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February 2022

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Abstract

Based on representative data for 1614 citizens in Germany, this paper empirically examines the relationship between different types of environmental protection activities and subjective well-being (SWB) in terms of life satisfaction by specifically considering the role of economic preferences for this relationship. With respect to pro-environmental behavior, we differentiate between stated non-climate environmental and climate protection activities as well as revealed climate protection activities, which are measured in an incentivized donation experiment and thus are more meaningful than stated climate protection activities. Our empirical analysis reveals that climate protection activities are more robustly and more strongly positively correlated with life satisfaction than non-climate environmental protection activities. Furthermore, not only stated climate protection activities, but also revealed climate protection activities are significantly positively correlated with life satisfaction. These results suggest that climate protection activities lead to stronger warm glow feelings and reputation gains than non-climate environmental protection activities. Our empirical analysis additionally shows that economic preferences play an important role since especially patience and trust, but also risk-taking preferences and (less robust) altruism are significantly positively correlated with life satisfaction. In particular, economic preferences are also relevant for the relationship between pro-environmental behavior and life satisfaction. When economic preferences are included in the econometric analysis, the estimated correlations between climate protection activities and life satisfaction become weaker and the estimated correlation between non-climate environmental protection activities and life satisfaction even becomes insignificant. These results strongly suggest omitted variable biases in cross-sectional econometric analyses of the relationship between pro-environmental behavior and SWB when economic preferences are not included as control variables.

JEL classification: I31, Q54

Keywords: Subjective well-being; life satisfaction; pro-environmental behavior; incentivized donation experiment; economic preferences

1. Introduction

Voluntary individual climate protection activities, which are an important dimension of mitigating climate change, can lead to personal costs (e.g. Schmitt et al., 2018, Andor et al., 2020), for example, by buying more expensive electric vehicles, energy-efficient appliances, or organic food or through direct donations for climate protection like in the case of carbon offsetting (e.g. Lange et al., 2017). In spite of these costs, however, a large number of previous studies reveals that individual climate and other environmental protection activities are positively correlated with subjective well-being (SWB) in terms of both happiness and life satisfaction (for an overview see e.g. Welsch, 2020a). For example, Welsch and Kühling (2011) find that composite indicators of five different environmental protection activities are positively correlated with life satisfaction. Furthermore, by examining 39 different environmental protection activities, Schmitt et al. (2018) show that 37 of them are positively correlated with life satisfaction. Interestingly, they also find that the positive correlations are stronger for environmental protection activities that are more observable, that involve more sociability, and especially that are more costly in terms of money, time, and effort.

In economic terms, the positive correlations between pro-environmental behavior and SWB are difficult to explain by common economic public good models, which focus on outcomes of environmental quality. Since environmental outcomes are almost unaffected by any activities of an individual (e.g. Andreoni, 1990), a higher environmental quality provides no adequate explanation for SWB benefits. Therefore, previous studies rather consider psychological benefits from the activities themselves instead of their outcomes. In this vein, Welsch and Kühling (2011) and Welsch (2020a) distinguish between intrinsic motives (i.e. impure altruism and conformity to social norms) and extrinsic motives (i.e. prestige and reputation gains) for pro-environmental behavior. With respect to impure altruism, Welsch (2020a) argues that pro-environmental behavior could increase SWB due to self-image concerns or "warm glow" feelings (e.g. Andreoni, 1990). Binder and Blankenberg (2017) additionally argue that pro-environmental behavior allow to achieve meaning in life and behave in altruistic ways. With respect to conformity to social norms, Binder et al. (2020) differentiate between norms at the societal level and at a group-specific level and find that SWB benefits derive from conformity to the latter rather than to the former norm. As an extrinsic motive, Welsch (2020a) discusses prestige and reputation gains, i.e. pro-environmental behavior that leads to a higher reputation in the social environment can lead to higher levels of SWB.

Against this background, this paper econometrically examines the relationship between different types of environmental protection activities and SWB. The contribution of our empirical analysis to previous empirical SWB studies is three-fold: First, we differentiate between climate protection activities (i.e. using energy-efficient appliances and using energy from renewable sources) and non-climate environmental protection activities (i.e. water and waste saving and buying environmentally friendly products) to examine which types of environmental protection activities are more relevant for SWB. Due to the increasing public awareness and concern about climate change (e.g. El Ouadghiri et al., 2021), especially after the Paris Agreement in 2015 and the formation of climate movements like Fridays for Future (FFF), it might be possible that climate protection activities not only lead to stronger feelings of warm glow, but also to higher reputation gains than non-climate environmental protection activities and thus possibly to higher SWB (e.g. Harbaugh, 1998, Sexton and Sexton, 2014). This would lead to stronger positive correlations between climate protection activities and SWB compared to the corresponding correlations between non-climate environmental protection activities and SWB.

Second, in addition to differentiating between climate and non-climate environmental protection activities, our empirical analysis also considers *revealed* climate protection activities. To the best of our knowledge, the relationship between such activities and SWB has not been examined so far. Instead, previous empirical SWB studies consider *stated* environmental protection activities based on common questions in surveys for their empirical analyses. However, the problems of using stated activities and behavior as indicators for real activities and behavior are well-known: For example, it is possible that the answers in surveys are not truthful, but biased towards a socially desirable direction. Furthermore, qualitative survey items like "using low-energy appliances", "buying an efficient vehicle", or "buying locally produced foods" that are often considered in previous studies (e.g. Welsch and Kühling, 2011, Schmitt et al., 2018) are vague and can be individually differently interpreted so that interpersonally comparisons are difficult. In addition, if composite multi-item indicators for pro-environmental behavior are used, the implicit assumption is that all items are equally relevant in terms of their environmental impacts. However, this assumption can be problematic, for example, if activities like "talking to children about environmental issues" and "using public transit or carpool" (e.g. Schmitt et al., 2018) are compared.

More reliable and meaningful survey-based indicators for pro-environmental behavior might thus rather be based on quantitative calculations of their environmental impacts or on stated donations. However, even such quantitative indicators would be imprecise since they are only

based on statements. Against this background, we examine interpersonally comparable revealed climate protection activities, which are measured with an incentivized donation scheme. Such incentive compatible schemes are common in experimental and behavioral economics to measure contributions to public goods like climate protection (e.g. Diederich and Goeschl, 2014, 2018, Falk et al., 2021, Ziegler, 2021, Fornwagner and Hauser, 2022). In our probabilistic incentive approach, the respondents were asked to divide 100 Euro between the own account and a charitable non-profit organization, which uses the donated money for buying emission allowances from the European Emissions Trading Scheme (EU ETS) and for decommissioning them permanently. The individually donated amount is then used as alternative indicator for climate protection activities in our empirical analysis.

The third contribution of our empirical analysis refers to one concern of previous results, i.e. that estimated positive correlations between pro-environmental behavior and SWB might be biased due to omitted variables. For example, Binder and Blankenberg (2017), Welsch (2020a), and Welsch et al. (2021) examine and discuss such biases due to the omission of green self-image and (stable) personality traits. We specifically consider economic preferences such as risk and time preferences, which are often examined in behavioral economics (e.g. Falk et al., 2016, 2018) and which play an important role not only for individual behavior like stock purchases (e.g. Dohmen et al., 2012), but also for pro-environmental behavior (e.g. Kotchen and Moore, 2007, Qiu et al., 2014, Newell and Siikamäki, 2015, Ziegler, 2020, 2021, Falk et al., 2021, Fischbacher et al., 2021). Omitting economic preferences in econometric analyses of the relationship between pro-environmental behavior and SWB can lead to biased estimation results since some economic preferences are not only correlated with pro-environmental behavior as aforementioned, but also with SWB according to a few previous studies (e.g. Dohmen et al., 2009, Becker et al., 2012). SWB benefits conventionally attributed to pro-environmental behavior may thus (at least partly) be attributable to economic preferences.

Our econometric analysis based on representative individual data in Germany reveals that climate protection activities are more robustly and more strongly positively correlated with life satisfaction than non-climate environmental protection activities. Furthermore, not only stated climate protection activities, but also revealed climate protection activities are significantly positively correlated with life satisfaction. Our empirical analysis additionally shows that economic preferences play an important role since some economic preferences are significantly correlated with life satisfaction. In particular, the estimated correlations between climate protection activities and life satisfaction become weaker and the estimated correlation between

non-climate environmental protection activities and life satisfaction even becomes insignificant when economic preferences are included in the econometric analysis. These results strongly suggest omitted variable biases in cross-sectional econometric analyses of the relationship between pro-environmental behavior and SWB when economic preferences are not included as control variables.

The remainder of the paper is as follows: Section 2 presents the data and the variables in the econometric analysis. Section 3 discusses the estimation results and Section 4 concludes.

2. Data and variables

The data for our empirical analysis were collected from a large-scale computer-based survey among 1614 citizens in Germany, which was carried out in April and May 2021 by the German market research institute Psyma. Due to the focus of the survey, only adults who are solely responsible for the purchase of major household items or services (e.g. vehicles, furniture, electricity contracts) or responsible together with a partner were included. The sample was stratified in terms of age groups, gender, education, and place of residence (with respect to the 16 federal states) so that it is widely representative for these criteria. After some screening questions and first socio-demographic variables, the first part of the questionnaire referred to personal values and attitudes including questions on life satisfaction and economic preferences. The second part comprised specific climate and other environmental questions. The third part included an incentivized question on climate protection activities, which was integrated in a framed field experiment. After some Corona and health specific variables in the fourth part of the questionnaire, the final part comprised further questions on socio-economic and socio-demographic characteristics. Among all respondents, the median time needed to complete the survey was about 28 minutes.

2.1. Dependent variable

The dependent variable in our econometric analysis refers to life satisfaction. The variable is based on a common question from the German Socio-Economic Panel (SOEP), which is used in many empirical studies on life satisfaction in Germany (e.g. Frijters et al., 2004, Rehdanz and Maddison, 2008, Dohmen et al., 2009, Becker et al., 2012, Biermann and Welsch, 2021). Therefore, we asked the respondents how satisfied they were at that time with their life overall. The respondents indicated their life satisfaction on a scale with eleven ordered response categories, ranging from zero (“fully dissatisfied”) to ten (“fully satisfied”). We assign increasing

integers from zero to ten to construct the ordinal variable 'life satisfaction'. While the use of ordered response models like ordered probit models would certainly be appropriate for the econometric analysis, Ferrer-i-Carbonell and Frijters (2004) and Luechinger et al. (2010) among others find that the estimation results in linear regression models are very similar to the corresponding results in ordered response models when life satisfaction is measured with eleven categories like in our case. Due to the simpler interpretation of the estimation results, it is therefore common in previous studies to use linear regression models. In spite of focusing on the application of linear regression models in our econometric analysis, we additionally consider an ordered probit model to check the robustness of the estimation results.

Table 1 reports the frequencies for all eleven levels of life satisfaction and shows that only a small fraction of 1.43% of the participants of the survey are fully dissatisfied with their lives, whereas 7.74% of the respondents are fully satisfied. In line with previous studies in former years for Germany (e.g. Rehdanz and Maddison, 2008), more than 70% of the respondents indicated a level of at least six for life satisfaction (i.e. more than the middle category of five). Furthermore, only less than 20% of the respondents indicated a level of four or less. Consequently, the median level of life satisfaction is seven and its mean is 6.523 (see the first line of Table 2)

2.2. Main explanatory variables

Environmental protection activities

For our econometric analysis of the relationship between environmental protection activities and life satisfaction we differentiate between *stated* activities, i.e. stated non-climate environmental and climate protection activities, and *revealed* activities, i.e. revealed climate protection activities. In line with previous studies (e.g. Welsch and Kühling, 2011, Schmitt et al., 2018), our indicators for stated pro-environmental behavior are based on several self-declared indications. With respect to non-climate environmental protection activities, we thus asked the participants of the survey whether the following four statements apply for them: "I save water in the household or use it several times", "I use my own carry bag when shopping", "I regularly buy products in refillable boxes or packages", and "I regularly buy certified environmentally friendly products". Based on these statements, four dummy variables for the four single activities are constructed in the first step, i.e. the dummy variables take the value one if the statement applies for the respondent, respectively. By adding up the values of the four dummy variables,

we construct the composite variable ‘stated non-climate environmental protection activities’, which varies between zero and four.

With respect to climate protection activities, we asked the respondents whether the following five statements apply for them: “In the household, I use an acknowledged energy-efficient refrigerator or freezer”, “in the household, I use an acknowledged energy-efficient washing machine”, “in the household, I use an acknowledged energy-efficient stove or oven”, “in the household, I use an acknowledged energy-efficient dishwasher”, and “I use energy from renewable sources in the household (e.g. via a solar or photovoltaic system or by purchasing green electricity)”. Again, dummy variables for the single activities are constructed in the first step on the basis of these statements. By adding up the values of the five dummy variables, we construct the composite variable ‘stated climate protection activities’, which varies between zero and five. The second and third lines of Table 2 report that the respondents stated about two environmental protection activities in the two respective activity classes on average. Due to the higher number of climate protection activities in our empirical analysis, this means that the relative frequency among all five activities in this class is slightly lower on average than the relative frequency among all stated non-climate environmental protection activities. In line with previous studies as discussed above, we expect that both variables are positively correlated with life satisfaction. Due to the increasing public awareness and concern about climate change, we additionally expect that the correlations are stronger for ‘stated climate protection activities’.

As discussed above, however, the reliability of these two variables as indicators for real pro-environmental behavior can be questioned. Beyond the well-known problems of widespread incorrect stated behavior, it is, for example, also unclear whether all respondents interpret the term “acknowledged energy-efficient” equally, i.e. it is possible that some appliances are considered as energy efficient by some respondents, although their real efficiency is lower than for appliances, which are not considered as energy efficient by other respondents. Therefore, we additionally consider interpersonally comparable revealed activities for the case of climate protection. In line with previous studies (e.g. Diederich and Goeschl, 2014, 2018, Falk et al., 2021, Ziegler, 2021, Fornwagner and Hauser, 2022), the quantitative indicator is based on an incentive compatible scheme. The respondents were asked to divide 100 Euro between the own account and a donation for climate protection. In a common probabilistic incentive approach (e.g. Falk et al., 2021, randomly chose 25 out of about 6.000 respondents), the respondents were informed that 16 of them and thus about 1% would be randomly selected and could receive the amount of 100 Euro. They were additionally informed that they would be notified immediately

after the survey and that their decisions on the Euro amount for themselves and the donation would be certainly realized.[1]

We consider a donation to the charitable non-profit organization Compensators e.V., which uses donated money for buying emission allowances from the EU ETS and for decommissioning them permanently. Prior to their decision, the participants of the survey were briefly informed about the EU ETS and the mechanism of decommissioning emissions allowances to convince them that donations to Compensators e.V. would really lead to a direct reduction of greenhouse gas emissions and thus to climate protection.[2] Furthermore, we informed the respondents about the amount of reduced greenhouse gas emissions for one donated Euro or for donating the entire 100 Euro on the basis of the emission prices at the time of the survey.[3] On this basis, the variable 'revealed climate protection activities' is the Euro amount that was donated to Compensators e.V. and thus can take values (i.e. integers) between zero and 100. The third line in Table 2 reports that the average value of the donations is about 32 Euro so that the assignment of the 100 Euro to the own account is clearly higher than to climate protection on average. Interestingly, the correlation between 'revealed climate protection activities' and 'stated climate protection activities' is relatively low (i.e. the Pearson correlation coefficient is only 0.08), which is in line with the concern that 'stated climate protection activities' might be a problematic indicator.

Economic preferences

For our econometric analyses of the relationship between economic preferences and life satisfaction, we differentiate between risk and time preferences, altruism, trust, as well as positive and negative reciprocity according to Falk et al. (2018). Our variable for risk preferences is based on a validated survey question (e.g. Dohmen et al., 2011, Vieider et al., 2015, Falk et al., 2016, 2018) according to the SOEP. The participants of the survey were thus asked how risk-taking they personally consider themselves on a symmetric scale with the five ordered response

[1] Specifically, the Euro amounts for the respondents were credited in bonus points to their membership account of the Psyma panel. Due to the completely random lottery, it was also pointed out that the respondents should make a decision as in the case that they would be definitely selected.

[2] Due to this mechanism, our approach leads to an even more direct indicator for pure climate protection activities compared to the consideration of climate-related donations for other charitable organizations in previous studies. For example, Falk et al. (2021) consider donations for atmosfair, which is a provider for carbon offsetting describing the financial compensation of own carbon emissions. While carbon offsetting definitely leads to a reduction of greenhouse gas emissions, co-benefits from compensation projects beyond climate protection are possible such as the increase of biodiversity in the case of reforestation or development assistance in the case of projects in poor countries (e.g. Schwirplies et al., 2019). Therefore, donations for such organization need not completely be individually motivated by climate protection.

[3] In addition, we also presented an illustrative simple example of greenhouse gas emissions for using a vehicle.

categories “not at all willing to take risks”, “rather not willing to take risks”, “undecided”, “rather willing to take risks”, and “very willing to take risks”. For the econometric analysis, we construct the dummy variable ‘risk-taking preferences’ that takes the value one if the respondent indicated one of the latter two categories. Our variable for time preferences is based on the following validated survey question from the SOEP (e.g. Vischer et al., 2013): “How patient do you personally consider yourself?”. The respondents had to indicate their assessment on a symmetric scale with the five ordered response categories “very impatient”, “rather impatient”, “undecided”, “rather patient”, and “very patient”. For the econometric analysis, we construct the dummy variable ‘patience’ that takes the value one if the respondent indicated one of the latter two categories.

Our variable for altruism is based on Falk et al. (2016). The participants of the survey were thus asked how willing they are to give for charity without expecting anything in return on a symmetric scale with the five ordered response categories “not at all willing”, “rather not willing”, “undecided”, “rather willing”, and “very willing”. For the econometric analysis, we construct the dummy variable ‘altruism’ that takes the value one if the respondent indicated one of the latter two categories. In line with, for example, Dohmen et al. (2012), our variable for trust is based on the following three validated survey items from the SOEP: “In general, one can trust people”, “these days one cannot rely on anybody else”, and “when dealing with strangers, it is better to be careful before one trusts them”. The respondents had to indicate their agreement on a symmetric scale with the five ordered response categories “totally disagree”, “rather disagree”, “undecided”, “rather agree”, and “totally agree”. We assign increasing integers from zero to four for the first item and decreasing integers from four to zero for the two latter items. Therefore, higher values indicate higher levels of trust, respectively. For the econometric analysis, we construct the variable “trust” which is the sum of the single values for the three items. The variable can thus vary between zero and 12.

Our variables for positive and negative reciprocity are in line with, for example, Dohmen et al. (2008, 2009) or Caliendo et al. (2012) and thus with survey questions from the SOEP. The variable for positive reciprocity is based on the following three statements: “If someone does me a favor, I am ready to return it”, “I particularly try to help someone who has helped me before”, and “I am willing to incur costs to help someone who has helped me before”. The variable for negative reciprocity is based on the following three statements: “If I am treated with a great injustice, I will take revenge at the first occasion, no matter what the cost”, “if someone puts me in a difficult position, I will do the same to him”, and “if someone offends

me, I will also offend him". The respondents had again to indicate their agreement on a symmetric scale with five ordered response categories ranging from "totally disagree" to "totally agree" as described before. Again, we assign increasing integers from zero to four for all six items. For the econometric analysis, we construct the variables "positive reciprocity" and "negative reciprocity" which are the sums of the single values for the three items, respectively. Both variables can thus generally vary between zero and 12.

Table 2 reports some descriptive statistics. It shows, for example, that about one third of the respondents consider themselves as risk-taking. The self-assessment for patience and especially altruism is higher on average. The table also reveals that all respondents have a minimum of positive reciprocity, i.e. for no respondent the indicator takes the values zero or one. Interestingly, the means for 'trust', 'positive reciprocity', and 'negative reciprocity' are very similar to corresponding values in previous studies in Germany that are based on the same survey questions and items (e.g. Ziegler, 2021, based on data from 2016). Becker et al. (2012) find that risk-taking preferences, patience, altruism, trust, and negative reciprocity are positively correlated with life satisfaction. However, their estimation results should be treated with caution since common determinants of life satisfaction as discussed below are not included in their econometric analysis.

2.3. Control variables

As discussed above, the inclusion of economic preferences addresses possible omitted variable biases when life satisfaction is regressed on pro-environmental behavior (e.g. Binder and Blankenberg, 2017, Welsch et al., 2021). While controlling for unobserved heterogeneity would even be a more promising approach to mitigate omitted variable biases, necessary panel data especially for revealed climate protection activities are unfortunately not available. Besides economic preferences, we therefore additionally control for two variables of environmental attitudes, which are shown to be strongly correlated with stated or revealed environmental and especially climate protection activities, i.e. environmental awareness and identification with ecological policy (e.g. Ziegler, 2017, 2020, 2021), but which are not commonly considered in empirical analyses of SWB. This consideration is in line with Schmitt et al. (2018). In contrast to the positive correlation between environmental protection activities and life satisfaction, they find that perceptions of ecological threat are rather negatively correlated with life satisfaction. As an explanation for their result, they argue that recognizing environmental problems and es-

pecially the climate crisis can be psychologically threatening and thus undermine SWB. Therefore, it is possible that our two indicators for environmental attitudes are also negatively correlated with life satisfaction.

The argumentation of psychological threat is particularly obvious for our indicator of environmental awareness, which is measured with the New Ecological Paradigm (NEP) scale according to Dunlap et al. (2000). It is based on 15 statements, whereby eight of them are environmentally positively worded (e.g. "when humans interfere with nature it often produces disastrous consequences", "the earth is like a spaceship with very limited room and resources") and seven of them are environmentally negatively worded (e.g. "humans have the right to modify the natural environment to suit their needs", "the so-called 'ecological crisis' facing humankind has been greatly exaggerated").[4] The respondents had again to indicate their agreement on a symmetric scale with five ordered response categories ranging from "totally disagree" to "totally agree". We assign increasing integers from zero to four for the eight environmentally positively worded statements and decreasing integers from four to zero for the seven environmentally negatively worded statements. For the econometric analysis, we construct the variable 'NEP' which is the sum of the single values for the 15 items. It can thus generally vary between zero and 60, whereby Table 2 shows that the minimum value is ten in our sample. In line with previous studies, the mean value of more than 42 is relatively high.

In addition, we examine identification with ecological policy, which is based on the statement "I identify with ecologically oriented policy". The participants of the survey had again to indicate their agreement on a symmetric scale with five ordered response categories ranging from "totally disagree" to "totally agree". For the econometric analysis, we construct the dummy variable 'ecological policy identification' that takes the value one if the respondent indicated "totally agree" or "rather agree". Our consideration of policy identification is different from most previous SWB studies (e.g. Napier and Jost, 2008) examining a simple one-dimensional indicator for a left/right-wing policy identification. Instead, we acknowledge the interrelations of political identification in Germany (e.g. Groh and Ziegler, 2022). Therefore, we do not only consider identification with ecological policy, but additionally asked the respondents on the same symmetric scale to indicate their agreement to the following three statements: "I identify with socially oriented policy", "I identify with liberally oriented policy", and "I identify with

[4] The other statements can be found in the online appendix, which comprises all survey questions that are considered in this paper.

conservatively oriented policy". The corresponding dummy variables 'social policy identification', 'liberal policy identification', and 'conservative policy identification' take the value one if the respondent indicated again "totally agree" or "rather agree", respectively. In line with previous SWB studies (e.g. Napier and Jost, 2008), we expect rather positive correlations between right-wing or conservative policy identification and life satisfaction, but rather negative correlations between left-wing policy identification and life satisfaction. Table 2 shows that the identification with social policy is highest on average, followed by the identification with ecological and liberal policy.

We control for further common variables which have been shown to be strongly correlated with SWB. With respect to health, the respondents were asked how they would describe their present health status on a symmetric scale with the five ordered response categories "very bad", "rather bad", "neither good nor bad", "rather good", and "very good". For the econometric analysis, we construct the dummy variable 'good health' that takes the value one if the respondent indicated one of the latter two categories. For the participation in this question, the respondents were informed that health data belong to particularly protected information so that they had to explicitly agree to health questions. Overall, 109 respondents refused to answer health questions. Since data for all other variables in our econometric are available for all 1614 participants of the survey, we construct an additional health variable to include all respondents in our empirical analysis. The dummy variable 'no health information' takes the value one if the respondent did not answer the health questions. Finally, the dummy variable 'neutral or bad health' takes the value one if the respondent was willing to answer health questions and indicated "very bad", "rather bad", or "neither good nor bad". The latter variable is used as base category in the econometric analysis. In line with previous studies, we expect positive correlations between good health and life satisfaction.

With respect to income, the respondents were asked to indicate their monthly net household income in Euro among 21 income classes overall. For each income class, we consider the mean values.[5] Specifically, we consider the concept of equivalized income to account for scale effects in the household (e.g. Groh and Ziegler, 2022). Our approach refers to a modified OECD equivalence scale (e.g. Horsfield, 2015), which weights the first adult in the household with the factor one, children up to the age of 13 years with the factor 0.3, and other older household members

[5] In line with Feldman (2010), we consider one and a half times of the lower bound of the open top class and thus assign 15,000 Euro to all respondents who indicated this household income class.

with the factor 0.5. The corresponding variable is termed ‘equivalized income’. In the econometric analysis, we consider ‘log equivalized income’, i.e. the natural logarithm of the equivalized income. Furthermore, we include several employment status variables. The dummy variable ‘full-time employment’ takes the value one if the respondent works at least 35 hours per week on average. The dummy variables ‘part-time employment’ and ‘minor employment’ take the value one if the respondent works between 20 and less than 35 hours per week and less than 20 hours per week on average, respectively. Finally, the dummy variables ‘not seeking unemployment’ and ‘seeking unemployment’ take the value one if the respondent is unemployed, but not seeking a job (including e.g. pupils, students, and retirees), and unemployed and seeking a job, respectively. The latter variable is used as base category in the econometric analysis. In line with previous studies, we expect a positive correlation between income and life satisfaction, but a negative correlation between ‘seeking unemployment’ and life satisfaction.

The dummy variable ‘high education’ takes the value one if the respondent has at least a college or university degree. The variable ‘age’ indicates the age of the respondent in years. In the econometric analysis, we additionally include the variable ‘age squared’. Furthermore, the dummy variable ‘female’ takes the value one if the respondent is a woman, the dummy variable ‘living together’ takes the value one if the respondent lives with a partner or spouse, and ‘household size’ indicates the number of persons permanently living in the household of the respondent. Finally, for controlling for regional differences in SWB between Eastern and Western Germany (e.g. Biermann and Welsch, 2021), the dummy variable ‘Eastern Germany’ takes the value one if the respondent lives in one of the Eastern federal states of Germany including Berlin. Table 2 reports some descriptive statistics of these explanatory variables.

3. Estimation results

Table 3 reports the main ordinary least squares (OLS) estimation results in seven linear regression models with ‘life satisfaction’ as the dependent variable. Besides the estimated parameters, heteroskedasticity robust z-statistics are reported. While all seven model specifications comprise the same control variables as discussed above, they are different in the inclusion of single types of environmental protection activities and economic preferences. The first three models omit economic preferences and separately include one of the three indicators of pro-environmental behavior (i.e. ‘stated non-climate environmental protection activities’, ‘stated climate protection activities’, ‘revealed climate protection activities’) as main explanatory variable to avoid possible multicollinearity problems due to the correlations between the three types of

environmental protection activities. The fourth model only includes the six economic preferences as main explanatory variables, but omits environmental protection activities. The last three models include both environmental protection activities and economic preferences, but again only include the three indicators of pro-environmental behavior separately.

With respect to the common control variables, Table 3 reveals very consistent estimation results across the different model specifications. In line with previous studies, good health, logarithmized equivalized income, living together, and household size are strongly significantly positively correlated with life satisfaction. In addition, age has a significant U-shaped correlation with life satisfaction. Respondents, who are full-time employed, only have a weakly significantly higher life satisfaction than unemployed respondents who are seeking a job. According to the results in the first three columns, ecological policy identification is surprisingly significantly positively correlated, whereas environmental awareness is slightly significantly negatively correlated with life satisfaction. The latter result is in line with the results of Schmitt et al. (2018) about perceptions of ecological threat. In line with previous studies, the results in the first two columns reveal that both types of stated environmental protection activities are significantly positively correlated with life satisfaction. In accordance with our expectation, the estimated correlation is slightly higher for 'stated climate protection activities' than for 'stated non-climate environmental protection activities'. Furthermore, due to the higher z-statistics, the estimated correlation for 'stated climate protection activities' is slightly more (statistically) significant.

The estimation results in the third column show (to the best of our knowledge for the first time) that also revealed climate protection activities are significantly positively correlated with life satisfaction. Similar to the two types of stated environmental protection activities, the strength of the estimated correlation is non-negligible. For example, an increase of the donated amount by 60 Euro leads to an estimated increase in life satisfaction by about 0.46 points[6] on the scale between zero and ten, which is comparable to the estimated difference in life satisfaction between respondents who are living together and respondents who are living alone. An increase from the lowest value of zero Euro to the highest value of 100 Euro leads to an estimated increase in life satisfaction that is similar to the estimated increase when the number of stated climate protection activities increases from the lowest value of zero activities to the highest value of five activities. However, the estimated increase in life satisfaction is smaller than the

[6] This value is based on the exact parameter estimate of 0.0076416.

estimated difference in life satisfaction of about one point between respondents with good health and neutral or bad health.[7]

The estimation results in the fourth column, which refer to the model that omits environmental protection activities but includes economic preferences, shows that (in line with Becker et al., 2012) risk-taking preferences, patience, altruism, and trust are significantly positively correlated with life satisfaction. The estimated correlation is particularly strong and robust for patience and trust, but less robust for altruism. The strength of the estimated correlation for 'patience' is similar to the estimated correlation for 'living together'.[8] In particular, the estimated parameter for 'trust' is remarkable. Already an increase by five points on the 13-point scale is associated with an estimated increase in life satisfaction that is higher than the estimated difference in life satisfaction between respondents with good health and neutral or bad health. With respect to the latter result, it should be noted that the inclusion of the economic preferences leads to a slight decrease in the estimated parameter of 'good health'. A similar slight decrease arises for the estimated parameter of 'log equivalized income'. However, the inclusion of the economic preferences has the strongest influence on the estimated parameters for environmental attitudes and political orientation. The correlations between 'NEP' or 'ecological policy identification' and life satisfaction are now insignificant. Furthermore, 'conservative policy identification' is now significantly positively correlated and 'social policy identification' is significantly negatively correlated with life satisfaction. In sum, the estimation results in the fourth column do not only suggest strong correlations between economic preferences and life satisfaction, but also strong effects on the correlation between other variables and life satisfaction.

These conclusions are confirmed by the estimation results in the last three columns that refer to models that include both environmental protection activities and economic preferences besides the control variables. The columns reveal qualitatively almost identical estimation results as in

[7] As aforementioned, the incentivized question on climate protection activities was integrated in a framed field experiment. Specifically, the respondents were randomly assigned to three treatment groups and a control group. The interventions in the treatment groups referred to information on different social norms, i.e. descriptive social norms, injunctive social norms, and a combination of both (the analysis of the treatment effects are considered in a complementary paper). To test the robustness of our estimation results for 'revealed climate protection activities', we have also included treatment dummy variables in the corresponding model specification. However, the estimation results (which are not reported due to brevity, but are available upon request) are qualitatively almost identical. It should be noted that the questions on stated environmental protection activities, environmental attitudes, and political orientations were asked before the framed field experiment so that the treatments could not influence the answers to these questions.

[8] It should be noted that the questionnaire also comprised an alternative item for time preferences according to Falk et al. (2016). A corresponding variable based on this question is not significantly correlated with life satisfaction. The corresponding estimation results are not reported for brevity, but are available upon request. However, the use of this variable has no influence on our main conclusions from this empirical analysis as discussed below.

the fourth column, also for all economic preferences (the only exception refers to altruism that is not significantly correlated with life satisfaction in the seventh model). This means that the additional inclusion of environmental protection activities hardly affects the estimation results so that there is no evidence that they mediate the correlation between economic preferences and life satisfaction. Economic preferences are therefore rather relevant for life satisfaction irrespective of any role they may play for environmental protection activities. In contrast, the inclusion of economic preferences is strongly relevant for the correlations between pro-environmental behavior and life satisfaction. In particular, the previous significantly positive correlation between stated non-climate environmental protection activities and life satisfaction becomes insignificant. Furthermore, while the estimated parameters for the two types of climate protection activities remain significantly different from zero, they decrease by about a quarter.

Similar to the results of Binder and Blankenberg (2017) and Welsch et al. (2021) for green self-image[9] and (stable) personality traits, these estimation results suggest that the exclusion of economic preference in econometric analyses of SWB can lead to omitted variable biases, especially for political orientation, environmental attitudes and particularly pro-environmental behavior. Furthermore, in line with our expectations, the estimation results suggest that correlations between (stated and revealed) climate protection activities and life satisfaction are much more robust than the correlation between (stated) non-climate environmental protection activities and life satisfaction since the latter becomes insignificant when controlling for economic preferences. These results are strongly confirmed in several robustness checks. Table 4 reports the corresponding estimation results in five additional models. To mitigate possible additional omitted variable biases, the first three linear regression models jointly include two types of environmental protection activities besides the economic preferences, whereas the fourth model includes all three indicators of pro-environmental behavior together. The fifth model also includes all three types of environmental protection activities and all economic preferences, but applies an ordered probit model.[10] Overall, the estimation results in Table 4 are qualitatively extremely similar to the estimation results in the last three columns of Table 3.[11]

[9] An extensive empirical analysis of the relationship between green self-image and SWB can be found in Welsch and Kühling (2018).

[10] While the four linear regression models were still estimated by OLS, the ordered probit model was estimated by the maximum likelihood method (ML). In the latter case robust z-statistics are reported in addition to the estimated parameters.

[11] Only the estimated parameters and the corresponding z-statistics for 'stated non-climate environmental protection activities' additionally decrease due to its strong correlations to 'stated climate protection activities' (the Pearson correlation coefficient is 0.28) and 'revealed climate protection activities' (the Pearson correlation coefficient is 0.23). However, these changes have no qualitative relevance.

4. Conclusions

Based on representative data for 1614 citizens in Germany, this paper provides new empirical evidence for the determinants of SWB in terms of life satisfaction. By controlling for common factors from previous SWB studies, our econometric analysis focuses on the interrelationship between pro-environmental behavior, economic preferences, and life satisfaction, and leads to the following four main results: (1) Climate protection activities are more robustly and more strongly significantly positively correlated with life satisfaction than non-climate environmental protection activities. (2) Not only stated climate protection activities, but also more meaningful revealed climate protection activities, measured in an incentivized donation experiment, are significantly positively correlated with life satisfaction. (3) Economic preferences play an important role since particularly patience and trust, but also risk-taking preferences and (less robust) altruism are significantly positively correlated with life satisfaction. (4) Economic preferences additionally influence the estimated correlation between several common variables and life satisfaction, especially with respect to political identification, environmental attitudes, and pro-environmental behavior. In particular, while the estimated correlations between climate protection activities and life satisfaction become weaker, the estimated correlation between non-climate environmental protection activities and life satisfaction even becomes insignificant when economic preferences are included in the econometric analysis.

With respect to the puzzle of positive correlations between pro-environmental behavior and SWB, which cannot be explained by common economic public good models (e.g. Welsch, 2020a), our empirical analysis provides two important insights: First, the estimated positive correlations in previous studies are obviously not generally due to the consideration of stated environmental protection activities since both stated and revealed climate protection activities (which are not strongly correlated with each other) are significantly positively correlated with life satisfaction, even when controlling for economic preferences. This result thus suggests that the aforementioned empirically validated puzzle is not generally a spurious result due to unreliable indicators, at least for climate protection activities. While we have made a first attempt to analyze the relationship between revealed environmental protection activities and SWB, an important direction for further research is the consideration of alternative meaningful indicators for pro-environmental behavior. These indicators might, for example, be measured in alternative climate-related donation experiments, but also in experiments on donations for non-climate environmental or for non-environmental charitable purposes. Even more interesting would be the use of data for environmental protection activities that are neither collected in surveys nor

in (hypothetical) incentivized experiments, but which are observed in real life, for example, donation data from charitable organizations. To the best of our knowledge, such data in combination with individual SWB data are not available so far.

Second, our empirical analysis points to an important methodological shortcoming of previous empirical studies on the relationship between pro-environmental behavior and SWB. Our estimation results suggest an overestimation of the positive correlations between environmental protection activities and life satisfaction when economic preferences are not included as control variables. While the estimated positive correlations at least remain significant in the case of stated and revealed climate protection activities so that the previous conclusions remain valid, the omitted variable bias is especially strong for non-climate environmental protection activities. Therefore, economic preferences should generally be included as control variables in econometric analyses of the relationship between pro-environmental behavior (and possibly also other variables) and SWB, especially if cross-sectional data are used. While it might be argued that controlling for unobserved heterogeneity in panel data analyses is sufficient to avoid omitted variable biases in this respect, it should be noted that recent studies reveal intertemporally changing economic preferences (e.g. Krupka and Stephens, 2013, Schildberg-Hörisch, 2018, Frondel et al., 2021, Adema et al., 2022). Therefore, it seems to be useful to also address economic preferences in panel data studies.

To further examine the puzzle of positive correlations between pro-environmental behavior and SWB methodologically, an interesting direction for future studies is the analysis of additional confounding variables that might lead to omitted variable biases. Possible candidates are moral values like universalism (e.g. Welsch, 2020b) or alternative personality traits like the Big Five factors (e.g. Boyce et al., 2019), which are also correlated with economic preferences (e.g. Dohmen et al., 2008, Becker et al., 2012). Methodologically most interesting, however, are future studies that shed more light on the causality of the relationship between pro-environmental behavior and SWB. So far, almost all previous studies can only be interpreted in terms of correlations, i.e. it is generally not possible to clearly conclude that environmental protection activities causally lead to SWB, but it is also possible that higher life satisfaction or greater happiness have a causal effect on pro-environmental behavior. A first experimental study of this simultaneity problem can be found in Falk and Graeber (2020). However, they only consider general prosocial activities so that no conclusions can be drawn for different types of environmental protection activities.

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Tables

Table 1: Frequencies of life satisfaction, 1614 respondents

Life satisfaction	0 (fully dissatisfied)	1	2	3	4	5
Frequencies	23 (1,43%)	31 (1,92%)	71 (4,40%)	106 (6,57%)	80 (4,96%)	168 (10,41%)
Life satisfaction	6	7	8	9	10 (fully satisfied)	
Frequencies	158 (9,79%)	300 (18,59%)	389 (24,10%)	163 (10,10%)	125 (7,74%)	

Table 2: Descriptive statistics of dependent and explanatory variables, 1614 respondents

Variable	Mean	Standard deviation	Minimum	Maximum
Life satisfaction	6.523	2.370	0	10
Stated non-climate environmental protection activities	2.076	1.102	0	4
Stated climate protection activities	2.116	1.586	0	5
Revealed climate protection activities	32.151	30.403	0	100
Risk-taking preferences	0.324	0.468	0	1
Patience	0.540	0.499	0	1
Altruism	0.710	0.454	0	1
Trust	5.245	2.383	0	12
Positive reciprocity	9.556	1.740	2	12
Negative reciprocity	4.522	2.849	0	12
NEP	42.014	8.861	10	60
Ecological policy orientation	0.407	0.491	0	1
Social policy orientation	0.592	0.492	0	1
Liberal policy orientation	0.305	0.460	0	1
Conservative policy orientation	0.243	0.429	0	1
Good health	0.535	0.499	0	1
No health information	0.068	0.251	0	1
Neutral or bad health	0.398	0.490	0	1
Equivalized income	1,803.676	1,135.795	89	15,000
Full-time employment	0.399	0.490	0	1
Part-time employment	0.145	0.352	0	1
Minor employment	0.053	0.225	0	1
Not seeking unemployment	0.364	0.481	0	1
Seeking unemployment	0.038	0.192	0	1
High education	0.203	0.403	0	1
Age	50.407	16.920	18	88
Female	0.504	0.500	0	1
Living together	0.603	0.489	0	1
Household size	2.243	1.151	1	10
Eastern Germany	0.218	0.413	0	1

Table 3: OLS estimates (heteroscedasticity robust z-statistics) in linear regression models, dependent variable: life satisfaction, 1614 respondents

Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Stated non-climate environmental protection activities	0.126** (2.34)	--	--	--	0.065 (1.24)	--	--
Stated climate protection activities	--	0.140*** (3.92)	--	--	--	0.108*** (3.10)	--
Revealed climate protection activities	--	--	0.008*** (3.89)	--	--	--	0.006*** (3.02)
Risk-taking preferences	--	--	--	0.274** (2.34)	0.265** (2.26)	0.265** (2.26)	0.285** (2.44)
Patience	--	--	--	0.518*** (4.64)	0.511*** (4.57)	0.514*** (4.61)	0.521*** (4.69)
Altruism	--	--	--	0.218* (1.72)	0.211* (1.66)	0.217* (1.72)	0.176 (1.38)
Trust	--	--	--	0.178*** (6.80)	0.178*** (6.80)	0.174*** (6.71)	0.172*** (6.54)
Positive reciprocity	--	--	--	-0.001 (-0.04)	-0.003 (-0.09)	-0.011 (-0.30)	-0.003 (-0.08)
Negative reciprocity	--	--	--	-0.019 (-0.88)	-0.016 (-0.77)	-0.016 (-0.78)	-0.017 (-0.83)
NEP	-0.013* (-1.88)	-0.013* (-1.85)	-0.013* (-1.91)	-0.006 (-0.82)	-0.007 (-1.05)	-0.008 (-1.14)	-0.008 (-1.21)
Ecological policy orientation	0.276** (2.17)	0.311** (2.48)	0.221* (1.71)	0.164 (1.34)	0.148 (1.19)	0.168 (1.37)	0.101 (0.81)
Social policy orientation	-0.199 (-1.59)	-0.211* (-1.69)	-0.181 (-1.45)	-0.338*** (-2.76)	-0.340*** (-2.77)	-0.347*** (-2.84)	-0.323*** (-2.62)
Liberal policy orientation	0.050 (0.39)	0.044 (0.35)	0.040 (0.31)	0.008 (0.07)	0.006 (0.05)	0.002 (0.01)	-0.004 (-0.03)
Conservative policy orientation	0.162 (1.23)	0.167 (1.28)	0.179 (1.36)	0.288** (2.22)	0.296** (2.28)	0.303** (2.34)	0.310** (2.39)
Good health	1.013*** (8.19)	1.008*** (8.21)	1.037*** (8.47)	0.872*** (7.21)	0.862*** (7.11)	0.853*** (7.06)	0.874*** (7.25)
No health information	0.265 (1.08)	0.293 (1.19)	0.306 (1.25)	0.203 (0.84)	0.195 (0.80)	0.210 (0.86)	0.222 (0.92)
Log equivalized income	0.480*** (4.46)	0.462*** (4.28)	0.454*** (4.17)	0.409*** (3.76)	0.403*** (3.72)	0.388*** (3.57)	0.385*** (3.53)
Full-time employment	0.611* (1.94)	0.611* (1.93)	0.560* (1.78)	0.576* (1.86)	0.561* (1.81)	0.555* (1.79)	0.514* (1.66)
Part-time employment	0.482 (1.48)	0.480 (1.47)	0.452 (1.40)	0.462 (1.46)	0.437 (1.37)	0.423 (1.33)	0.402 (1.27)
Minor employment	0.271 (0.70)	0.275 (0.71)	0.176 (0.46)	0.318 (0.85)	0.301 (0.80)	0.296 (0.79)	0.220 (0.59)
Not seeking unemployment	0.402 (1.26)	0.395 (1.23)	0.341 (1.08)	0.420 (1.36)	0.399 (1.29)	0.384 (1.23)	0.345 (1.12)
High education	0.042 (0.31)	0.025 (0.18)	0.041 (0.30)	-0.063 (-0.47)	-0.064 (-0.48)	-0.078 (-0.58)	-0.065 (-0.49)
Age	-0.104*** (-4.97)	-0.104*** (-4.99)	-0.104*** (-5.03)	-0.092*** (-4.44)	-0.094*** (-4.50)	-0.095*** (-4.58)	-0.094*** (-4.56)
Age squared	0.001*** (5.83)	0.001*** (5.81)	0.001*** (5.89)	0.001*** (5.15)	0.001*** (5.20)	0.001*** (5.25)	0.001*** (5.27)
Female	0.010 (0.09)	0.000 (0.00)	0.025 (0.22)	0.094 (0.82)	0.082 (0.71)	0.067 (0.59)	0.091 (0.78)
Living together	0.442*** (3.39)	0.387*** (2.98)	0.447*** (3.44)	0.492*** (3.91)	0.489*** (3.89)	0.446*** (3.55)	0.492*** (3.92)
Household size	0.173*** (2.93)	0.150*** (2.58)	0.169*** (2.88)	0.163*** (2.83)	0.165*** (2.85)	0.147*** (2.59)	0.164*** (2.85)
Eastern Germany	0.118 (0.90)	0.119 (0.91)	0.109 (0.83)	0.118 (0.92)	0.113 (0.88)	0.111 (0.86)	0.105 (0.81)
Constant	3.182*** (3.33)	3.393*** (3.52)	3.468*** (3.57)	2.304** (2.25)	2.374** (2.32)	2.632** (2.54)	2.617** (2.52)

Note: * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively

Table 4: OLS estimates (heteroscedasticity robust z-statistics) in linear regression models and ML estimates (robust z-statistics) in an ordered probit model, dependent variable: life satisfaction, 1614 respondents

	Linear regression models				Ordered probit model
Explanatory variables	(1)	(2)	(3)	(4)	(5)
Stated non-climate environmental protection activities	0.031 (0.59)	0.045 (0.85)	--	0.009 (0.18)	0.010 (0.40)
Stated climate protection activities	0.104*** (2.93)	--	0.108*** (3.12)	0.107*** (3.04)	0.054*** (3.10)
Revealed climate protection activities	--	0.006*** (2.89)	0.006*** (3.04)	0.006*** (2.99)	0.003*** (2.70)
Risk-taking preferences	0.261** (2.23)	0.278** (2.38)	0.275** (2.36)	0.274** (2.35)	0.135** (2.37)
Patience	0.511*** (4.58)	0.516*** (4.64)	0.517*** (4.67)	0.516*** (4.65)	0.269*** (5.07)
Altruism	0.213* (1.69)	0.173 (1.36)	0.175 (1.38)	0.174 (1.37)	0.066 (1.09)
Trust	0.174*** (6.71)	0.173*** (6.54)	0.168*** (6.44)	0.168*** (6.43)	0.079*** (6.13)
Positive reciprocity	-0.011 (-0.31)	-0.004 (-0.12)	-0.012 (-0.34)	-0.012 (-0.35)	-0.002 (-0.10)
Negative reciprocity	-0.015 (-0.73)	-0.016 (-0.75)	-0.015 (-0.72)	-0.015 (-0.70)	-0.016 (-1.55)
NEP	-0.008 (-1.23)	-0.009 (-1.35)	-0.010 (-1.52)	-0.011 (-1.54)	-0.005 (-1.40)
Ecological policy orientation	0.160 (1.29)	0.092 (0.73)	0.104 (0.83)	0.102 (0.81)	0.049 (0.80)
Social policy orientation	-0.348*** (-2.84)	-0.324*** (-2.64)	-0.332*** (-2.70)	-0.332*** (-2.70)	-0.169*** (-2.84)
Liberal policy orientation	0.001 (0.00)	-0.005 (-0.04)	-0.011 (-0.09)	-0.011 (-0.09)	-0.013 (-0.21)
Conservative policy orientation	0.306** (2.37)	0.314** (2.42)	0.325** (2.51)	0.325** (2.51)	0.172*** (2.70)
Good health	0.850*** (7.01)	0.867*** (7.17)	0.856*** (7.10)	0.854*** (7.07)	0.443*** (7.36)
No health information	0.206 (0.85)	0.216 (0.89)	0.230 (0.94)	0.228 (0.94)	0.139 (1.23)
Log equivalized income	0.387*** (3.55)	0.382*** (3.51)	0.365*** (3.34)	0.364*** (3.34)	0.172*** (3.26)
Full-time employment	0.549* (1.77)	0.506 (1.64)	0.493 (1.59)	0.492 (1.59)	0.225* (1.69)
Part time employment	0.412 (1.29)	0.387 (1.22)	0.363 (1.14)	0.360 (1.13)	0.154 (1.12)
Minor employment	0.289 (0.77)	0.212 (0.57)	0.199 (0.53)	0.197 (0.53)	0.105 (0.64)
Not seeking unemployment	0.376 (1.21)	0.333 (1.08)	0.309 (0.99)	0.307 (0.99)	0.179 (1.35)
High education	-0.077 (-0.58)	-0.066 (-0.49)	-0.079 (-0.60)	-0.079 (-0.60)	-0.022 (-0.33)
Age	-0.096*** (-4.59)	-0.096*** (-4.60)	-0.097*** (-4.71)	-0.098*** (-4.70)	-0.048*** (-4.65)
Age squared	0.001*** (5.26)	0.001*** (5.30)	0.001*** (5.37)	0.001*** (5.36)	0.001*** (5.37)
Female	0.063 (0.55)	0.082 (0.72)	0.063 (0.55)	0.062 (0.54)	0.040 (0.73)
Living together	0.447*** (3.55)	0.490*** (3.90)	0.446*** (3.55)	0.446*** (3.54)	0.189*** (3.05)
Household size	0.149*** (2.61)	0.165*** (2.86)	0.148*** (2.61)	0.149*** (2.61)	0.081*** (2.84)
Eastern Germany	0.109 (0.85)	0.101 (0.79)	0.098 (0.76)	0.097 (0.76)	0.031 (0.50)
Constant	2.652** (2.56)	2.655** (2.56)	2.945*** (2.81)	2.949*** (2.81)	--

Note: * (**, ***) means that the estimated parameter is different from zero at the 10% (5%, 1%) significance level, respectively

Online appendix: Survey questions for the variables in the econometric analysis (translated into English)

Dependent variable: 'Life satisfaction'

In the following we ask you some questions about your individual attitudes and preferences. How satisfied are you with your life at present overall? Please indicate your satisfaction on a scale from 0 to 10 where "0" indicates fully dissatisfied and "10" fully satisfied.

Fully dissatisfied										Fully satisfied
0	1	2	3	4	5	6	7	8	9	10
□	□	□	□	□	□	□	□	□	□	□

Explanatory variables: 'Stated non-climate environmental protection activities' and 'stated climate protection activities'

Please indicate which of the following statements apply to you:

I save water in the household or use it several times	□
I use my own carry bag when shopping	□
I regularly buy products in refillable boxes or packages	□
I regularly buy certified environmentally friendly products	□
In the household, I use an acknowledged energy-efficient refrigerator or freezer	□
In the household, I use an acknowledged energy-efficient washing machine	□
In the household, I use an acknowledged energy-efficient stove or oven	□
In the household, I use an acknowledged energy-efficient dishwasher	□
I use energy from renewable sources in the household (e.g. via a solar or photovoltaic system or by purchasing green electricity)	□

Explanatory variable: 'Revealed climate protection activities'

Please enter in the following field the amount you would like to use for the purchase of emission rights via Compensators e.V. and thus for the reduction of greenhouse gas emissions.
You can enter any integer between 0 and 100 Euro.
Amount in Euro: _____

Explanatory variable: 'Risk-taking preferences'

How willing are you personally to take risks?

Not at all willing to take risks	Rather not willing to take risks	Undecided	Rather willing to take risks	Very willing to take risks
□	□	□	□	□

Explanatory variable: 'Patience'

How patient do you personally consider yourself?

Very impatient	Rather impatient	Undecided	Rather patient	Very patient
□	□	□	□	□

Explanatory variable: 'Altruism'

How willing are you to give for charity without expecting anything in return?

Not at all willing	Rather not willing	Undecided	Rather willing	Very willing
□	□	□	□	□

Explanatory variable: 'Trust'

Now we are interested in your view of other people. Please indicate to what extent you agree with the following statements:

Statement	Totally disagree	Rather disagree	Unde-cided	Rather agree	Totally agree
In general, one can trust people	□	□	□	□	□
These days one cannot rely on anybody else	□	□	□	□	□
When dealing with strangers, it is better to be careful before one trusts them	□	□	□	□	□

Explanatory variables: 'Positive reciprocity' and 'negative reciprocity'

Now we are interested in your view of other people. Please indicate to what extent you agree with the following statements:

Statement	Totally disagree	Rather disagree	Unde-cided	Rather agree	Totally agree
If someone does me a favor, I am ready to return it	□	□	□	□	□
I particularly try to help someone who has helped me before	□	□	□	□	□
I am willing to incur costs to help someone who has helped me before	□	□	□	□	□
If I am treated with a great injustice, I will take revenge at the first occasion, no matter what the cost	□	□	□	□	□
If someone puts me in a difficult position, I will do the same to him	□	□	□	□	□
If someone offends me, I will also offend him	□	□	□	□	□

Explanatory variable: 'NEP'

Now it is about the relationship between humans and the environment. Please indicate to what extent you agree with the following statements:

Statement	Totally disagree	Rather disagree	Undecided	Rather agree	Totally agree
We are approaching the limit of the number of people the earth can support	□	□	□	□	□
Humans have the right to modify the natural environment to suit their needs	□	□	□	□	□
When humans interfere with nature it often produces disastrous consequences	□	□	□	□	□
Human ingenuity will insure that we do not make the earth unlivable	□	□	□	□	□
Humans are severely abusing the environment	□	□	□	□	□
The earth has plenty of natural resources if we just learn how to develop them	□	□	□	□	□
Plants and animals have as much right as humans to exist	□	□	□	□	□
The balance of nature is strong enough to cope with the impacts of modern industrial nations	□	□	□	□	□
Despite our special abilities humans are still subject to the laws of nature	□	□	□	□	□
The so-called 'ecological crisis' facing humankind has been greatly exaggerated	□	□	□	□	□
The earth is like a spaceship with very limited room and resources	□	□	□	□	□
Humans were meant to rule over the rest of nature	□	□	□	□	□
The balance of nature is very delicate and easily upset	□	□	□	□	□
Humans will eventually learn enough about how nature works to be able to control it	□	□	□	□	□
If things continue on their present course, we will soon experience a major ecological catastrophe	□	□	□	□	□

Explanatory variables: ‘Ecological policy orientation’, ‘social policy orientation’, ‘conservative policy orientation’, and ‘liberal policy orientation’

In the next question, we would like to find out more about your personal attitude towards policy. Please indicate to what extent you agree with the following statements:

Statement	Totally disagree	Rather disagree	Undecided	Rather agree	Totally agree
I identify myself with ecologically oriented policy	□	□	□	□	□
I identify myself with socially oriented policy	□	□	□	□	□
I identify myself with liberally oriented policy	□	□	□	□	□
I identify myself with conservatively oriented policy	□	□	□	□	□

Explanatory variables: ‘Good health’ and ‘neutral or bad health’

How would you describe your present state of health?

Very bad	Rather bad	Neither good nor bad	Rather good	Very good
□	□	□	□	□

Explanatory variable: ‘Equivalized income’

How high is the monthly household income of all currently permanently living (based on the primary residence) persons in your household?
Please refer to the current net monthly amount, i.e. after deduction of taxes and social security contributions, and please include regular payments such as pensions, housing allowance, child benefit, BAföG or alimony. If you are not sure, please estimate the monthly amount.

Less than 500 Euro	□
500 to less than 1.000 Euro	□
1,000 to less than 1,500 Euro	□
1,500 to less than 2,000 Euro	□
2,000 to less than 2,500 Euro	□
2,500 to less than 3,000 Euro	□
3,000 to less than 3,500 Euro	□
3,500 to less than 4,000 Euro	□
4,000 to less than 4,500 Euro	□
4,500 to less than 5,000 Euro	□
5,000 to less than 5,500 Euro	□
5,500 to less than 6,000 Euro	□
6,000 to less than 6,500 Euro	□
6,500 to less than 7,000 Euro	□
7,000 to less than 7,500 Euro	□
7,500 to less than 8,000 Euro	□
8,000 to less than 8,500 Euro	□
8,500 to less than 9,000 Euro	□
9,000 to less than 9,500 Euro	□
9,500 to less than 10,000 Euro	□
10,000 Euro or more	□

Explanatory variables: ‘Full-time employment’, ‘part-time employment’, ‘minor employment’, ‘not seeking unemployment’, ‘seeking unemployment’

In which form of employment are you currently engaged? Employment is understood as any paid activity associated with an income, regardless of the amount of time involved.

Full-time employment (at least 35 hours per week on average)	□
Part-time employment (20 to less than 35 hours per week on average)	□
Marginal or irregular employment (less than 20 hours per week on average)	□
No employment	□

To which of the following groups do you belong?

Pupil	□
Trainee	□
Student	□
Employee	□
Job seeker	□
Civil servant	□
Self-employed	□
Parental leave	□
Housewife or househusband	□
Retiree or pensioner or in early retirement	□
Other, namely: _____	□

Explanatory variable: ‘High education’

Please indicate your highest school or university degree:

I left school without a graduate	□
Elementary or secondary school degree (GDR: 8th grade)	□
Secondary school degree (“Mittlere Reife”) (GDR: 10th grade)	□
Degree from a polytechnic high school (8th / 10th grade)	□
Advanced technical college certificate	□
High school degree (“Abitur”) or higher education entrance qualification	□
Degree from a university of applied sciences or from a vocational academy (GDR: engineering and technical high school degree)	□
University or college degree	□
Doctorate or habilitation	□
Other qualifications with a high school degree (“Abitur”) or a higher education entrance qualification	□
Other qualifications without a high school degree (“Abitur”) or a higher education entrance qualification	□

Explanatory variables: ‘Age’ and ‘age squared’

Please indicate your age:

Age in years: _____

Explanatory variable: ‘Female’

Please indicate your gender:

Male	□
Female	□
Divers	□

Explanatory variable: ‘Living together’

Do you currently live in your home together with a partner?

No	□
Yes	□

Do you currently live in your home together with your spouse or life partner?

No	□
Yes	□

Explanatory variable: ‘Household size’

Please indicate the number of all persons currently living permanently in your household (yourself included) in the following age groups:

Number of children under 14 years: _____

Number of persons between 14 and 65 years: _____

Number of persons between 66 and 74 years: _____

Number of persons over 74 years: _____

Explanatory variable: ‘Eastern Germany’

Please indicate in which city or municipality you currently live:

Name of the city or municipality: _____

Zip code of the city or municipality: _____