and 4). Table 5 distinguishes between the regressions that control for general environmental concern (results shown in Table 4) and those that do not (results shown in Table 3).

As already noted, when environmental concern is not controlled for, the strongest moral predictor of both, behaviors and regulation endorsements, are Fairness, Care and Loyalty, where Care and Loyalty are weaker than Fairness and of similar strength to each other. Liberty, Sanctity and Authority play only a minor role.

The finding that Fairness, Care and Loyalty are the strongest moral predictors of climate-friendly behaviors and endorsement of climate-related regulations makes sense in the light of the archetypical triggers of those MFs (Table 1): the need for cooperation in the case of Fairness, distress and neediness in the case of Care, and threats and challenges to the group in the case of Loyalty. While these triggers can reasonably be argued to pertain to climate change (subject to

qualifications to be discussed below), the triggers of the other MFs are more ambiguously related to the challenges posed by climate change, rendering them less relevant.

Table 5: Relationship between MFs and Climate-Friendly Behaviors and Regulations

	Not controlling for environmental concern (Table 3)			Controlling for environmental concern (Table 4)		
	Behaviors	Regulations	Behavior + Regulation	Behaviors	Regulations	Behavior + Regulation
Care	0.15	0.09	0.24	0.05	0.02	0.07
Fairness	0.20	0.24	0.44	0.09	0.12	0.21
Liberty	0.07	0.02	0.09	-0.01	-0.03	-0.04
Loyalty	0.12	0.09	0.21	-0.04	-0.01	-0.05
Authority	0 (n.s.)	0.02	0.01	-0.03	-0.01	-0.04
Sanctity	0.12	-0.06	0.06	0.05	-0.10	-0.05

Note: Entries are the sum across behaviors and regulations of significant coefficients reported in Tables 3 and 4.

The relative unimportance of Liberty, Authority and Sanctity documented in the left-hand part of Table 5 can be further illuminated by referring to some of the more detailed results mentioned above. In the case of Liberty it was found that endorsement of this MF is insignificant with respect to reducing energy use and significantly negatively related to support for taxes on fossil fuels. This is consistent with the idea that individuals strongly committed to Liberty may perceive those behaviors and regulations as restrictions to their sovereignty. This explains why, overall, Liberty is a relatively weak predictor of climate-friendly behaviors and regulation endorsements.

In the case of Authority it was found that people who strongly endorse this MF are pro-tax and anti-subsidy. Together with insignificant coefficients with respect to the behaviors, this renders the Authority foundation virtually irrelevant overall. Yet, the positive relationship to support of

fuel taxes is consistent with the idea that people who favor Authority have a high esteem for following rules.

In the case of Sanctity, people who endorse this MF favor the purchase of energy efficient appliances and doing things to save energy while being opposed to climate-related taxes and subsidies. This is consistent with people who cherish Sanctity/Purity having a taste for frugality (distaste for waste) while preferring traditions and customs over state interference.

Some of these results and interpretations are accentuated when considering the regressions that control for environmental concern. It is seen in the right-hand part of Table 5 that in this case Fairness outperforms all other MFs by far. Importantly, while the Care foundation is still positively related to the climate-friendly behaviors and regulations, the relationships become negative for Liberty, Loyalty, Authority, and Sanctity. There is thus a remarkable difference between the roles of Liberty, Loyalty, Authority and Sanctity when regressions control for environmental concern and when they do not. The difference is particularly salient in the case of Loyalty, as the role of Loyalty switches from strongly positive to negative once environmental concern is controlled for.

These differences are explicable by noting three points. First, controlling for environmental concern means that the respective regressions more specifically focus on the MFs' role with respect to climate change mitigation rather than with respect to environmental distress more generally. Second, climate change mitigation is a global rather than local or regional public good: In contrast to pollution (of water, soil and air, say), climate change is not a threat that specifically pertains to one's own group (family, neighborhood, or nation, say). Third, as noted in section 2, Care, Fairness and Liberty are individual-focused MFs in the sense that they refer to individuals independent of their group membership. Specifically, Care and Fairness refer to neediness and justice without being restricted to "people close". By contrast, Loyalty, Authority and Sanctity are group-focused.

The latter is particularly salient in the case of Loyalty, which is explicitly conceived of as a trait that has evolved in response to "threats and challenges to the group" (Table 1).

Together, these observations help to explain why the roles of Authority and Sanctity switch from slightly positive to negative and, in particular, why the role of Loyalty switches from strongly positive to negative: Once general environmental concern is controlled for, the respective regressions more accurately separate the moral foundations relevant to a global (group-independent) public good (Care and Fairness) from others that are more group-focused (Loyalty, Authority, and Sanctity). With respect to the group-focused MFs, Loyalty stands out as it was found to be the strongest of all moral predictors of environmental concern (Table 4, regression 6). Loyalty thus positively affects climate change mitigation in an indirect way, through boosting general environmental concern, while the direct, climate-focused relationship is negative,[8]

Similar to Authority and Sanctity, the role of Liberty also becomes negative when environmental concern is controlled for while being slightly positive otherwise. This may suggest that people with a strong concern for Liberty are willing to accept restrictions to their sovereignty when those restrictions contribute to mitigating some group-focused distress but not when distress extends beyond their group.

5 Conclusion

Motivated by moral psychologists' notion that endorsement of a distinct set of universally available moral foundations helps in overcoming free-rider incentives in public good problems, this paper is the first to explore how individuals' willingness to engage in climate-friendly

[8] To be clear, a negative direct relationship (Table 4) in spite of a positive overall relationship (Table 3) means that the respective MF is *less* relevant with respect to climate change than with respect to general environmental distress, which includes group-focused distress (pollution). This makes sense from the point of view of evolutionary group selection: mitigation of group-independent environmental distress (climate change) does not contribute to the group's competitive advantage.

behaviors and to support climate-related regulations is linked to their moral concern for Care, Fairness, Liberty, Loyalty, Authority and Sanctity. The empirical analysis benefitted from the availability in the ESS Round 8 of indicators for both the behaviors and regulation endorsements on the one hand and endorsement of the moral foundations on the other.

Using as dependent variables individuals' stated likelihood to buy energy efficient appliances and to engage in activities to save energy as well as their degree of endorsement of fossil fuel taxes, subsidies for renewable energies, and a ban on energy-inefficient appliances, it was found that inclusion of the moral foundations in addition to a standard set of explanatory variables improved the explanatory power of the respective regressions by 44 percent on average. Differentiating between alternative specifications, it was found that the Fairness and Care foundations are strong and robust predictors of the dependent variables. The Loyalty foundation, which explicitly refers to "threats and challenges to the group", contributes positively only when neglecting the nature of climate change mitigation as a public good that benefits individuals independent of their membership to one's own group (e.g. family, neighborhood, or nation). More generally, in contrast to the individual-focused moral foundations (that apply to all individuals), the group-focused moral foundations were found to be of little direct relevance for climate change mitigation, as distress from climate change extends beyond the in-group (however defined) to which these foundations refer. Group-focused moral foundations are only of indirect relevance as their endorsement fosters general environmental concern which, in turn, is an important predictor of climate-friendly behaviors and regulation endorsements. Concern for Liberty plays a special role, as it implies that behaviors and regulations that are perceived as restrictive to individual sovereignty (activities to save energy and taxes on fossil fuels) are rejected whereas others are more likely to be accepted.

Climate change arguably is among the most pressing public good problems of our time. Human-induced climate change has arisen as a by-product of the massive expansion of mankind's technological forces since the industrial revolution. In parallel with the technological changes that have boosted climate change, and in the wake of enlightenment philosophy, Western societies have seen moral change in the sense of a heightened emphasis on the individual-focused moral foundations which this study has found to be important factors for climate change mitigation. It is an open question whether moral progress, in this sense, is sufficiently strong to mitigate the adverse global consequences of some forms of the technological progress seen over the past two centuries.

Limitations of this study include the circumstance that the data on climate-friendly behaviors refer to self-reports of the likelihood to engage in them. If data availability allows, future work may check the robustness of the results with respect to actual behaviors. A second point to be noted is that data availability implied using simple single-item questions to measure the degree of endorsement of the moral foundations whereas moral psychologists have used more sophisticated instruments to measure their theoretical constructs. In spite of this, the findings obtained (e.g. those referring to the differentiation between individual-focused and group focused moral foundations) are intuitive against the background of Moral Foundations Theory, suggesting that the proxies used are meaningful. Finally, caveats may relate to the cross-sectional design of this study. In the light of the stable nature of individuals' moral profile noted by moral psychologists, however, fixed-effects analysis would hardly be a viable alternative even if it were not prevented by data unavailability. As to possible endogeneity stemming from omitted variables it should be noted that the regressions include a rich set of controls usually used in the pertinent literature.

Moral motivation has been invoked in the literature on voluntary provision of public goods for a couple of decades, but the specific moral concerns involved seem to have been largely

unaddressed. The present paper has presented a case study focusing on climate change mitigation. The findings suggest that the role of the various moral foundations depends on the nature of the particular public good studied, that is, whether the associated benefits are global or more narrowly confined. With respect to the global public good of climate change mitigation, the relevant moral foundations are the individual-focused (universalist) ones, in particular Fairness and Care. Future research may study the moral foundations' role in contributing to other public goods, environmental or other.

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