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Keeping Up at the Planet's Expense: Longitudinal Evidence on Relative Concerns and Environmental Attitudes

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Abstract

The pressure to keep up with others may shift attention from environmental protection as a collective good toward private positional concerns. We study whether income comparisons are associated with environmental concern using the Socio-Economic Panel for 2000–2020. Individual fixed-effects linear probability models with rich reference-group definitions show that higher reference-group income is associated with a lower probability of reporting high environmental concern, while the own-income estimate is small in magnitude and statistically imprecise. A 10% increase in others' mean income corresponds to a decline of about 1–2% of the mean of environmental-protection or climate-change concern. The association is stronger among individuals with lower environmental awareness, lower patience, weaker prosocial orientation, and limited political engagement. It is also more pronounced in settings with higher pollution exposure and more intensive environmental-protection efforts, consistent with normalisation and moral licensing interpretations. The results are robust to nonlinear specifications, income-rank measures, median-based reference income, alternative comparison goods, and alternative reference-group definitions. Overall, socioeconomic comparisons appear to be systematically related to environmental attitudes and offer policy-relevant insights for settings marked by rising inequality.

JEL classification

D62, H41, Q54, D31

Keywords

relative income, environmental concern, climate change, prosociality, fairness

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"*He who fights monsters should see to it that he himself does not become a monster.*"
— *Beyond Good and Evil* §146 – Friedrich Nietzsche

1 Introduction

Issues related to environmental sustainability are among the most pressing concerns on the political agendas of many developed countries (e.g., European Commission, 2019; OECD, 2025). People's environmental attitudes and behaviours are central to environmental outcomes and policy support (Ajzen, 1991; Bamberg & Moser, 2007; Spence et al., 2011; Pothitou et al., 2016; Casaló & Escario, 2018; Drews & van den Bergh, 2016). This is especially relevant because environmental protection has a public-good character: the benefits of cleaner air, climate stability, and ecological quality are shared, while the costs of protection and mitigation are often borne privately or unevenly. Environmental concern is therefore not only an individual attitude; it is also part of the cooperative foundation that sustains support for environmental policy and voluntary contribution. A broad literature has examined the determinants of this concern, emphasising environmental knowledge, values, perceived risk, efficacy, education, institutions, and economic conditions (e.g., Hines et al., 1987; Bamberg & Moser, 2007; Franzen & Meyer, 2010; Marquart-Pyatt, 2012; Dorsch, 2014; van der Linden, 2015; Lo, 2016; Hartmann & Preisendörfer, 2021). Yet this cooperative foundation is fragile because the same individuals who are asked to support environmental protection also live in social environments where private consumption signals success, security, and status. In such settings, environmental concern competes with other claims on attention and resources, including the desire to maintain or improve one's relative position. The question is therefore not only who has stronger environmental concern, but also whether the social organisation of economic life itself shifts concern toward or away from environmental public goods. This paper studies that question by examining how absolute income and relative income are associated with individuals' concern about environmental degradation.

A higher income level may be positively associated with environmental sensitivity, pro-environmental behaviour, policy support, and willingness to pay for environmental goods, as income can come with greater knowledge and demand for better living conditions and public goods (Gelissen, 2007; Franzen & Meyer, 2010; Franzen & Vogl, 2013). Yet the evidence is mixed at both the individual and national levels (Dunlap & Mertig, 1995; Marquart-Pyatt, 2012; Fairbrother, 2013; Pampel, 2014; Lo, 2016; Li & Chen, 2018; Hartmann & Preisendörfer, 2021). At the national level, income associations are mediated by values, education, institutions, and macroeconomic conditions; at the individual level, higher income can raise knowledge and ability to pay, but can also lower perceived urgency through residential sorting, private mitigation, and insulation from environmental risks (Kahn & Kotchen, 2011; Scruggs & Benegal, 2012). Social comparison theory suggests a distinct channel: relative socioeconomic position can shape preferences, attention, and perceived priorities independently of absolute resources (Festinger, 1954; Luttmer, 2005; Ferrer-i-Carbonell, 2005; Clark et al., 2008). Status races, often described as "keeping up with the Joneses", generate positional externalities and can shift resources toward visible private consumption (Hirsch, 1976; Frank, 2005; Alpízar et al., 2005; Heffetz, 2011). The central conjecture of the paper follows from this tension: the pressure to keep up with others may shift attention from environmental protection as a collective good toward private positional concerns, weakening environmental concern even when one's own material resources are unchanged.

Socioeconomic comparisons matter because people derive utility, motivate behaviour, and direct attention not only through their own absolute resources but also through their position relative to peers, neighbours, colleagues, and other comparable individuals (Luttmer, 2005; Ferrer-i-Carbonell, 2005; Clark et al., 2008). When people perceive themselves as worse off than others, they may experience stress, frustration, or a stronger desire to catch up with the consumption standards around them. The conjecture here is that this comparison pressure may also spill over into environmental attitudes. Individuals with relatively low income, or with lower consumption of visible goods such as housing quality, cars, holidays, or other status goods, may prioritise catching up with others' living standards and push environmental considerations to the background. These comparisons can also matter higher in the distribution, where status distances compress or visible consumption norms intensify. Related work on positional consumption shows that status motives tilt spending

toward visible goods, providing a micro-foundation through which comparisons can crowd out attention and resources for public goods such as environmental protection (Alpízar et al., 2005; Heffetz, 2011). Survey evidence directly linking relative standing to environmental attitudes remains limited but suggestive. Cross-sectional online surveys from the United States and the United Kingdom document a negative relationship between personal relative deprivation and pro-environmental intentions (Skylark & Callan, 2021), while cross-sectional data from China indicate that lower relative socioeconomic status is associated with weaker environmental concern, with mixed associations for absolute income (Li & Chen, 2018). Motivated by this logic, we treat relative income, calculated with respect to comparable individuals, as an independent correlate of environmental concern and test whether higher reference-group income is associated with lower reported concern about environmental protection and global climate change.[1]

The two closest studies establish an important empirical starting point, but their cross-sectional designs and online samples leave limited scope for analysing how the reference-income relationship varies across individuals, social preferences, and local environmental contexts (Li & Chen, 2018; Skylark & Callan, 2021). This study extends that literature in two directions. First, it applies the comparison-income methodology developed in the subjective well-being literature to the environmental-attitudes domain, using a long panel dataset with individual fixed effects and rich reference-group definitions (Ferrer-i-Carbonell, 2005). This is valuable because environmental concern is a subjective outcome and may be shaped by persistent unobserved traits, values, risk perceptions, and political dispositions that cross-sectional designs cannot absorb. Second, the panel allows us to examine a broad set of moderators that speak directly to the behavioural and institutional conditions under which comparison pressures are more or less strongly associated with environmental concern. We consider environmental awareness and education, which may raise issue salience and perceived efficacy; prosocial orientation, including volunteering, fairness norms, trust, and willingness to enforce norms; time preferences, since patience may support longer-horizon environmental objectives; local environmental conditions and protection efforts, which may increase salience but may also normalise degradation or

[1] A complementary interpretation is attention scarcity or the finite-pool-of-worry argument: individuals have limited cognitive and emotional resources to allocate across domains of concern. When relative standing becomes more salient, concern about environmental degradation may receive less attention. We do not separately identify this interpretation, but it is consistent with the broader status-attention channel examined in the paper.

generate moral licensing; and political orientation and engagement, which organise identities, priorities, and support for collective action (Ostrom, 2000; Ostrom, 2010; Frederick et al., 2002; Hardisty & Weber, 2009; Spence et al., 2011; Howe et al., 2013; Gifford, 2011; Hornsey et al., 2016; McCright & Dunlap, 2011; Kahan et al., 2012). These dimensions are not treated as separately identified causal mechanisms. They provide a structured way to ask when the relationship between relative standing and environmental concern is weaker or stronger.

We adopt a panel design to study how relative standing relates to environmental concern using two decades of the Socio-Economic Panel (2000–2020, SOEP). We estimate a series of individual fixed-effects regressions that control for time-invariant unobserved heterogeneity potentially correlated with observed characteristics, an issue that small cross-sectional studies in this area cannot address. A key contribution is to adapt the reference-group methodology developed in the relative-income and subjective well-being literature to the environmental domain (Ferrer-i-Carbonell, 2005; Luttmer, 2005). In that literature, relative concerns are identified by comparing individuals' own income with the income of comparable others and estimating whether this comparison benchmark is associated with subjective well-being, conditional on own income. We apply the same logic to environmental concern: we relate environmental and climate concerns to own income, measured as per-capita household income net of taxes and transfers, and to the mean income of comparable others defined using granular reference-group cells based on gender, age, education, federal state, and year. We condition on rich personal, household, and regional characteristics. We then ask whether higher reference-group income is associated with lower concern and whether analogous patterns appear for other comparison goods, namely occupational prestige and home ownership (Alpízar et al., 2005; Heffetz, 2011; Clark & Senik, 2010; Di Tella et al., 2010).

The results are highly consistent. We find no statistically significant relationship between own income and environmental concern once we control for individual fixed effects, reference-group income, and a full set of personal, household, and regional characteristics. Yet higher reference-group income, which implies lower relative standing conditional on own income, is associated with lower concern about both environmental protection and climate change. A 10% increase in others' mean income is associated with a decline of

roughly 0.3–0.7 percentage points in the probability of reporting high concern, translating to about 1–2% of the sample mean. The association is stronger among relatively deprived respondents and remains stable across subsamples and time. Results are robust to alternative estimators, treating the outcome as ordinal, rank- and median-based measures of relative position, inequality metrics within reference groups, alternative reference-group definitions, and alternative comparison goods. The moderation analysis shows that environmental awareness, education, prosocial orientation and fairness perceptions, trust, patience, left-leaning ideology, and political engagement attenuate the association. Local conditions also matter: in areas with higher air pollution or more intensive environmental-protection efforts, concern remains more sensitive to comparisons, a pattern consistent with normalisation, crowd-out, or moral-licensing interpretations in some settings. Overall, the evidence suggests that relative concerns operate as a positional externality: the status race can redirect attention and spending toward visible private goods and away from environmental public goods.

The rest of the paper is organised as follows. Section 2 describes the data, sample selection, measures, and construction of reference groups and comparison goods. Section 3 outlines the empirical specification. Section 4 presents the main results, relative-deprivation and heterogeneity analyses, moderating factors, and robustness checks. Section 5 concludes.

2 Data

2.1 Sample Selection

The analysis uses the Socio-Economic Panel (SOEP), a nationally representative household panel in Germany with repeated observations on income, household structure, employment, attitudes, subjective outcomes, and social preferences.[2] The panel structure is essential for the question studied here because both environmental concern and relative income may be related to stable individual traits, such as persistent ideology, personality, environmental orientation, or long-run social preferences. We use observations from 2000 to 2020 and restrict the sample to German natives aged 18–80. Migrants are excluded because their relevant comparison sets may span both Germany and their origin coun-

[2]For further information about the data, see www.diw.de and https://paneldata.org/.

tries, and because attachment to environmental problems in the host country may differ systematically (Akay et al., 2012). The baseline estimation sample contains 381,763 individual × year observations. We combine the SOEP with federal state-level data on GDP per capita, population, PM2.5 exposure, and environmental-protection turnover for the local-context moderation analysis.

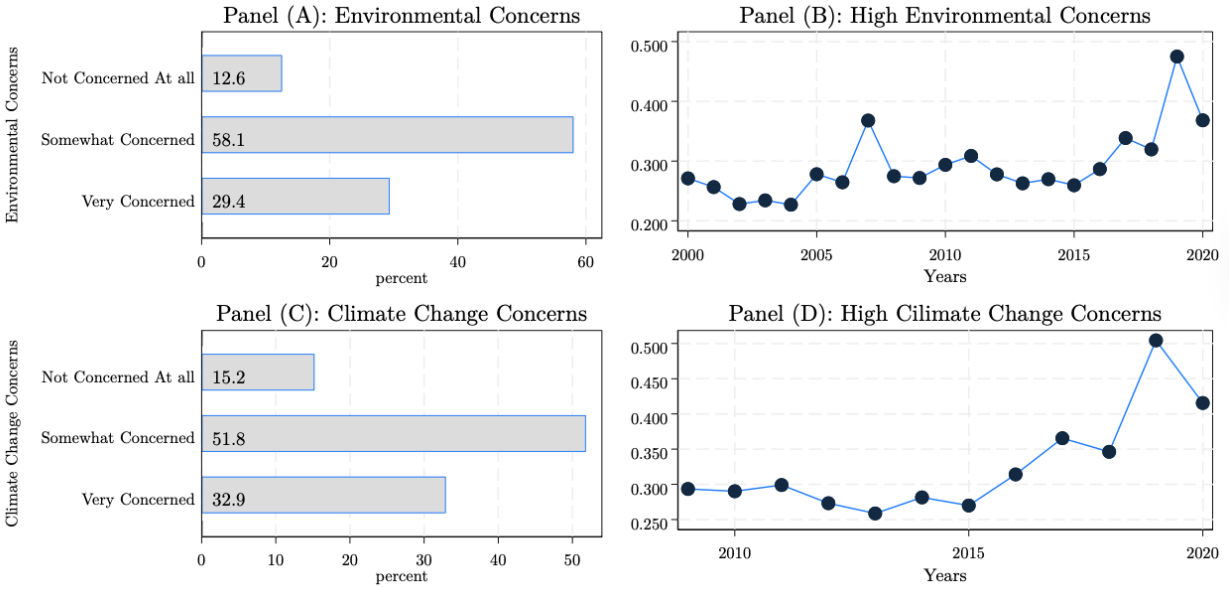
2.2 Measures

Environmental Concerns The main outcome is based on the SOEP question: "*How concerned are you about the following?...*"[3] Respondents report concern about several domains, including environmental protection and climate change, on a three-point scale: "*very concerned*", "*somewhat concerned*", and "*not concerned at all*". Environmental-protection concern is the baseline outcome because it is available throughout 2000–2020; climate-change concern is used as a consistency outcome because it is observed from 2009 to 2020. The first item is broader and may partly capture concern about the adequacy of environmental protection in Germany, while the second is more directly tied to global climate change. The empirical advantage of using both is that they test the same comparison logic on two related but not identical environmental attitudes.

Our preferred outcome is a dummy equal to one for respondents who are "very concerned" and zero otherwise. This definition isolates the upper tail of concern and avoids treating the middle category as equivalent to strong concern. Robustness checks use the original three-point scale and an alternative binary coding that combines "somewhat concerned" with "very concerned". Figure 1 shows both the cross-sectional distribution and the time path of the concern measures. Panel (A) indicates that 29.4% of respondents report being very concerned about environmental protection, while 58.1% are somewhat concerned and 12.6% are not concerned at all. Panel (C) shows a similar distribution for climate-change concern, with 32.9% in the highest category. Panels (B) and (D) show that high concern is fairly flat in the early 2000s, rises around 2008, weakens thereafter, and increases sharply after the mid-2010s. The two high-concern dummies have a correlation of 0.73. This high

[3]The original German question asks: "*Wie ist es mit den folgenden Gebieten, machen Sie sich da Sorgen?*" The two items used here refer to "*um den Schutz der Umwelt*" and "*um die Folgen des Klimawandels.*" In both cases, respondents choose among the same three response categories: "*große Sorgen*", "*einige Sorgen*", and "*keine Sorgen.*"

Figure 1. Distribution of Environmental and Climate Change Concerns and Time Variations



Note: Authors' own calculations from the SOEP (2000–2020). Panels (A) and (C) present the frequency distribution of our environmental measures. Panels (B) and (D) present the time variation in high environmental and climate-change concern.

overlap is useful for interpretation, but the different time windows motivate using the longer environmental-protection series as the baseline outcome.

Comparison Good: Income The main comparison good is income, following the relative-income literature (Ferrer-i-Carbonell, 2005; Luttmer, 2005). Own income is post-government household net income after taxes and transfers. We equivalise household income using the standard OECD scale, with weights of 1 for the household head, 0.5 for other adults, and 0.3 for children under 14. The resulting per-capita measure is the absolute income assigned to each household member (Di Tella et al., 2010). Income is especially useful for this application because it is both fungible and socially legible: it finances consumption, but it also organises comparisons over living standards, security, and visible opportunities. Non-labour income sources are controlled for in the regressions. In extended analyses, we also examine occupational prestige and home ownership as alternative comparison goods because both are visible markers of socioeconomic position and therefore useful tests of whether the comparison pattern is specific to liquid income.

Reference Groups and Income Reference income is the mean per-capita income of comparable others. Since subjective comparison sets are unobserved, any empirical reference group is an approximation. The SOEP nevertheless allows us to construct socially plausible cells while retaining sufficient within-cell sample sizes. We follow the comparison-income approach used in subjective well-being research and define the baseline group by gender, age group, education, federal state, and year (Ferrer-i-Carbonell, 2005; Luttmer, 2005; Clark & Senik, 2010). Age is split into five groups, [18,30], (30,40], (40,50], (50,65], and (65,80], and education is coded as above or below 12 years. This yields up to $2 \times 5 \times 2 \times 16 = 320$ reference cells per year. We require at least 10 observations per cell; the average cell contains about 177 observations. Appendix Figure B.2 reports the distribution of cell sizes and reference-group mean income. The distribution is right-skewed in cell size and approximately centred around the mean reference income, suggesting sufficient variation for the comparison-income design while preserving meaningful social proximity.

Descriptive Statistics Table 1 reports descriptive statistics for the full sample and separately by high and low environmental and climate-change concern. Column I shows that the average respondent is about 49 years old, 53% of the sample is female, 61% is married, the average household contains 2.69 members, and average education is 12.52 years. The average annual equivalised income is about 24,310 euros, while reference-group income averages about 21,070 euros. These figures are useful because the comparison-income coefficient is identified conditional on own income: respondents do not simply differ by their own resources, but by how those resources compare with incomes in their reference cells.

Columns II(A) and II(B) show that respondents with high environmental concern are slightly older, more often female, and somewhat more educated than those with lower concern. The income differences are small: absolute income is 24,420 euros among high-concern respondents and 24,260 euros among low-concern respondents, while reference income is 21,590 and 20,850 euros, respectively. Columns III(A) and III(B) show a similar pattern for climate-change concern, with high-concern respondents again more often female and slightly more educated. The descriptive contrasts are therefore consistent with familiar environmental-attitude gradients, but they are modest and do not identify the

Table 1. Descriptive Statistics of Key Variables and Comparison Goods

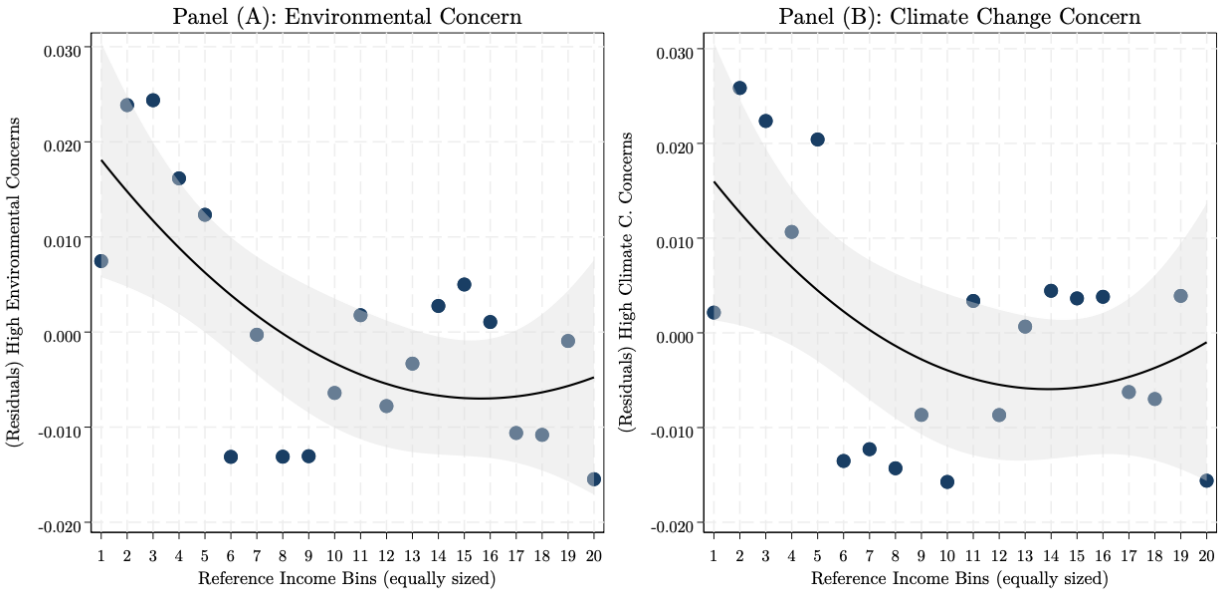
	I	II(A)	II(B)	III(A)	III(B)
	Whole Sample	Environmental Concerns		Climate Change Concerns	
		High	*Low*	*High*	*Low*
Age	49.41	50.14	49.10	51.44	50.04
	(16.674)	(16.636)	(16.681)	(16.545)	(16.744)
Gender (female=1)	0.53	0.58	0.51	0.58	0.51
	(0.499)	(0.494)	(0.500)	(0.494)	(0.500)
Marital status (married=1)	0.61	0.60	0.61	0.59	0.60
	(0.488)	(0.491)	(0.487)	(0.492)	(0.490)
Number of kids	0.56	0.53	0.57	0.55	0.61
	(0.933)	(0.910)	(0.942)	(0.940)	(0.994)
Household size	2.69	2.62	2.72	2.62	2.72
	(1.269)	(1.252)	(1.274)	(1.275)	(1.318)
Health status	3.39	3.33	3.42	3.36	3.40
	(0.945)	(0.963)	(0.937)	(0.958)	(0.943)
Years of education	12.52	12.67	12.46	12.86	12.60
	(2.695)	(2.752)	(2.669)	(2.818)	(2.715)
Employment status (employed=1)	0.66	0.64	0.67	0.65	0.68
	(0.473)	(0.479)	(0.470)	(0.476)	(0.467)
Comparison Good (relative levels are calculated using the baseline reference groups)					
Absolute income (1000s Euro)	24.31	24.42	24.26	26.85	25.90
	(23.266)	(24.561)	(22.705)	(31.207)	(24.817)
Reference income: (1000s Euro)	21.07	21.59	20.85	23.23	22.08
	(5.056)	(5.271)	(4.948)	(5.581)	(5.406)
# Observations	381,763	112,161	269,602	73,404	149,469

Note: Authors' own calculations from the SOEP data (2000–2020). Column I reports the full estimation sample. Columns II(A)–II(B) split the sample by high versus lower environmental-protection concern, and Columns III(A)–III(B) apply the same split to climate-change concern. Standard deviations are presented in parentheses.

relationship of interest. The small unconditional gap in own income is especially informative: it foreshadows why the regression analysis must distinguish absolute resources from comparison benchmarks. Environmental concern, own income, and reference-group income may all be related to stable individual traits, household circumstances, and regional factors. The panel specification below is designed to absorb these stable components and focus on within-person variation.

Descriptive Relationships Figure 2 provides a first visual representation of the relationship between reference income and concern. We residualise the high-concern indicators and reference income with respect to year and region dummies, split residual reference

Figure 2. Intuitive Analysis



Note: Authors' own calculations from the SOEP (2000–2020). Panels A and B plot binned residual associations conditional on year and region dummies. In Panel A (environmental concern), we residualise reference income and the high-environmental-concern indicator on year and region dummies for 2000–2020. In Panel B (climate concern), we residualise reference income and the high-climate-concern indicator for 2009–2020. We then compute the mean residual outcome within 20 equally sized bins of the residual reference-income distribution. The curve shows the quadratic fitted values estimated on the underlying data. Shaded areas denote 95% confidence intervals.

income into 20 equally sized bins, and plot the mean residual concern within each bin. This exercise is not intended as evidence of a conditional relationship; rather, it offers a transparent diagnostic of whether the comparison pattern is visible in the data before imposing the full panel specification. It also helps assess whether the association is approximately linear or varies across the reference income distribution. Panel (A) shows a clear downward-sloping residual association for environmental concern; Panel (B) shows the same pattern for climate-change concern. The fitted quadratic curves suggest that the decline is steeper at lower parts of the residual reference-income distribution and then flattens, a pattern that motivates the later analysis of relative deprivation. The figure is descriptive and does not yet condition on the full set of individual and household covariates, but it previews the central empirical result: concern is lower when the income of comparable others is higher.

3 Empirical Specification

The baseline dependent variable E_{it} is a dummy equal to one if individual i reports high environmental concern in wave t. The same specification is used for high climate-change concern. The generic model is

$$E_{it} = 1(\phi_{Relative} ln(\overline{Y}_{it}^{R}) + \phi_{Absolute} ln(Y_{it}) + X'\gamma + \epsilon_{it} > 0), \tag{1}$$

$$\epsilon_{it} = T_t + F_r + \alpha_i + \varepsilon_{it}. \tag{2}$$

Here Y_{it} is own post-government equalized household income and $\overline{Y}_{it}^{R_j}$ is mean income in reference group R_j, defined as $\overline{Y}_{it}^{R_j} = \frac{1}{N_{R_j}-1} \sum_{i=1}^{N_{R_j}-1} Y_{it}$. The logarithmic specification makes the interpretation close to a relative-income ratio: $\ln(Y_{it}/\overline{Y}_{it}^{R_j}) = \ln(Y_{it}) - \ln(\overline{Y}_{it}^{R_j})$. Conditional on own income, a higher reference-group income therefore corresponds to lower relative standing. The coefficient $\phi_{Relative}$ captures the association between others' mean income and environmental concern, while $\phi_{Absolute}$ captures the association with own income conditional on the comparison benchmark.

The vector X includes time-varying individual and household controls, including age, marital status, household composition, education, employment status, working hours, labour and non-labour income components, and health status; Appendix Table A.1 reports the full baseline specification. Year dummies T_t absorb aggregate shocks, national debates, and common time trends in environmental concern. Federal-state dummies F_r capture time-invariant regional differences in politics, industrial structure, and environmental conditions. Individual fixed effects α_i absorb time-invariant unobserved heterogeneity, including stable personality traits, long-run ideological dispositions, and persistent environmental orientations that may be related to income and concern.

We estimate a fixed-effects linear probability model as the preferred specification and cluster standard errors at the reference-group level. This model is transparent, keeps the full within-person variation used by the panel, and avoids relying on nonlinear fixed-effects estimates as the main evidence. The robustness section reports fixed-effects logit estimates, correlated random-effects specifications, models using the original ordinal concern scale, and the Blow-up and Cluster fixed-effects ordered logit estimator (Baetschmann et al., 2015). The empirical design should be read as a longitudinal association design rather

than as a causal treatment design: fixed effects remove time-invariant heterogeneity, but time-varying confounding and measurement error in constructed reference groups may remain.

4 Results

4.1 Main Results

Table 2 presents the baseline estimates. Column I(A) uses the high environmental-concern dummy as the outcome for the full 2000–2020 period. The coefficient on own income is small and statistically insignificant. By contrast, the coefficient on reference-group income is negative and statistically significant at the 1% level. Since higher reference-group income implies lower relative standing conditional on own income, the estimate indicates that respondents report lower environmental concern when comparable others have higher incomes. The contrast between the insignificant own-income coefficient and the negative reference-income coefficient is one of the paper's main empirical patterns. The magnitude is moderate but economically interpretable. In Column I(A), a 10% increase in others' mean income is associated with a decline of about 0.3 percentage points in the probability of reporting high environmental concern, roughly 1.1% of the sample mean (about 2.6% for a standard deviation increase in others' mean income). The size is moderate but persistent, emerging after absorbing individual fixed effects, year effects, regional effects, and detailed controls. The estimate, therefore, points to a comparison component in environmental concern that is separate from the direct association with one's own income.

Column II(A) repeats the analysis for high climate-change concern over 2009–2020. The reference-income coefficient is again negative and statistically significant, while own income remains statistically insignificant. The implied decline is about 0.7 percentage points, or approximately 2.2% of the mean of high climate-change concern (about 5.2% for a standard deviation increase in others' mean income). Because the climate-change question is observed only from 2009 onward, the levels are not directly comparable to the full-period environmental-protection estimates. However, when the environmental-concern model is re-estimated over the same 2009–2020 window, the reference-income coefficient is close to the climate-change estimate and highly statistically significant. The

Table 2. Main Results

	I(A)	I(B)	II(A)	II(B)
Dependent Variable	Environmental Concerns		Climate Change Concerns	
	High-concerns dummy		High-concerns dummy	
Baseline Model				
Log of Reference Income	−0.0323***		−0.0713***	
	(0.0063)		(0.0083)	
Log of Absolute Income	0.0025	0.0012	−0.0011	−0.0004
	(0.0022)	(0.0029)	(0.0028)	(0.0035)
Magnitude: 10% increase (% relative to mean environmental or climate-change concern)				
	1.100		**2.164**	
Asymmetric Specification				
a.Upward comparators ($\Delta Y_{it}^R \leq$ First Tercile (T1))		−0.0388***		−0.0964***
		(0.0098)		(0.0123)
b.Downward comparators ($\Delta Y_{it}^R \geq$ Third Tercile (T3))		−0.0188**		−0.0511***
		(0.0090)		(0.0119)
P-value (H_0: a=b)		**0.042**		**0.000**
R-Squared	0.017		0.022	
# Observations	381,763		222,733	

Note: Authors' calculations from the SOEP data (2000–2020). Estimates are obtained from panel data fixed-effects linear probability models. Columns I(A) and II(A) report the baseline associations for high environmental-protection concern and high climate-change concern, respectively. Columns I(B) and II(B) interact reference income with relative-deprivation status. The reference income measure is the mean per-capita income of comparable others in cells defined by gender, age group, education, federal state, and year. Regressions include the full set of controls (see Appendix Table A.1). Standard errors clustered by reference group are presented in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively.

two outcomes, therefore, carry the same message: income comparisons are systematically related to environmental attitudes, whereas own income is not statistically distinguishable from zero in our baseline fixed-effects specification. For parsimony and because of its longer time coverage, the remaining analyses use high environmental concern as the baseline outcome and return to climate-change concern where it is most informative.

4.2 Relative Deprivation and Observed Heterogeneity

Upward vs Downward Comparisons We next examine whether the association differs by position within the reference-income distribution. To this end, we first define the income distance metric as $\Delta Y_{it}^R = Y_{it} - \overline{Y}_{it}^R$. Respondents in the bottom tertile of this distance are classified as upward comparators, or relatively deprived; respondents in the top tertile are classified as downward comparators. Let $Z_{it} = 1$ denote the relatively deprived group and $Z_{it} = 0$ the better-off comparison group. We augment equation (1)

with $\gamma Z_{it} + \phi_R^{Z=1} Z_{it} \ln(\overline{Y}_{it}^R) + \phi_R^{Z=0}(1 - Z_{it}) \ln(\overline{Y}_{it}^R)$ and test $H_0 : \phi_R^{Z=1} = \phi_R^{Z=0}$. This interaction specification estimates the reference-income coefficient on both sides of the relative-position split while preserving the same fixed-effects and control structure as the baseline model. Columns I(B) and II(B) of Table 2 report the estimates. For environmental concern, the coefficient is -0.0388 among upward comparators and -0.0188 among downward comparators, with a statistically significant difference (p-value = 0.042). For climate-change concern, the estimates are -0.0964 and -0.0511, with an even sharper difference (p-value $<$ 0.001). Thus, the negative reference-income association is present across the distribution but is substantially larger among those who are relatively deprived.

Heterogeneity: Socio-Demographic and Economic Characteristics Table 3 reports additional observed heterogeneity for the environmental-concern outcome. Row 1 shows a more negative reference-income coefficient for men than for women, a pattern consistent with broader evidence that women often report higher environmental concern and lower status-oriented competitiveness in related domains (p-value = 0.0012). Row 2 shows that the coefficient is more negative among younger respondents than among older respondents. One interpretation is that environmental concern among older individuals is more anchored in experience, health salience, or accumulated preferences, whereas younger respondents may be more exposed to current-status competition in housing, labour, and consumption domains (p-value = 0.0006). Row 3 shows a more negative coefficient for unmarried respondents than for married respondents (p-value = 0.0115). Rows 4 and 5 show no statistically significant differences by current non-employment or full-time work, suggesting that labour-market attachment alone is not the main source of heterogeneity. Row 6 examines industry differences by comparing respondents employed in manufacturing with those employed in services. The reference-income coefficient is more negative among manufacturing workers, consistent with the possibility that industrial environments, and the pollution exposure often associated with them, condition how status comparisons coexist with environmental concern (p-value = 0.0418).

Table 3. Observed Heterogeneity

Dep. Var. Environmental concerns dummy	I	II	III
	$Z = 0$	$Z = 1$	P-value
Gender (D=1, female)	-0.0479^{***}	-0.0185^{**}	**0.0012**
	(0.0078)	(0.0077)	
Age (D=1, older, age > Q2)	-0.0505^{***}	-0.0199^{***}	**0.0006**
	(0.0080)	(0.0074)	
Marital status (D=1, married)	-0.0463^{***}	-0.0245^{***}	**0.0115**
	(0.0083)	(0.0070)	
Employment status (D=1, currently not working)	-0.0268^{***}	-0.0345^{***}	0.3428
	(0.0086)	(0.0067)	
Working hours (D=1, fulltime, > 35 hours)	-0.0275^{***}	-0.0381^{***}	0.1349
	(0.0071)	(0.0074)	
Industries (D=1, 14 manufacturing industries)	-0.0326^{**}	-0.0751^{***}	**0.0418**
	(0.0136)	(0.0219)	

Note: Authors' own calculations from the SOEP data (2000–2020). The table reports subgroup-specific coefficients on log reference-group income from fixed-effects linear probability models for high environmental-protection concern. Column I reports the coefficient for the baseline group ($Z = 0$), Column II reports the coefficient for the indicated group ($Z = 1$), and Column III reports the p-value from a test of equality between the two subgroup coefficients. The relative income measure uses the baseline reference-group definition. All regressions include the full set of controls. Standard errors clustered by reference group are presented in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively.

4.3 Moderating Factors

Table 4 examines whether the reference-income association varies across observable dimensions that are theoretically related to environmental concern and status competition. The analysis uses the same interaction architecture introduced in the relative-deprivation exercise above: for each binary proxy Z_{it}, log reference-group income is interacted with the proxy, the two reference-income coefficients are estimated within the individual fixed-effects model, and an equality test compares the coefficients across proxy groups. Column I reports the coefficient for the lower or baseline category of the moderator, Column II reports the coefficient for the higher category, Column III reports the equality-test p-value, and Column IV reports the number of observations used in the corresponding exercise. A less negative coefficient in Column II indicates that the corresponding factor attenuates the negative reference-income association; a more negative coefficient indicates that it amplifies the association. These exercises are not intended to identify causal mechanisms. They are used to discipline the interpretation of the baseline association

by showing whether it is systematically weaker or stronger across groups that differ in awareness, social preferences, time horizons, local environmental conditions, and political engagement.

Awareness and Environmental Consciousness Rows 1 and 2 of Table 4 show that awareness-related proxies attenuate the reference-income association. Row 1 splits respondents by education, using 12 years as the threshold.[4] The coefficient is -0.0529 among those below the threshold and -0.0140 among those above it; the difference is statistically significant (p-value < 0.0001). This pattern is consistent with the idea that education raises information-processing capacity, environmental knowledge, and perceived efficacy, making concern less sensitive to status pressure (Gelissen, 2007; Kellstedt et al., 2008; van der Linden, 2015; Pothitou et al., 2016). Row 2 uses the SOEP environmental-consciousness item.[5] The coefficient is -0.0995 among those with lower consciousness and -0.0239 among those with higher consciousness (p-value $= 0.034$). Although this proxy is observed in fewer waves and should be interpreted cautiously, it points in the same direction as the education split: when education, environmental knowledge, or environmental consciousness is higher, the negative reference-income association is weaker.

Social and Time Preferences Rows 3–7 examine social and time preferences. Environmental quality is a public good, so cooperative orientation is not an auxiliary concern but part of the logic linking status pressure to environmental attitudes (Ostrom, 2000; Ostrom, 2010; Claessens et al., 2022). The central tension is that relative concerns may pull individuals away from the logic of collective contribution. When others' higher income is interpreted as a status advantage, or as greater capacity to consume and pollute, environmental concern can become more vulnerable to free-rider reasoning, perceived unfairness, retaliation, or withdrawal from cooperative responsibility. The proxies in Rows

[4]Education is measured as years of schooling. We compute within-person means and classify respondents with more than 12 years of education as highly educated. The threshold corresponds to the median used in the reference-group construction.

[5]Environmental consciousness is measured with the question "*Are you environmentally conscious?*" Responses are coded on a four-point scale: 1 "*Definitely applies*", 2 "*Probably applies*", 3 "*Probably does not apply*", and 4 "*Does not apply*". We reverse-code the scale so that higher values indicate greater consciousness. The item is available in 2003. We carry the score three years backward and forward, covering 2000–2007, and classify respondents in the two affirmative categories of the reversed scale as environmentally conscious.

3–7 capture different margins of this public-good problem: voluntary contribution, fairness expectations, norm enforcement, social trust, and patience in the face of delayed collective benefits. Row 3 uses volunteering as a proxy for other-regarding orientation and engagement in collective activity.[6] The coefficient is -0.0444 among non-volunteers and -0.0251 among volunteers, with a statistically significant difference (p-value = 0.035). Volunteering therefore appears to buffer the relationship between others' income and environmental concern, consistent with the idea that even limited experience of voluntary collective activity can sustain attention to shared environmental outcomes when comparison pressures are present.

Rows 4 and 6 show similar attenuation for fairness and trust. These proxies speak to a central condition for public-good provision: individuals are more willing to sustain cooperative concern when they believe that others will also behave fairly and responsibly. If social comparison is interpreted through a lens of exploitation or low trust, higher income among comparable others may not only signal lower relative standing, but also reinforce the belief that environmental burdens are unfairly distributed. The fairness proxy captures whether respondents expect fair treatment rather than exploitation.[7] Respondents who expect others to treat them fairly have a less negative reference-income coefficient than those who expect exploitation (-0.0179 versus -0.0442), with p-value = 0.003. Trust is measured separately and produces the same qualitative pattern.[8] Higher-trust respondents display a smaller negative coefficient (-0.0223 versus -0.0406), with p-value = 0.041. Overall, Rows 4 and 6 indicate that the reference-income association is weaker where reciprocity expectations and social capital are stronger (Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000; Putnam, 2000; Alesina & La Ferrara, 2002). This supports the inter-

[6]Volunteering is measured by the frequency of volunteering in clubs and institutions. The original scale is 1 "*never*", 2 "*sometimes*", 3 "*at least once a month*", 4 "*at least once a week*", and 5 "*daily*". The item is available biannually from 2001 to 2019, with an additional wave in 2008. We first recode the measure so that higher values indicate more frequent volunteering and zero denotes no volunteering. We then compute within-person means and classify respondents with a positive mean as volunteers.

[7]Fairness is based on the question "*Do you believe that most people would exploit you if they had the opportunity or would try to treat you fairly?*" We code a dummy equal to one if the respondent answered "*fair*" and zero if the respondent answered "*exploitative*". The item is available in 2003, 2008, 2013, and 2018. We compute within-person means and define higher fairness perceptions as values above the sample median.

[8]Generalised trust is measured with the statement "*People can generally be trusted*". Responses are coded on a four-point scale: 1 "*agree completely*", 2 "*partly agree*", 3 "*partly disagree*", and 4 "*disagree completely*". The item is available in 2003, 2008, 2013, and 2018. We reverse-code the scale, compute within-person means, and classify respondents above the median as higher-trust individuals.

Table 4. Moderating Factors

Dep. Var. High environmental concerns dummy	I	II	III	IV
	Z=0	Z=1	p-value	#Obs.
Awareness: Human Capital and Proenvironmental Orientation				
1 Years of education (Z=1, > Q2)	−0.0529***	−0.0140*	**0.0000**	381,763
	(0.0079)	(0.0078)		
2 Environmentally conscious (Z=1, high levels)	−0.0995***	−0.0239	**0.0339**	122,101
	(0.0362)	(0.0171)		
Preferences: Social and Time Preferences				
3 Volunteering (Z=1, #activity > 0)	−0.0444***	−0.0251***	**0.0348**	371,963
	(0.0084)	(0.0072)		
4 Fairness perceptions (Z=1, high levels, > Q2)	−0.0442***	−0.0179**	**0.0032**	352,465
	(0.0075)	(0.0081)		
5 Prosocial punishment (Z=1, high levels, > Q2)	−0.0306***	−0.0497***	**0.0628**	303,770
	(0.0072)	(0.0097)		
6 Trusting behaviour (Z=1, high levels)	−0.0406***	−0.0223***	**0.0409**	346,002
	(0.0078)	(0.0078)		
7 Time preferences: patience (Z=1, high patience, > Q2)	−0.0411***	−0.0237***	**0.0542**	316,238
	(0.0078)	(0.0081)		
Exposure, Adaptation and Environmental Protection Effort				
8 State level exposure to air pollution (Z=1, high PM2.5, > Q2)	−0.0276***	−0.0391***	0.1385	381,763
	(0.0070)	(0.0078)		
9 Individuals affected by air pollution (Z=1, highly affected, > Q2)	−0.0398***	−0.0607***	0.3257	74,650
	(0.0138)	(0.0230)		
10 Environmental protection efforts (Z=1, high levels, > Q2)	−0.0178**	−0.0474***	**0.0009**	273,453
	(0.0086)	(0.0082)		
11 Optimism about future (Z=1, high levels, > Q2)	−0.0191***	−0.0581***	**0.0001**	348,711
	(0.0071)	(0.0092)		
Political Preferences and Partisanship				
12 Voting for left or right wing parties (D=1, right wing, > Q2)	−0.0085	−0.0518***	**0.0000**	344,769
	(0.0083)	(0.0075)		
13 Actively interested in politics (D=1, high levels)	−0.0638***	−0.0286***	**0.0011**	381,323
	(0.0113)	(0.0065)		

Note: Authors' own calculations from the SOEP data (2000–2020). The table reports moderator-specific coefficients on log reference-group income from fixed-effects linear probability models for high environmental-protection concern. Column I reports the coefficient for the lower or baseline category of each moderator, Column II reports the coefficient for the higher category, Column III reports the p-value from a test of equality, and Column IV reports the relevant sample size. The relative income measure uses the baseline reference-group definition. All regressions include the full set of controls. Standard errors clustered by reference group are presented in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively.

pretation that social trust and perceived fairness can protect environmental concern from being crowded out by relative-position pressures.

Row 5 points in the opposite direction. We construct a negative-reciprocity index, which we interpret as a norm-enforcement or retaliation tendency rather than as pure altruism.[9]

[9]Negative reciprocity is constructed from three statements following the prompt "*When someone does wrong to me*": (1) "*I bear grudges*", (2) "*I forget or forgive*", and (3) "*I think of it for a while*". Responses are on a seven-point scale from 1 "*completely disagree*" to 7 "*completely agree*". Items (2) and (3) are

The coefficient is more negative in the high negative-reciprocity group (-0.0497 versus -0.0306), with the equality test significant at the 10% level. In public-good settings, perceived unfairness can shift behaviour from contribution to sanctioning or withdrawal, which is privately costly and can reduce group provision (Fehr & Gächter, 2002; Rustagi et al., 2010). The pattern is therefore consistent with the claim that retaliatory orientations make environmental concern more vulnerable to comparison pressure: when others' higher income is read as unfair advantage, the cooperative response may weaken rather than strengthen.

Row 7 shows that patience, a proxy for time preferences, also matters.[10] More patient respondents display a smaller negative coefficient (-0.0237 versus -0.0411), with a marginally significant difference (p-value = 0.054). This result fits the interpretation that longer time horizons reduce the salience of short-run status competition and support concern for delayed environmental benefits (Frederick et al., 2002; Hardisty & Weber, 2009). It also connects the status channel to the intergenerational nature of environmental public goods: when the future receives greater weight, environmental concern appears less elastic to the income of others. In contrast, present-biased individuals may be more exposed to the immediate pressure of catching up, making the public-good component of environmental concern easier to displace.

Environmental Degradation and Protection Efforts Rows 8–11 examine whether local environmental conditions and protection efforts moderate the association. These variables are important because actual degradation can work in two directions. It may increase salience and strengthen concern, but repeated exposure can also normalise environmental harm and make status competition more behaviourally relevant (Spence et al., 2011; Howe et al., 2013; Gifford, 2011; Sun et al., 2017). Row 8 uses objective PM2.5 exposure at the federal-state level.[11] The coefficient is more negative in states

reverse-coded. The items are available in 2010, 2015, and 2020. We sum the items, compute within-person means, and classify respondents above the median as more retaliatory.

[10] Patience is measured with the SOEP question "*How patient are you in general?*" on an 11-point scale from 0 "*very impatient*" to 10 "*very patient*". We classify respondents above the median value of 7 as highly patient.

[11] PM2.5 exposure is taken from OECD statistics at the German federal-state level for 2000–2020. We define high-exposure states as those above the median PM2.5 exposure. The regressions also control for state-level GDP per capita, obtained from the Federal Statistical Office of Germany, because more polluted states may differ systematically in population density, industrial structure, and prosperity.

above the median of PM2.5 exposure (-0.0391 versus -0.0276), but the equality test is only marginally significant (p-value = 0.135). Row 9 uses subjective pollution experience in the neighbourhood.[12] The coefficient is again more negative among those reporting stronger exposure (-0.0607 versus -0.0398), but the difference is not statistically significant. These two rows therefore suggest a directionally consistent but statistically weaker role for pollution exposure.

Row 10 provides sharper evidence for environmental-protection turnover.[13] In states with above-median environmental-protection turnover, the coefficient is -0.0474, compared with -0.0178 in lower-turnover states; the difference is statistically significant (p-value < 0.001). A suggestive interpretation of this result is moral licensing: visible public, institutional, or market-based protection efforts may reduce perceived personal responsibility, allowing status concerns to weigh more heavily in the formation of environmental attitudes (Merritt et al., 2010; Mazar & Zhong, 2010; Jacobsen et al., 2012; Tiefenbeck et al., 2013; Burger et al., 2022). Environmental-protection turnover may also proxy for local economic structure, institutional capacity, or optimism about future environmental management. Thus, Row 11 speaks to this ambiguity by using optimism about the future.[14] Respondents who are more optimistic exhibit a much more negative coefficient than less optimistic respondents (p-value < 0.001). This pattern is consistent with the possibility that confidence in future management, whether public or private, weakens the perceived need to sustain personal environmental concern when status pressure is salient. The interpretation remains cautious, but the row is important because it shows that the protection-turnover result need not be read only as a technological or institutional story; it also has a behavioural component.

[12] Subjective pollution exposure is measured with the question "*How impacted do you feel by pollution in your neighbourhood, for example: exhaust, dust, etc.?*" Responses are coded on a five-point scale: 1 "*not at all*", 2 "*little*", 3 "*bearable*", 4 "*strong*", and 5 "*very strong*". The item is available in 2004, 2009, 2014, and 2019. Respondents above the median value of 3 are classified as having stronger subjective pollution experience.

[13] Environmental-protection effort is proxied by official state-level turnover related to environmental protection, measured in millions of euros from 2006 to 2020. We divide turnover by state population to obtain a per-capita measure and classify states above the median as high-turnover states. The regressions control for log state GDP per capita to separate protection-related turnover from general regional prosperity.

[14] Optimism is measured with the question "*If you think about the future, are you...*" Responses are coded as 1 "*optimistic*", 2 "*more optimistic than pessimistic*", 3 "*more pessimistic than optimistic*", and 4 "*pessimistic*". The item is available in 2005, 2009, 2014, and 2019. We reverse-code the scale, compute within-person means, and classify respondents above the median value of 2 as more optimistic.

Political Preferences and Partisanship Rows 12 and 13 examine political orientation and engagement. Row 12 uses the SOEP left-right self-placement scale and codes respondents below the median as left-leaning.[15] The reference-income coefficient is close to zero among left-leaning respondents (-0.0085) and substantially more negative among right-leaning respondents (-0.0518), with a highly significant difference. Row 13 uses political interest, measured in every wave.[16] Politically interested respondents display a smaller negative coefficient (-0.0296) than those with lower interest (-0.0638), with p-value = 0.001. These patterns are consistent with political engagement and left-leaning orientation increasing the salience of collective-action, fairness, and environmental frames (Neumayer, 2004; McCright & Dunlap, 2011; Kahan et al., 2012; Hornsey et al., 2016). They also reinforce the public-good interpretation: when environmental concern is embedded in a broader political or cooperative orientation, it appears less sensitive to income comparisons.

4.4 Robustness

Table 5 summarises the robustness analysis. The checks address four possible concerns: whether the result depends on the linear probability model, whether it depends on the binary coding of environmental concern, whether mean reference income is the appropriate measure of relative position, and whether the pattern is specific to income rather than socioeconomic comparison more generally. Across these exercises, the coefficient on the comparison benchmark remains stable in sign and close in magnitude to the baseline estimate in Table 2.

Estimators and Outcome Measures Rows 1–4 examine estimator choice and outcome coding. Row 1 reports fixed-effects logit estimates. The coefficient on reference income remains negative and highly significant, while the own-income parameter is small

[15] Political orientation is measured with the question "*In politics people often talk about left and right when it comes to characterising different political attitudes. If you think about your own political views: Where would you place yours?*" Responses range from 0 "*far left*" to 10 "*far right*". The item is available in 2005, 2009, 2014, and 2019. We compute within-person means and classify respondents below the median value of 5 as left-leaning.

[16] Political interest is measured with the question "*Generally speaking, how interested are you in politics?*" Responses are coded as 1 "*very interested*", 2 "*moderately interested*", 3 "*not so interested*", and 4 "*completely disinterested*". We code respondents as politically interested if they answer 1 or 2.

and imprecise, consistent with the baseline linear probability model. Row 2 reports a correlated random-effects specification that adds within-person means of time-varying covariates, Big-Five personality measures, and subjective well-being (Chamberlain, 1984). This is a demanding check because it absorbs several persistent traits and subjective dispositions that may be related to both income comparisons and environmental concern. The reference-income coefficient remains negative and significant, suggesting that the result is not generated by a narrow implementation of individual fixed effects. Rows 3 and 4 address the coding of the dependent variable. Row 3 uses the original three-point environmental-concern scale in a linear fixed-effects model, while Row 4 uses the Blow-up and Cluster fixed-effects ordered logit estimator (Baetschmann et al., 2015). Both preserve a negative and statistically significant reference-income coefficient. The own-income coefficient is positive in the ordinal specifications but weak, reinforcing the distinction between absolute resources and relative position.

Relative-Income Measures and Inequality Rows 5–7 replace or complement the mean reference-income measure. Row 5 uses income rank within the reference group. As expected, the coefficient is positive: respondents with a higher income rank are more likely to report high environmental concern. This is the mirror image of the baseline result because rank improves when relative standing improves, whereas reference-group income worsens relative standing conditional on own income. Row 6 replaces mean reference income with median reference income, reducing sensitivity to outliers and small-cell imprecision; the coefficient remains negative and very close to the baseline. Row 7 adds reference-group inequality, measured by the Gini coefficient, and the reference-income coefficient remains negative. Thus, the main result is not simply an artefact of using the cell mean as the comparison benchmark. Appendix Figure B.1 further shows that the baseline estimate is insensitive to raising the minimum required reference-group size from 10 to 50 observations.

Alternative Comparison Goods Rows 8 and 9 ask whether the relationship is unique to income or reflects broader socioeconomic comparison. This is an important check because the proposed interpretation is not that income is intrinsically special, but that socially visible markers of position may shift attention toward private status concerns

Table 5. Robustness

Dep. var: High environmental concerns	I	II
	Log Absolute Income	Log Reference Income
Estimators and Measures		
1 Fixed-effects logit model	0.020	−0.243***
	(0.017)	(0.049)
2 Correlated linear random effects (CRE) with Big-5 and SWB	−0.001	−0.019***
	(0.002)	(0.006)
3 Linear fixed effects (with three-point scale)	0.005*	−0.054***
	(0.003)	(0.008)
4 "Blow-up and Cluster" ordered logit fixed effects (three-point scale)	0.029*	−0.301***
	(0.016)	(0.050)
Measures of relative income position and inequality		
5 Ranks in the reference group	−0.003	0.014**
	(0.003)	(0.006)
6 Median levels as comparison point	0.002	−0.029***
	(0.002)	(0.006)
7 Income inequality in the reference group	0.002	−0.034***
	(0.002)	(0.006)
Alternative comparison goods		
8 Job Prestige (SIOPS)	0.006	−0.035***
	(0.005)	(0.011)
9 Home Ownership	−0.002	−0.017***
	(0.003)	(0.004)
Reference group definitions		
10 Reference group 1: age, gender, education, West Germany	0.002	−0.040***
	(0.002)	(0.007)
11 Reference group 2: age, gender, married, Federal States	0.003	−0.026***
	(0.002)	(0.006)

Note: Authors' own calculations from the SOEP (2000–2020). The table reports robustness checks for the association between environmental-protection concern and socioeconomic comparisons. Rows 1–4 vary estimator and outcome coding; Rows 5–7 vary the measure of relative position; Rows 8–9 use alternative comparison goods; Rows 10–11 vary the reference-group definition. Unless otherwise stated, the reference-income measure uses the baseline reference-group definition and all regressions include the full control set. Standard errors clustered by reference group, where applicable, are presented in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively.

and away from environmental public goods. Row 8 uses occupational prestige, measured by the Standard International Occupational Prestige Scale (SIOPS), as the comparison good among employed respondents.[17] Relative job prestige is negatively and significantly associated with environmental concern. This result is informative because occupational prestige is less liquid than income but highly visible as a marker of social position. Row 9 uses the share of homeowners in the reference group and also yields a negative coefficient,

[17]SIOPS is the Standard International Occupational Prestige Scale, which assigns occupations a prestige score based on their social standing. In the SOEP, occupational prestige is derived from respondents' reported occupation and provides a continuous measure of occupational status. We construct reference-group prestige analogously to reference-group income by calculating the mean SIOPS score among comparable others in the relevant reference group.

although the magnitude is smaller. Overall, these two rows suggest that the comparison pattern is not confined to liquid income. It also appears for other visible markers of status, which is consistent with the interpretation that socioeconomic comparison, rather than income alone, is related to environmental concern.

Alternative Reference-Group Definitions Rows 10 and 11 alter the reference-group definition. Row 10 replaces federal states with the broader East-West Germany distinction, while Row 11 replaces education with marital status in the reference-group construction. In both cases, the sign and order of magnitude of the reference-income coefficient are preserved. This indicates that the baseline result is not driven by one particular partition of the population. Overall, Table 5 supports the stability of the main association across estimators, outcome codings, measures of relative position, comparison goods, and reference-group definitions. The robustness exercises therefore reinforce the central empirical pattern: environmental concern is systematically lower when the income or socioeconomic position of comparable others is higher, while the own-income coefficient remains small or imprecisely estimated in the baseline specifications.

5 Conclusion

This paper studies whether income comparisons are associated with environmental concern. Using the Socio-Economic Panel (SOEP) from 2000 to 2020, we estimate individual fixed-effects models that absorb time-invariant unobserved heterogeneity and relate two measures of concern, environmental protection and climate change, to own income and the mean income of comparable others. The empirical strategy adapts the comparison-income framework from the subjective well-being literature to environmental attitudes, using rich reference-group cells and an extensive set of personal, household, and regional controls. We also examine whether similar patterns emerge for other comparison goods, including occupational prestige and home ownership, and assess the stability of the findings through a broad set of robustness and moderation analyses.

The results are consistent with the central conjecture. Once individual fixed effects and covariates are included, own income is not significantly associated with either measure

of environmental concern. By contrast, higher reference-group income is associated with lower concern about both environmental protection and climate change. A 10% increase in others' mean income corresponds to a decline of about 0.3 to 0.7 percentage points in the probability of reporting high concern, roughly 1 to 2% of the sample mean. The association is stronger among the relatively deprived, namely upward comparators, than among those better positioned within their reference group. The sign and magnitude are stable across alternative samples, estimators, ordinal outcome specifications, reference-group definitions, and rank- and median-based measures of relative position. The results for occupational prestige and for homeownership further suggest that the relationship is not confined to liquid income but also reflects broader socioeconomic position and visible markers of status.

The moderation analysis indicates that the negative reference-income association is more pronounced among men, younger respondents, and single individuals, groups for whom status competition may be more salient. Education and environmental consciousness attenuate the association, as do volunteering, other-regarding orientation, perceived fairness, generalised trust, patience, left-leaning political orientation, and political engagement. By contrast, perceptions of unfairness and stronger negative reciprocity are associated with larger reference-income coefficients. Local context also matters: the association is larger in areas with higher air-pollution exposure and in regions with higher environmental-protection turnover, a pattern consistent with normalisation and moral-licensing interpretations. These results suggest that relative concerns are least damaging to environmental concern where awareness, future orientation, social trust, and cooperative norms are stronger.

The welfare implication is that relative concerns can operate as a negative consumption externality. When rising comparison benchmarks redirect attention and resources toward visible private goods, they can weaken concern for environmental public goods and reduce the effective demand for collective environmental protection. This status race may divert resources away from environmental quality and delay support for policies whose benefits are social and long-term. Environmental policy should therefore account not only for prices and material constraints, but also for the positional appeal of high-emission consumption. Carbon pricing remains central, but complementary instruments may be

needed to reduce the status component of conspicuous high-emission goods, including large luxury vehicles and other visible status durables. In places with high environmental exposure, investments in public transport and air-quality monitoring can improve welfare directly while narrowing the space in which status competition displaces attention to the environment.

Several limitations remain. The fixed-effects strategy addresses time-invariant traits, but it does not establish causality. Reference groups are constructed from observable cells and may differ from respondents' subjective comparison sets, potentially introducing measurement error and endogeneity. The outcomes are self-reported concern measures: they are relevant for policy demand and voluntary commitment, but they are not direct measures of emissions, consumption, realised environmental behaviour, willingness to pay, or support for specific policy instruments. The estimates should therefore be read as evidence on the attitudinal foundations of environmental concern rather than as evidence on material environmental behaviour. Future research could use plausibly exogenous shocks to others' income, direct measures of subjective comparison groups, revealed environmental behaviour, and cross-country designs to test whether these patterns generalise across institutional settings. Nevertheless, the evidence shows that socioeconomic comparisons are systematic correlates of environmental attitudes, while one's own income is not. The magnitudes are modest at the individual level, but stable across outcomes, samples, and specifications. Ignoring relative concerns in environmental policy risks underestimating how status competition shapes support for environmental public goods and how resources are allocated between private visibility and collective sustainability.

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Appendices

A Full Estimation Results

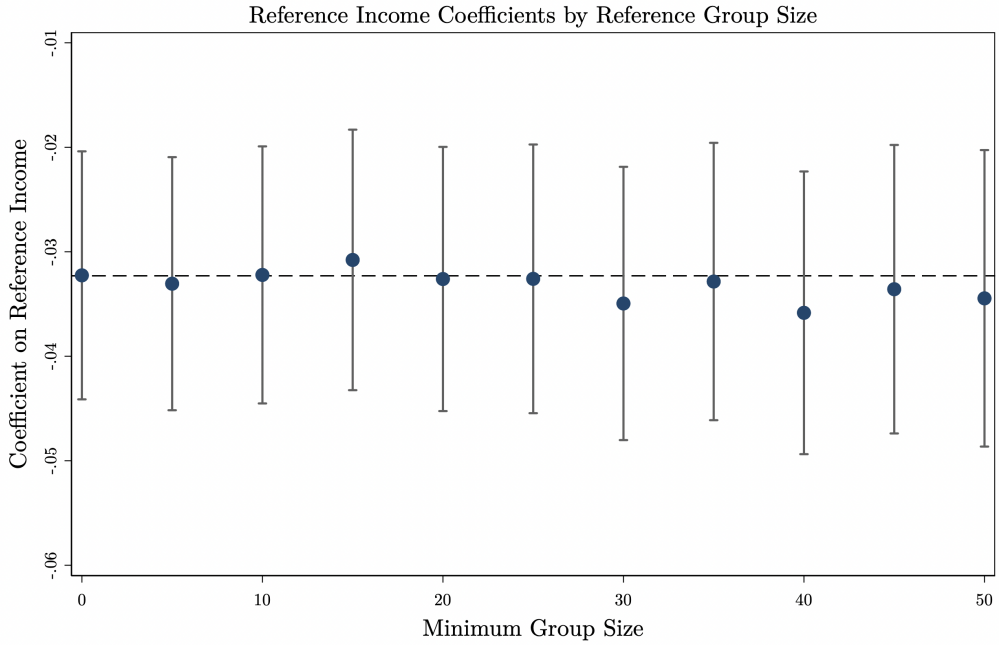
Table A.1. Full Estimation Results

	I	II		I	II
	Environmental Concerns	Climate Change Concerns		Environmental Concerns	Climate Change Concerns
Marital status (single=1)	0.006	0.002	Health situation (very good=1)	−0.028***	−0.001
	(0.005)	(0.007)		(0.005)	(0.007)
Marital status (widowed=1)	0.003	−0.003	Health situation (good=1)	−0.019***	0.000
	(0.007)	(0.012)		(0.005)	(0.006)
Marital status (divorced=1)	−0.007	−0.008	Health situation (fair=1)	−0.010**	0.006
	(0.005)	(0.009)		(0.004)	(0.006)
Marital status (separated=1)	−0.020***	−0.028***	Health situation (bad=1)	−0.007	−0.002
	(0.006)	(0.008)		(0.004)	(0.006)
# Kids (aged 0–1)	0.008**	0.009*	Years of education	0.001	0.003*
	(0.004)	(0.006)		(0.001)	(0.002)
# Kids (aged 2–4)	0.002	0.002	Employment status (employed=1)	0.002	0.001
	(0.003)	(0.004)		(0.003)	(0.004)
# Kids (aged 5–7)	0.001	−0.004	Average weekly working hours (log)	−0.080	−0.038
	(0.003)	(0.004)		(0.073)	(0.100)
# Kids (aged 8–10)	−0.004	−0.009**	Years of working experience /100	−0.016	−0.003
	(0.003)	(0.004)		(0.018)	(0.024)
# Kids (aged 11–12)	−0.004	−0.013***	Working in public sector (public=1)	−0.003	−0.001
	(0.003)	(0.004)		(0.003)	(0.004)
# Kids (aged 13–15)	0.003	−0.005	Nonlabour income (log)	0.015	0.010
	(0.002)	(0.004)		(0.036)	(0.050)
# Kids (aged 16–18)	−0.001	−0.005	Log absolute income	0.002	−0.001
	(0.002)	(0.003)		(0.002)	(0.003)
Household size	−0.002*	−0.001	Log relative income	−0.032***	−0.071***
	(0.001)	(0.002)		(0.006)	(0.008)
Year fixed effects				✓	✓
State fixed effects				✓	✓
R2-overall				0.017	0.022
# Observations				381,763	222,733

Note: Authors' own calculations from the SOEP (2000–2020). Standard errors are clustered at the reference group level and presented in parentheses. ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

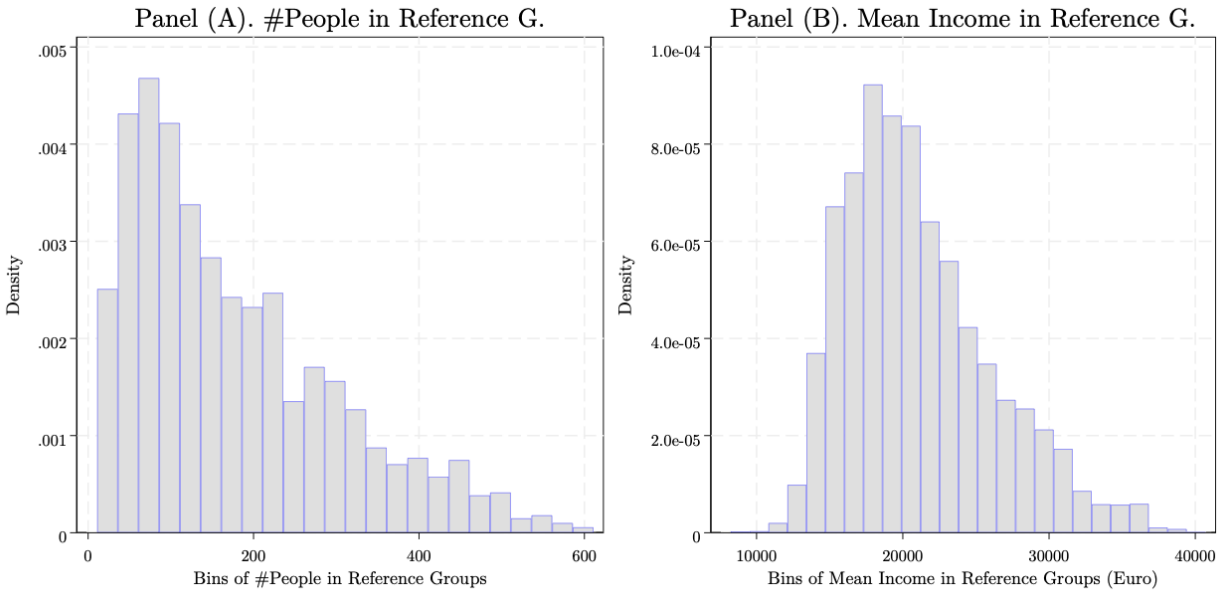
B Sensitivity Checks: Sample Size in Reference Groups

Figure B.1. Sensitivity Checks: Sample Size of Reference Groups



Note: Authors' own calculations from SOEP (2000–2020). The estimates are obtained from a baseline linear probability fixed-effects model with the full set of control variables and baseline reference-group definitions. The horizontal axis indicates the minimum sample size allowed in reference groups for the analysis. The horizontal dashed line shows the baseline estimates of environmental concern. The vertical lines show 95% confidence intervals.

Figure B.2. Distribution of Number of People and Mean Income in Reference Groups



Note: Authors' own calculations from the SOEP (2000–2020). The baseline reference group is defined by gender (male, female), age group ([18,30], (30,40], (40,50], (50,65], and (65,80]), education level (low, high), federal state, and year. Mean income is per-capita yearly income measured in euros.