Two Worlds of Environmentalism?

Empirical Analyses on the Complex Relationship between Postmaterialism, National Wealth, and Environmental Concern

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Abstract: This article examines cross-cultural differences in the value cluster of environmentalism and postmaterialism. Based on an extension of Ronald Inglehart's "objective problems–subjective values" hypothesis, we posit different sources of postmaterialism and environmental concern in wealthy versus poor countries. We test hypotheses on the relationship between national wealth, postmaterialist values, and environmental concern using empirical data from the World Values Survey waves 5 and 6 and the International Social Survey Program 2010. Using multilevel regression models with cross-level interaction terms and country fixed effects, we show that the effect of postmaterialism on environmental concern is indeed moderated by national wealth: whereas there is a weak or even no effect in poorer countries, the relationship is substantial in wealthy countries. Therefore, we argue that individual postmaterialist values and environmental concern do in fact form a coherent structure in wealthy countries, but should be considered as isolated constructs in poorer countries.

Keywords: environmental concern, International Social Survey Program, national wealth, postmaterialism, varieties of environmentalism, World Values Survey

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The Paris Agreement (UNFCCC 2015) aims at "holding the increase in the global average temperature to well below 2°C above pre-industrial levels" (Art. 2.1a). Even though more than 174 countries have ratified the agreement as of February 2018, attaining this goal will crucially depend on public support for costly national contributions. However, the global spread of environmental concern and the reasons for differing levels of concern among countries are not yet fully understood. In this article, we contribute to the understanding of the topic by addressing one of the most prominent explanations of national differences in environmental concern: the postmaterialism hypothesis. Ronald Inglehart (1977) observed a shift in individuals' value orientations toward postmaterialistic preferences in Western countries: the "silent revolution." The concept of postmaterialism has since been elaborated upon. Inglehart (1995) and Steven Brechin (1999), for example, have made the connection between the "silent revolution" and the increase in global environmental concern. An alternative account of the global increase in environmental concern is based on affluence theory, which ignores postmaterialism, stating simply that individual environmental concern is the direct outcome of a country's wealth. As such, individuals in wealthier countries should be more environmentally concerned (Franzen and Vogl 2013). However, empirical studies testing this hypothesis found inconclusive evidence (see later discussion). Furthermore, some countries exhibit high proportions of pro-environmental citizens yet at the same time the proportion of postmaterialistic citizens is low.

One possible explanation for these puzzling phenomena is the "objective problems–subjective values" (OPSV) hypothesis (Inglehart 1995). According to this hypothesis, there are multiple sources of environmental concern: environmental concern may arise when countries are relatively wealthy and postmaterialistic values are widespread in the population. When countries are relatively poor and objective local environmental problems are pressing, environmental concern may develop as well. Therefore, it is not solely the wealth of a

country, nor the postmaterialistic “silent revolution”, nor the degree of objective environmental problems that explains increases of environmental concern. Instead, it seems to be a rather complex multifactorial causal system that explains the emergence of environmental concern in a country (e.g., Echavarren 2016; Fairbrother 2013; Pampel 2014). In this article, we focus on the empirical testing of the affluence and postmaterialism hypothesis, and an interaction derived from the “objective problems–subjective values” hypothesis. The interaction hypothesis integrates the different theoretical positions outlined above and offers an explanation for the mixed empirical results. Following arguments found in the literature (e.g., Guha and Martinez-Alier 1997), we expect the effect of individual postmaterialism to be moderated by national wealth: individual postmaterialism is hypothesized to be effective in wealthy countries only. We add to the state of research by using new data from World Values Survey (WVS) wave 6 and combining it with data from WVS wave 5 and International Social Survey Program (ISSP) 2010. Furthermore, we use two different operationalizations of environmental concern and estimate multilevel models with country fixed effects to rigorously identify the effect of postmaterialism on environmental concern.

The article is structured as follows: we first discuss the theoretical and empirical state of research on the connection between postmaterialism and environmental concern. Data and statistical methods will be introduced, followed by the empirical results. Finally, the article will conclude with a discussion and conclusion.

Theoretical Background and State of Research

Theoretical approaches seeking to explain the worldwide spread of environmental concern can be roughly divided into three main approaches: the globalization hypothesis, the affluence hypothesis, and the postmaterialism hypothesis (e.g., Franzen and Meyer 2004,

2010). Extensions of the postmaterialism hypothesis led to the "objective problems–subjective values" hypothesis (Inglehart 1995) and the differentiation between types of environmentalism ("empty stomach" vs. "full belly" environmentalism; see Guha and Martinez-Alier 1997). We shall review these approaches in the following paragraphs, with a focus on affluence and postmaterialism. Note that the comparison (and convergence) of empirical results in this field is greatly complicated by different operationalizations of environmental concern as well as by selective nonrandom samples of countries.

The globalization hypothesis (e.g., Brechin and Kempton 1994; Dunlap et al. 1993; Dunlap and Mertig 1995, 1997; Dunlap and York 2008) states that environmental problems are a globally ubiquitous phenomenon. In this respect, it can be hypothesized that environmental concern should be independent of economic development of a country and independent of a general value change, for example, toward postmaterialism. Global environmental problems like climate change concern everyone, without differentiation between countries, between rich and poor, or between the postmaterialists and the materialists. Theoretically, this approach is problematic because it does not offer an explanation for varying levels of environmental concern between countries. Instead, the globalization hypothesis implies that there is a general basic level of environmental concern and differences between countries should be marginal. This assumption is questionable empirically, as about 25 to 33 percent of countries' populations in the two World Value Surveys from 2004 to 2014 are against environmental protection and in favor of economic growth. Riley Dunlap and Angela Mertig (1995), on the other hand, support their global environmentalism assumptions with empirical data from the Health of the Planet Survey (HOP) and conclude that environmental concern is a global phenomenon and that it is even negatively correlated with country-level wealth.

The affluence hypothesis (e.g., Baumol et al. 1979; Field 1994; Franzen 2003; Grossman and Krueger 1995), in contrast, states that global environmental problems are subjectively relevant only for people living in a wealthy country. From an actor's perspective, environmentalism is seen as a luxury good that is only individually relevant when basic needs are met. This assumption can be founded on Abraham Maslow's (1954) hierarchy of needs, where physiological needs, safety needs, and social needs come first. Environmental concern should therefore be primarily formed in wealthy societies where citizens have needs beyond these basic ones. In the same line, when arguing with diminishing marginal utility, Inglehart and Scott Flanagan (1987) state that when wealth reaches a certain level, economic factors become less crucial and lifestyle factors as well as perception of environmental problems become increasingly important. Thus, empirical analyses of environmental concern should show a direct significant effect of national wealth on environmental concern. An alternative approach of operationalization of affluence on the micro level implies that individual socioeconomic status (SES) and individual prosperity within countries should show the same effects as macro-level effects of a country's wealth, stating that richer people or people with higher SES are higher in environmental concern than poorer or lower SES people.

Some empirical studies show evidence in line with the affluence hypothesis on the country level using data from the ISSP survey (e.g., Diekmann and Franzen 1999; Franzen and Meyer 2010; Franzen and Vogl 2013; Kemmelmeier et al. 2002), HOP survey (e.g., Diekmann and Franzen 1999), WVS (Franzen and Vogl 2013), EVS (Franzen and Vogl 2013). On the other hand, Malcolm Fairbrother (2013) did not confirm affluence effects on the country level using WVS. Sandra Marquart-Pyatt (2012) showed in her analyses of ISSP data no or even negative effects of gross domestic product (GDP), and Dunlap and Mertig (1995) come to the same result with HOP data. Effects of individual SES – usually operationalized by income – on environmental concern were found by Axel Franzen and Reto

Meyer (2010) and with some variability by Markus Kemmelmeier and colleagues (2002) using ISSP data, and Lee Ahern (2012) using WVS data. In contrast, Jose Echavarren (2016) could not confirm the affluence hypothesis using WVS 6 data when controlling for environmental degradation. In line with this, studies show that individual income has a significant positive effect on willingness to pay for environmental measures (Fairbrother 2013; Lo 2016), but a significant negative (Lo 2016) or no effect (Marquart-Pyatt 2012) on risk perception of environmental problems. Interestingly, using WVS data, Fred Pampel (2014) found that individual SES (income and education) is significantly associated with environmental concern but moderated by a country's wealth in the way that SES effects are stronger in wealthier countries. Overall, the relationship between prosperity and environmental concern seems to be quite inconsistent over empirical studies.

Following the postmaterialism hypothesis (e.g., Brechin 1999; Franzen and Meyer 2010; Inglehart 1995), the rise of subjective postmaterialistic values leads to a higher awareness of nonmaterialistic issues like environmental protection. Arguing again in the analytical context of Maslow's hierarchy of needs, environmental concern becomes relevant once basic materialistic needs are met. Thus, it is not directly the wealth of a country that leads to higher environmental concern. Rather, affluence triggers the adoption of postmaterialistic values that, in turn, serve as the basis for subjective environmental concern of successive generations.[1]

However, Inglehart (1995) argues that it is not only postmaterialistic values that trigger environmentalism. Rather, objective environmental problems – which are more predominant in poorer countries – can lead to environmental concern as well: this relates back to the "objective problems–subjective values" (OPSV) hypothesis. In the original formulation, the OPSV hypothesis posits a two-factor explanation of environmental concern. Brechin (1999) criticizes this conceptualization and points to aggregation problems and the

need for social psychological foundations of the hypothesis. The OPSV has since been extended to differentiate between problem-driven "empty belly" environmentalism and the culturally driven "full stomach" environmentalism embedded in a postmaterialistic worldview (Brechin 1999: 795–796; Guha and Martinez-Alier 1997). Brechin (1999) and Ramachandra Guha and Joan Martinez-Allier (1997) have brought forward the argument that environmental concern in the global South differs from environmental concern in the global North: while the former mainly derives from experiencing fierce environmental problems (empty belly environmentalism), the latter is shaped by a preference for self-expression, quality of life, and other subjective cultural factors (full stomach environmentalism). While the former will be more predominant in poorer societies – typically in the global South – the latter can be expected in wealthier countries of the global North. This perspective offers insight into what Guha and Martinez-Alier call "varieties of environmentalism." For example, Alex Lo (2014) emphasizes differences in risk perception, actual risks, and an unequal capacity to cope with environmental degradation. Following this line of argumentation, environmentalism of the poor can be perceived as materialistic, whereas the culturally driven environmentalism of the rich is part of a general value change and a move toward postmaterialistic preferences. Therefore, in poor countries, the hypothesis predicts a weak relationship between postmaterialistic values and environmental concern. In statistical terms, this extension of the OPSV hypothesis posits an interaction effect of national wealth and subjective postmaterialist values to explain environmental concern.

Direct effects of individual postmaterialism on individual environmental concern were found in several recent empirical studies: Franzen and Meyer (2010) with ISSP data, Ahern (2012), Fairbrother (2013), and Pampel (2014) with WVS data, and Franzen and Dominikus Vogl (2013) with ISSP, WVS, and EVS data. Analyses of OPSV demonstrating an interaction effect of postmaterialism and a country's wealth are less widespread.

Interestingly, results of empirical tests have been inconsistent, thus showing results in favor (Inglehart 1995) or against (Brechin 1999) the OPSV hypothesis. Methodologically problematic macro-level analyses on subjective values based on the individual level may be one of several reasons why these empirical studies come to quite different results. In a recent study analyzing WVS waves 1 to 5, Pampel (2014) found evidence for a significant interaction effect of country GDP with individual postmaterialism.

According to the theoretical approaches sketched above, the following hypotheses can be postulated to explain environmental concern. First, in line with the affluence hypothesis, hypothesis H1 assumes a significant effect of national wealth:

H1: The higher the level of national wealth, the higher the environmental concern.

According to the postmaterialism hypothesis, subjective postmaterialistic values should have a direct effect on environmental concern:

H2: Individual postmaterialism leads to higher environmental concern.

But following the interaction hypothesis formulated above, this effect of postmaterialism should be stronger when national wealth is high, thus implicating a cross-level interaction (moderator effect):

H3: The higher the national wealth, the stronger the effect of individual postmaterialism on environmental concern.

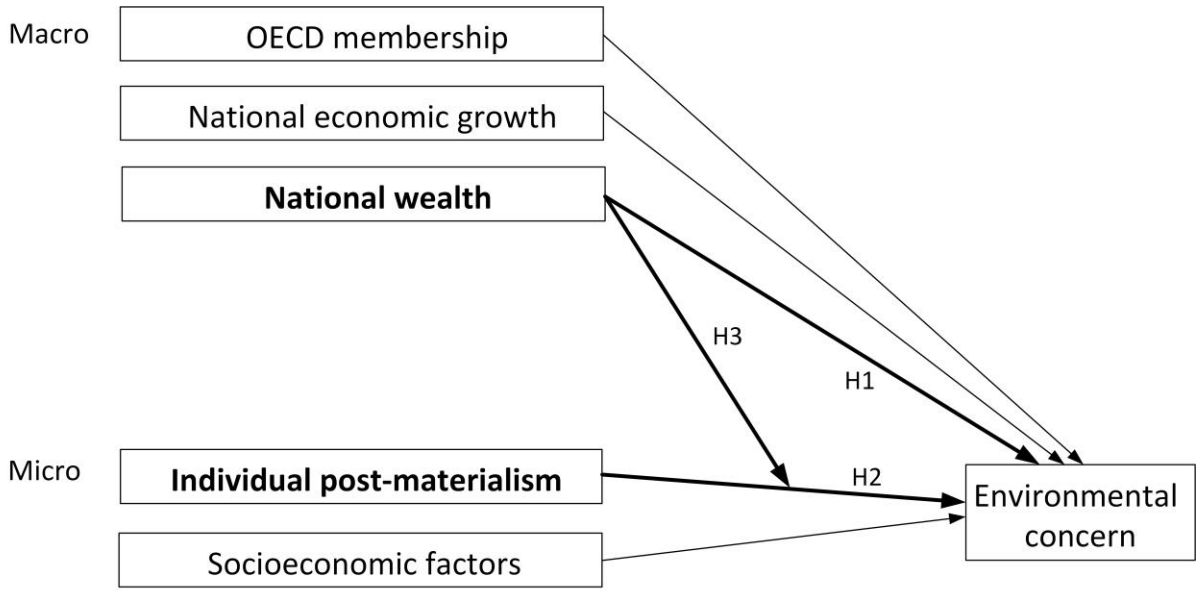


Figure 1: A multilevel model of environmental concern.

We test these hypotheses empirically in a multilevel design (Figure 1). The complete model includes several control variables on the macro level (national economic growth, OECD membership) as well as on the micro level. In addition to individual SES (in terms of income and education), other individual characteristics have been found to be significant predictor variables of environmental concern: women as well as young people tend to display a higher level of environmental concern (e.g., Franzen and Meyer 2010; Franzen and Vogl 2013; Pampel 2014). These variables will be included as micro-level control variables in our statistical models.

Data and Methods

For our empirical analyses, we use data from the 2005 to 2009 wave 5 data and 2010 to 2014 wave 6 data from the World Values Survey (WVS; see World Values Survey Wave 5 2005–2008; World Values Survey Wave 6 2010–2014) as well as the 2010 International Social Survey Program (ISSP; see ISSP Research Group 2012). Both survey programs collect data on attitudes and values from countries from all continents. Using three data sets and different

operationalizations of environmental concern, we are able to include a larger set of countries in the study and increase the robustness of our results.

By estimating multilevel models, we adequately consider different types of analysis levels and take the hierarchical structure of data into account (people nested in countries). The multilevel regression models are estimated with N = 45,656 respondents with valid answers out of 41 countries from the WVS wave 5, N = 70,431 respondents out of 55 countries from WVS wave 6, and N = 28,720 respondents from 30 countries from ISSP. Macro data on the national level were collected from the World Development Indicators (see World Bank 2013) and refer to 2005 for the WVS wave 5 data set and 2010 for the ISSP and WVS wave 6 data sets. From WVS 6 we excluded Qatar, the wealthiest country in the world, as an obvious outlier with a GDP about three times higher than that of the United States and a population of less than 300,000 citizens and about 1.5 million expatriates.

The dependent construct of our study is environmental concern. In the literature, there is no consensus on a conceptualization of individual environmental concern that refers to "the whole range of environmentally related perceptions, emotions, knowledge, values, attitudes, and behaviors" (Bamberg 2003: 21). Riley Dunlap and Robert Jones conclude that "several hundred varying operational definitions [of environmental concern] have been employed." Thus, they define environmental concern in a rather broad and general sense as "the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate the willingness to contribute personally to their solution" (2002: 493, 485). Henning Best and Jochen Mayerl (2013) show that different concepts of environmental concern can be ordered in a hierarchical structure, with environmental values leading to general environmental attitudes that in turn affect specific environmental attitudes and finally behavioral intentions and actual behavior. Throughout this article, we use this broad term of environmental concern, but our measurements mainly cover general pro-environmental

attitudes. In the ISSP we use a summated rating scale of general pro-environmental attitudes to cover individual environmental concern, operationalized using nine items on different aspects of environmental protection.[2] In the WVS, this construct is operationalized by individual preference for environmental protection over economic growth.[3]

Our main macro explanatory variable of "national wealth" is operationalized by GDP per capita (ppp, centered and divided by 10,000). Two additional independent macro variables serve as control variables: GDP growth of the last 10 years in percentage and national membership in OECD (0/1). The main independent micro variable is subjective postmaterialism. We use the standard four-item ranking scale (y002 in WVS and Q3 in ISSP) and treat mixed values as "non-postmaterialists."[4] Thus, postmaterialism is a binary variable with postmaterialist goals ranked on positions one and two (coded 1) or coded 0 otherwise. By doing so, we try to avoid effects of mixed subjective values leading to an unclear interpretation. Socioeconomic control variables are age (in decades, centered), sex (1 = female; 0 = male), upper secondary degree of formal school education (binary coded), and relative income by country (a 10-point subjective rating scale in the WVS and by country, *z*-standardized household income in the ISSP). In addition, WVS wave 5 data allow controlling for perceived local pollution problems (four-point rating scale from "not serious at all" to "very serious"). The properties of all variables are shown in Table 1.

Table 1: Coding of Central Variables

	ISSP 2010			WVS 5			WVS 6		
	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD
Preference for environment	–	–	–	{0;1}	.56	.50	{0;1}	.51	.50
Scale of Environmental Concern	[9;45]	27.50	5.82	–	–	–	–	–	–
OECD	{0;1}	.77	.42	{0;1}	.35	.48	{0;1}	.26	.44
GDP growth (% 10Y)	[30.54; 195.85]	71.65	33.19	[35.14; 193.73]	88.19	36.88	[-26.63; 342.54]	92.81	50.85
GDP/c (10,000 ppp; centered)	[-2.52; 2.83]	0	1.28	[-1.39; 3.31]	0	1.27	[-1.85; 5.37]	0	1.66
Perceived local pollution	–	–	–	[0;3]	1.89	1.131	–	–	–
Postmaterialist	{0;1}	.11	.31	{0;1}	.12	.32	{0;1}	.09	.28
Age (in decades; centered)	[-3.26; 5.04]	0	1.69	[-2.65; 5.55]	0	1.64	[-2.56; 5.74]	0	1.64
Gender (female)	{0;1}	.53	.50	{0;1}	.51	.50	{0;1}	.52	.05
Relative income	[-2.00; 30.53]	0	1	[1;10]	4.69	2.30	[1;10]	4.91	2.10
Upper secondary education	{0;1}	.60	.49	{0;1}	.37	.48	{0;1}	.43	.50

Note: GDP and GDP growth refer to 2010 in the ISSP and WVS 6 data set and to 2005 in WVS 5 (World Bank 2013).

To estimate effects of macro and micro data with hierarchical structured data containing respondents from different countries, we estimate linear multilevel models with a metric dependent variable for the ISSP and logistic multilevel models with a binary dependent variable for the WVS. Multilevel modeling allows us to estimate effects of macro predictors (characteristics of countries, e.g., national wealth) as well as effects of micro predictors (characteristics of individuals, e.g., subjective postmaterialistic value orientation). These statistical models have several advantages when dealing with hierarchical data, such as corrected standard errors and the ability to estimate cross-level interactions (see, e.g., Hox

2010; Hox and Wijngaards-de Meij 2014 for more details on multilevel modeling). The estimation of cross-level interactions allows for testing whether macro characteristics explain the variation of effects of micro predictors across countries. In our case we study whether macro-level national wealth is a moderator of the micro-level relationship between subjective postmaterialism and environmental concern.

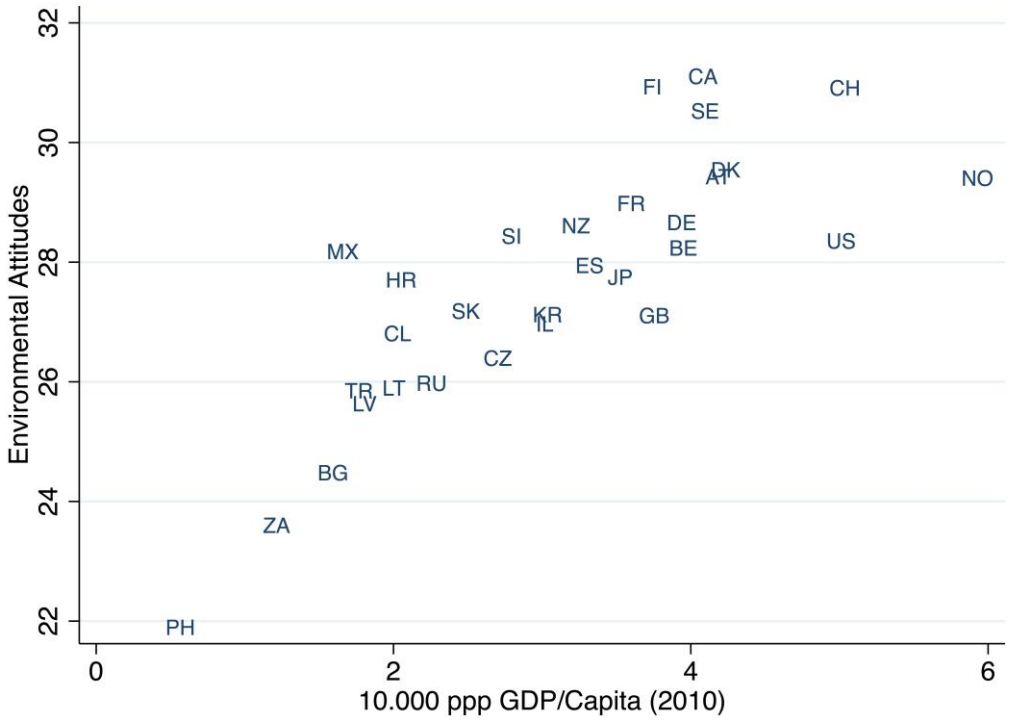
Results

To empirically test the hypotheses derived above we use two different indicators for environmental concern and three different international survey data sets. This approach has the great advantage of (a) including as many countries in the analysis as possible and (b) providing enhanced robustness of results. This advantage becomes immediately clear in Figure 2: when having a look at the ISSP data in Figure 2a, one would suspect a relatively simple, linear aggregate effect of GDP on environmental concern. Figures 2b and 2c, with WVS data, however, show a more complex picture with a weaker and/or curvilinear relationship.

How can this divergence be explained? It is not due to the different operationalization, as many countries are placed on similar positions, such as US, CH, and NO in the upper-right corner or ZA in the lower-left corner in both Figures 2a and 2b. The most striking difference is the lack of poorer countries in the ISSP. In fact, if we removed these countries (except ZA) from the World Values Survey, the three graphs would look much more similar. This aggregate finding can be interpreted as a first indication that the determinants of environmental concern may be different in poorer countries as compared to wealthy countries. More importantly, it points to the need to include as many countries as possible in cross-national surveys to avoid severe coverage bias.

In our empirical testing of the hypotheses on varieties of environmentalism, we proceed with estimating multilevel regression models. The linear model for ISSP data reveals an *ICC* of 13.3 percent between-country variation in environmental concern. This means that there is more than 13 percent of variance at the country level, so there are ample country differences to explain and it makes sense to use multilevel models.[5]

(a)



(c)

(b)

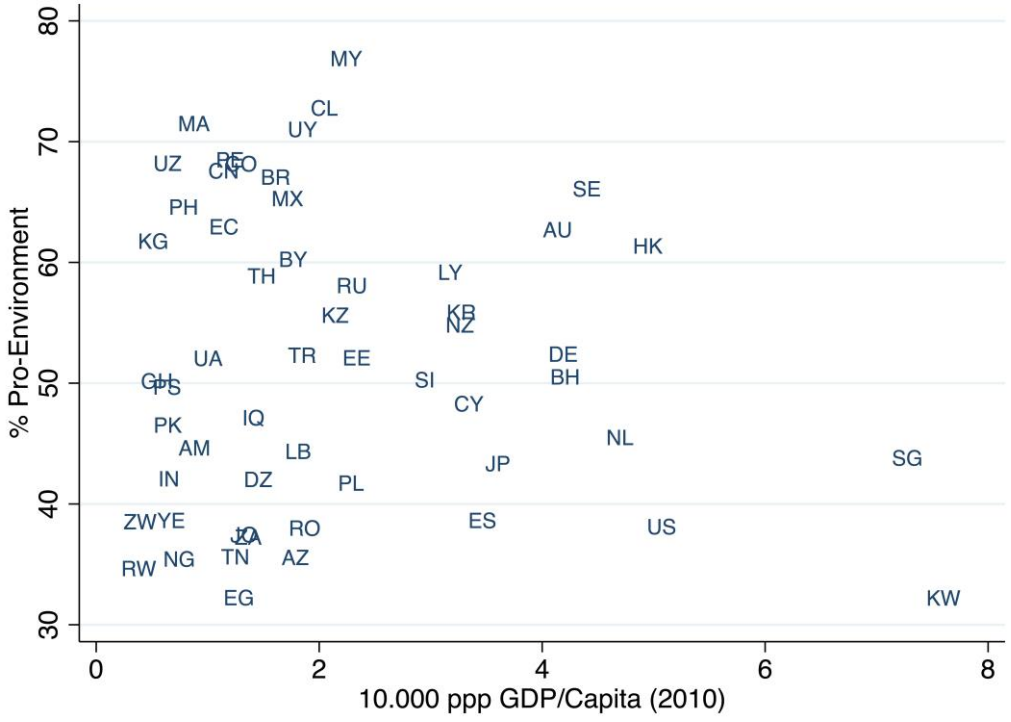


Figure 2: Aggregate distribution of GDP and environmental concern: (a) ISSP; (b) WVS 5; (c) WVS 6.

Table 2: Multilevel Regression Models on Environmental Concern

	Simple Multilevel Models					
	M1a (linear, ISSP 2010)		M1b (logistic, WVS 5)		M1c (logistic, WVS 6)	
	b	SE	b	SE	b	SE
Macro						
OECD	1.445*	(0.705)	-0.076	(0.226)	0.036	(0.173)
GDP growth (% in 10y)	-0.003	(0.008)	0.004*	(0.002)	-0.001	(0.001)
GDP/c (10,000 ppp)	0.955***	(0.232)	0.197*	(0.088)	-0.062	(0.045)
Micro						
Postmaterialist (PM)	1.641***	(0.189)	0.353***	(0.070)	0.379***	(0.062)
Perceived local air pollution			0.084***	(0.010)		
Age (10y)	-0.118***	(0.019)	0.003	(0.007)	-0.002	(0.006)
Age²	-0.149***	(0.010)	-0.016***	(0.003)	-0.004	(0.003)
Female	0.833***	(0.062)	0.038	(0.020)	0.047**	(0.016)
Relative income	0.370***	(0.032)	0.017***	(0.005)	0.004	(0.004)
Upper secondary degree	1.810***	(0.071)	0.266***	(0.023)	0.182***	(0.018)
Intercept	25.476***	(0.956)	-0.383	(0.209)	-0.003	(0.166)
var(PM)	0.652*	(0.256)	0.140***	(0.045)	0.137***	(0.039)
var(Intercept)	1.283***	(0.341)	0.196***	(0.044)	0.242***	(0.047)
N	28720		45656		70341	
AIC	176190.235		59093.225		93111.260	
LL	-88082.118		-29533.612		-46543.630	

Note: Reference categories: not OECD, not postmaterialist, male, no upper secondary education;

***$p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Table 3: Multilevel Regression Models of Environmental Concern Including Interaction Effects

	ISSP 2010 (Linear models)				WVS 5 (Logistic models)				WVS 6 (Logistic models)			
	M2a (Cross-level interaction)		M3a (Country fixed effects)		M2b (Cross-level interaction)		M3b (Country fixed effects)		M2c (Cross-level interaction)		M3c (Country fixed effects)	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Macro												
OECD	1.453*	(0.708)			-0.072	(0.227)			0.036	(0.173)		
GDP growth (% in 10y)	-0.003	(0.008)			0.004*	(0.002)			-0.001	(0.001)		
GDP/c (10,000 ppp)	0.944***	(0.233)			0.191*	(0.088)			-0.063	(0.045)		
Micro												
Postmaterialist (PM)	1.587***	(0.174)	1.583***	(0.168)	0.325***	(0.057)	0.323***	(0.055)	0.370***	(0.054)	0.369***	(0.053)
Perceived local air pollution					0.084***	(0.010)	0.084***	(0.010)				
Age (10y)	-0.118***	(0.019)	-0.119***	(0.033)	0.003	(0.007)	0.002	(0.007)	-0.002	(0.006)	-0.002	(0.006)
Age^2	-0.149***	(0.010)	-0.149***	(0.024)	-0.016***	(0.003)	-0.016***	(0.003)	-0.004	(0.003)	-0.004	(0.003)
Female	0.834***	(0.062)	0.834***	(0.150)	0.038	(0.020)	0.038	(0.020)	0.047**	(0.016)	0.047**	(0.016)
Relative income	0.371***	(0.032)	0.371***	(0.059)	0.017***	(0.005)	0.017***	(0.005)	0.004	(0.004)	0.004	(0.004)
Upper secondary degree	1.810***	(0.071)	1.815***	(0.194)	0.266***	(0.023)	0.266***	(0.023)	0.181***	(0.018)	0.182***	(0.018)
Cross-level interaction												
GDP * PM	0.321*	(0.138)	0.323*	(0.154)	0.176***	(0.042)	0.175***	(0.041)	0.133***	(0.035)	0.133***	(0.034)
Intercept	25.471***	(0.960)	28.589***	(0.081)	-0.382	(0.209)	0.226*	(0.100)	-0.013	(0.166)	-0.395***	(0.073)
var(PM)	0.484*	(0.209)	0.440*	(0.173)	0.075***	(0.031)	0.066***	(0.029)	0.091***	(0.030)	0.086***	(0.029)
var(Intercept)	1.288***	(0.342)			0.196***	(0.044)			0.242***	(0.047)		
N	28720		28720		45656		45656		70341		70341	
AIC	176187.424		176037.665		59081.591		58959.060		93100.443		92917.357	
LL	-88079.712		-88008.832		-29526.795		-29428.530		-46537.221		-46394.679	

Note: Country dummies not shown in M3. Reference categories: not OECD, not postmaterialist, male, no upper-secondary education;

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

We start our empirical analyses with a model containing micro and macro explanatory variables (Model 1a, 1b, and 1c in Table 2). Model 2 (Table 3) adds the cross-level interaction between GDP and postmaterialism to the models, and Model 3 (Table 3) identifies the effect of postmaterialism using a country fixed effects multilevel model. Country fixed effects account for unobserved heterogeneity between countries and therefore allow an unbiased identification of the cross-level interaction.[6]

For all three data sets and in case of all multilevel models (Models 1 and 2), the variance of the intercept is statistically significant, showing evidence in favor of random intercept models. This finding indicates that the base level of environmental concern differs between countries. Even more importantly, the variance of the postmaterialism slope is statistically significant and substantial compared to the effect size. Hence, there are country differences not only in the base level, but also in the regression coefficient of postmaterialism. Thus, the effect of postmaterialistic value orientation varies over different national contexts, supporting evidence that a macro factor might act as a moderator variable. Therefore, we estimate a random intercept and random slope multilevel model with a cross-level interaction. In sum, this statistical model will be suited to test our hypotheses, including the interaction hypothesis stating a stronger effect of individual postmaterialism on environmental concern in wealthier countries.

According to hypothesis H1, we expect macro-economic effects of national wealth (GDP/c) on individual environmental concern. The estimated effect of GDP/c is positive and statistically significant in both Models 1 and 2 and in both data sets (ISSP: $p < 0.001$; WVS wave 5: $p < 0.05$). Interestingly, WVS wave 6 does not replicate this finding, showing a positive but clearly nonsignificant effect of GDP/c on environmental concern ($p > 0.10$). This means that, in line with affluence hypothesis H1, WVS wave 5 and ISSP 2010 data show that the higher the national wealth, the higher the base level of individual environmental concern

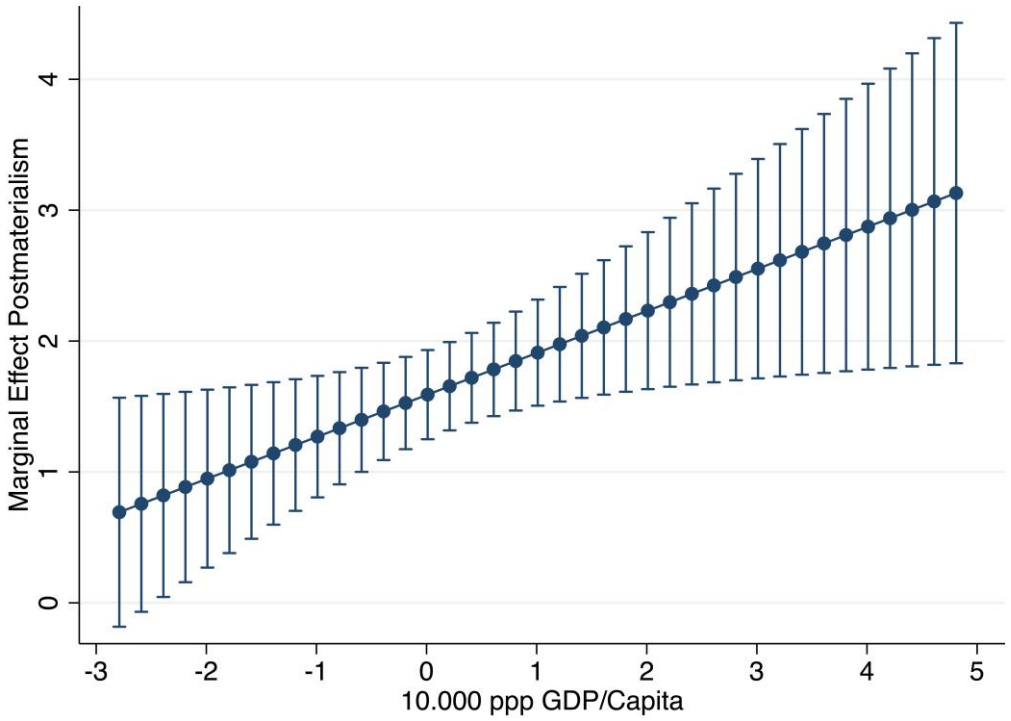
– but WVS wave 6 data do not confirm this hypothesis. Furthermore, while ISSP 2010 and WVS wave 5 data show evidence for the affluence hypothesis even on the micro level with significant effects of individual SES (income and education), relative individual income has no significant effect in WVS wave 6 (but the education effect stays significant). To sum up these results, there is no consistent evidence in favor of the affluence hypothesis H1, thus allowing us no clear conclusion in favor of, or against, this hypothesis (but note the results of Franzen and Vogl 2013).[7]

According to hypothesis H2 we expect that individual postmaterialistic value orientation is connected with a higher degree of individual environmental concern. Indeed, the postmaterialism effect is positive and statistically significant ($p < 0.001$) in all models in all three data sets. Thus, our empirical analysis confirms hypothesis H2: on average, postmaterialists show higher levels of environmental concern than materialists and members of the mixed-value group. In the case of WVS wave 5, it was also possible to control for perceived pollution. Subjectively perceived pollution problems indeed lead to a significant increase in environmental concern. The effect of postmaterialism, however, remains statistically significant and substantially meaningful even when controlling for environmental problems. Note that this article focuses on the "affluence" part of the OPSV hypothesis. Hence, we do not address objective problems at great length (but see, e.g., Hao 2016; Knight and Messer 2012; Nawrotzky et al. 2014 for recent studies on this topic).

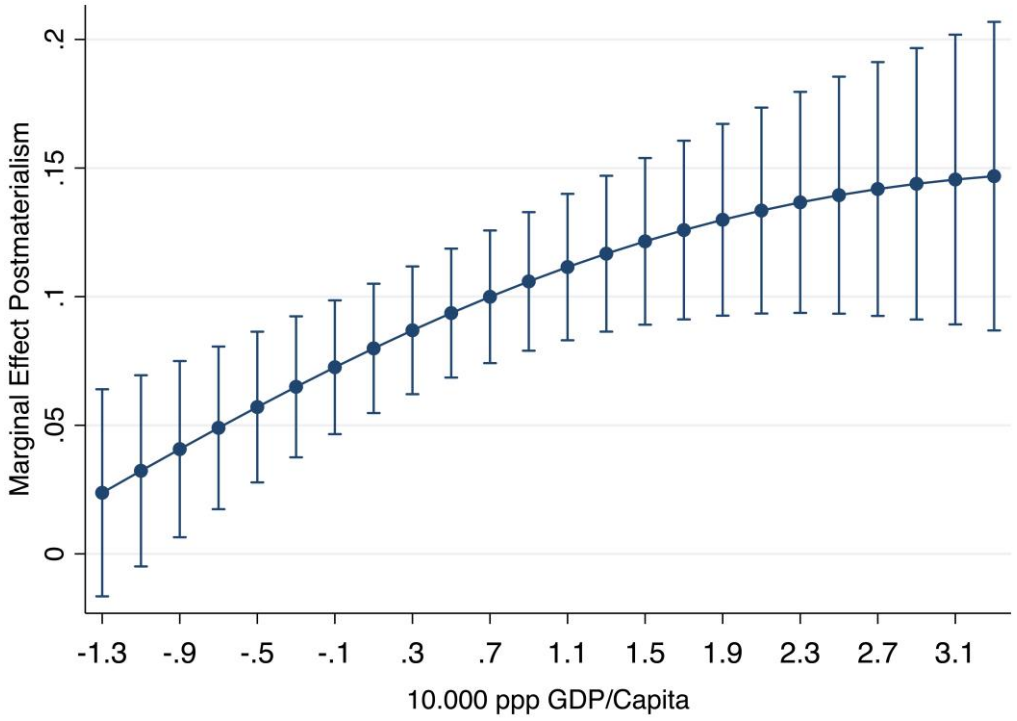
So far, we have looked only at direct causal effects of macro and micro predictors. But in the interaction hypothesis H3 we argue that the relationship between individual postmaterialism and individual environmental concern is moderated by the social context of national wealth. In multilevel modeling, this moderation effect is estimated by a cross-level interaction. Empirically, we find this cross-level interaction positive and significant in all three data sets (ISSP: $p < 0.05$; WVS wave 5 and wave 6: $p < 0.001$), while the conditional

main effect of postmaterialism is still significantly positive. Hence, our empirical results show that the effect of postmaterialism on environmental concern is weaker in poorer countries and stronger in wealthier countries, and positive in a country with average wealth. The cross-level interaction explains about 26 percent (ISSP), 46 percent (WVS wave 5), and 34 percent (WVS wave 6) of the between-country variance of the postmaterialism effect (Model 2). This finding of a significant cross-level interaction holds true for Model 2 with inclusion of macro effects as well as for Model 3, which estimates country fixed effects.[8] Hence, the interaction is not biased by unobserved country differences (these would have been detected by the fixed effects model).

(a)


Marginal Effect Postmaterialism
0
1
2
3
4
-3
-2
-1
0
1
2
3
4
5
10.000 ppp GDP/Capita

(a)


Marginal Effect Postmaterialism
0
.05
.1
.15
.2
-1.3
-.9
-.5
-.1
.3
.7
1.1
1.5
1.9
2.3
2.7
3.1
10.000 ppp GDP/Capita

(b)

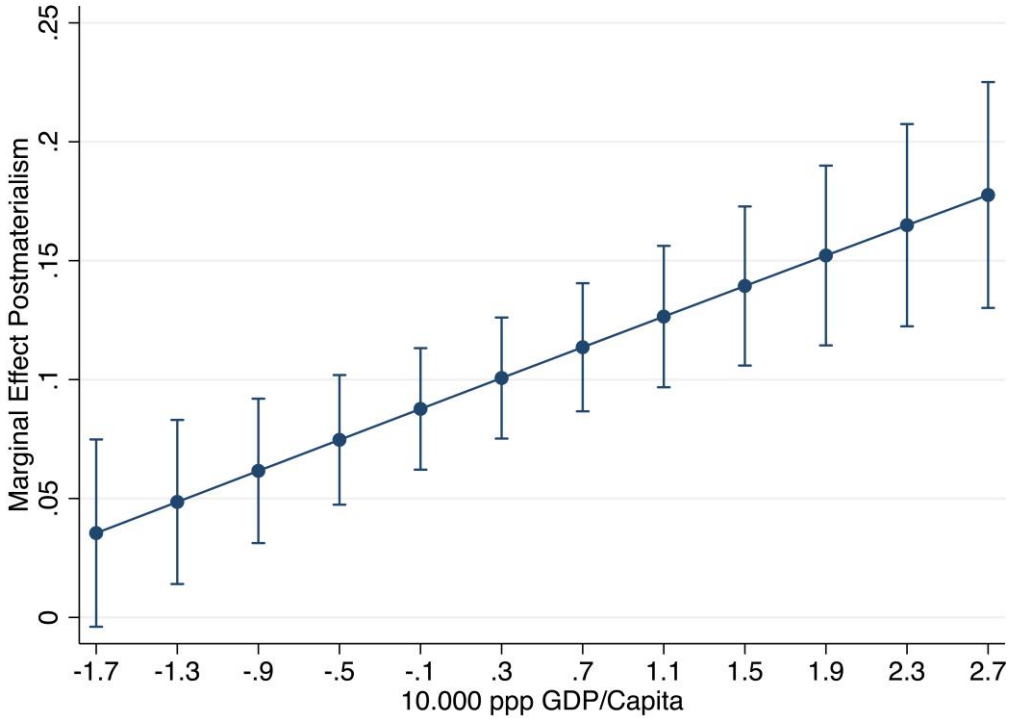


Figure 3: Marginal effect of postmaterialism on environmental concern, by national wealth: (a) ISSP, linear model; (b) WVS 5, logistic model (AME); (c) WVS 6, logistic model (AME).

The finding of a significant cross-level interaction between national wealth and individual postmaterialism clearly confirms that hypothesis H3 can be accepted: the predictive power of postmaterialistic value orientation on environmental concern depends on social economic context. Figure 3 visualizes the cross-level interaction of national wealth and individual postmaterialism that was found in all three international data sets (Models 2a, 2b, 2c): in the case of very poor countries, marginal effect of postmaterialism is low and even nonsignificant. Thus, individual postmaterialism is not a salient predictor of subjective environmental concern in these countries, while it is in wealthier countries.

Discussion and Conclusion

This article began with reviewing theoretical arguments that have been brought forth in the literature on cross-national variation of environmental concern. Based on economic theory, Gene Grossman and Alan Krueger (1995) posited environmental concern to be mainly prevalent in affluent countries (see also Franzen and Meyer 2010). This so-called affluence hypothesis has been challenged by Riley Dunlap and others (e.g., Dunlap and Mertig 1997; Dunlap and York 2008), who emphasize the existence of multiple sources of environmentalism, ubiquitous pollution problems, and the role of global media. They argue that environmental concern is a worldwide phenomenon and formulate the "globalization hypothesis." Finally, Inglehart (1995) hypothesized an effect of postmaterialism on environmental concern (the postmaterialism hypothesis), and pointed to the additional importance of objective environmental problems for the development of environmental concern. The latter argument was extended by Brechin (1999) and others and has evolved within the "objective problems–subjective values" (OPSV) hypothesis. This hypothesis explicitly deals with the multiple sources of environmental concern and emphasizes the importance of structural conditions. Based on ideas brought forth by Guha and Martinez-Alier (1997), the argument can be extended to suggest an interaction effect between national wealth and the effect of postmaterialism on environmental concern. Hence, the OPSV hypothesis and the corresponding interaction hypothesis are suited to integrate the different theoretical positions and offer an explanation for the mixed empirical results.

Empirical research on a possible interaction effect of national wealth and postmaterialism in cross-national comparative studies has been scarce with some exceptions (e.g., Fairbrother 2013; Pampel 2014). We extend this research by using different operationalizations of environmental concern, different cross-country data sets (ISSP and WVS wave 5 and 6), and multilevel models with country fixed effects. In doing so, we are

able to identify the effect of postmaterialism and its interaction with national wealth in an unbiased way, and to increase the external validity of the results with the large number of countries included in the analysis.

Our findings shed light on the nontrivial sources of worldwide environmental concern and its cross-cultural variations. There is neither a simple relationship with national wealth, as stated in the affluence hypothesis, nor is environmental concern merely a by-product of the silent revolution and the spread of postmaterialistic values. Rather, national wealth and postmaterialism interact with each other and lead to a complex relationship. In poor countries, we find only a weak relationship between postmaterialism and environmental concern. In these countries, environmental concern exists independent of postmaterialist values. In wealthy countries, however, we find a strong effect of postmaterialism on environmental concern. In those countries, environmental concern is part of the postmaterialistic value cluster. These findings underline the idea of varieties of global environmentalism suggested by Guha and Martinez-Alier (1997). In line with their macro distinction between "empty belly" environmentalism of the poor and "full stomach" environmentalism of the rich, our results show that "environmentalism of the rich" is culturally driven by the postmaterialistic shift, as theorized by Inglehart (1977, 1995). In contrast, "environmentalism of the poor" is driven by perceptions of environmental problems that are independent of postmaterialistic values. As stated by the OPSV hypothesis, it is the objective environmental problems that are the driving force of public environmental concern for this type of environmentalism.

According to our analyses, the moderation function of national wealth is robust (a) for different operationalizations of environmental concern, (b) for different international data sets, that is, irrespective of which countries are omitted in each data set, (c) for linear versus

logistic multilevel regression, (d) when controlling for subjectively perceived pollution on the micro level, and (e) when taking possible endogeneity on the macro level into account.

Despite our efforts to identify the causal effect of postmaterialism, potential shortcomings remain and must be addressed. First, we constrained ourselves to operationalizing environmental concern by individual preference for environmental protection over economic growth (WVS data) and an additive index of nine items of different aspects of environmental protection (ISSP data). Due to data restrictions, we were not able to use well-established scales of environmental concern on different levels of generalization like the New Environmental Paradigm (NEP) scale as a generalized measure of environmental values versus more specific attitudes toward environmental problems and behaviors (see Best and Mayerl 2013). However, the use of two different operationalizations as well as the consistency of our results with articles analyzing willingness to pay (e.g., Fairbrother 2013) point to the robustness of our results. Second, our study likely suffers from country selection bias, since the countries were not randomly selected. We tried to account for this problem by using data from three different international survey programs, thereby including information on a total of 82 countries. Nonetheless, problems stemming from selection bias persist, and they can be solved only by the inclusion of more countries in international surveys. Finally, just like any empirical study on cross-cultural differences, our results are confronted with the problem of possible violations of measurement invariance. In our study, this especially applies to the measurements of postmaterialism and environmental concern across the different countries. Both scales have been shown to reach metric invariance (see Ippel et al. 2014 for the postmaterialism scale and Mayerl 2016 for the environmental concern scale of ISSP).[9] Since metric invariance is sufficient for cross-national comparison of relationships between constructs (Davidov et al. 2014: 64), we are confident in comparing causal

relationships between postmaterialism and environmental concern across countries in our analyses.

That said, our results have important implications for research on the cross-cultural variation of environmental concern as well as for postmaterialism theory. The inconclusive results of previous studies on environmental concern (see, e.g., the debate between Franzen and Dunlap) may be the result of model misspecification. The effect on postmaterialism and GDP is interdependent and results therefore can strongly depend on the sample of countries used. Regarding postmaterialism theory, we were able to confirm the hypothesis derived from the extended OPSV. However, our results allude to a more general point: environmentalism is different in poor and in wealthy countries. While environmental concern and postmaterialism should be seen as separate constructs in poorer countries, they appear to be part of the same value cluster in wealthier ones. Hence, public and political discussions of environmental policy instruments need to distinguish between these two general types of environmentalism with different driving forces. The implementation and evaluation of environmental and climate policy programs should take into account the "two worlds of environmentalism" in order to be successful.

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Notes

[1] The relationship between postmaterialism, national wealth, and environmentalism is even more complex when taking into account that postmaterialistic values emerge through socialization processes (Inglehart 1977) that incorporate indirect intergenerational effects between wealth, subjective values, and subjective environmental perceptions. Thus, our empirical model is undoubtedly a simplification of the causal mechanisms underlying the relationships under study, which entails some bias in the estimated empirical effects.

[2] The item wording of the nine items in the ISSP questionnaire is: "Modern science will solve our environmental problems with little change to our way of life" (Q9c); "We worry too much about the future of the environment and not enough about prices and jobs today" (Q10a); "People worry too much about human progress harming the environment" (Q10c); "In order to protect the environment [COUNTRY] needs economic growth" (Q11a); "It is just too difficult for someone like me to do much about the environment" (Q13a); "There are more important things to do in life than protect the environment" (Q13c); "There is no point

in doing what I can for the environment unless others do the same" (Q13d); "Many of the claims about environmental threats are exaggerated" (Q13e); and "I find it hard to know whether the way I live is helpful or harmful to the environment" (Q13f). Each item was measured with a five-point rating scale from 1 ("Agree strongly") to 5 ("Disagree strongly") (all items were recoded before index computation). All items show acceptable factor loadings on a common single factor in a PCA, and Cronbach's alpha is in the acceptable range at 0.73. The summated scale ranges from 9 to 45, with high values indicating strong environmental concern.

[3] The exact item wording in the WVS questionnaire is: "Which of them comes closer to your own point of view? 1: Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs; 0: Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent."

[4] Inglehart's ranking scale ("most important thing" and "second most important thing") measures preference for two so-called postmaterialistic goals of extended democracy ("Give people more say in government decisions" and "Protect freedom of speech") as opposed to two materialistic goals ("Maintain order in the nation" and "Fight rising prices") (see Inglehart 1995).

[5] While we cannot compute the ICC from the logistic model with WVS data, an empty model without explanatory variables reveals a statistically significant random intercept. This, too, points to the necessity of using multilevel modeling.

[6] However, a disadvantage of country fixed effects modeling is that its results cannot be generalized to a population of countries that are not part of the sample (Bryan and Jenkins 2013).

[7] Franzen and Vogl (2013) argue that cross-cultural studies of environmental concern need to control for country-specific levels of culturally driven acquiescence (e.g., Asian countries). Stating this, they found empirical evidence in favor of the affluence hypothesis when controlling for acquiescence only. This argument does not carry over to the country fixed effects models we estimated (Table 3). These models account for all country-level differences and hence avoid possible bias due to culture-specific acquiescence.

[8] Due to the low number of observations on the macro level, the cross-level interaction is sensitive to bias and model misspecification. To control possible endogeneity, we include country fixed effects, specified as country dummies. Fixed effects models control for cross-national heterogeneity, which can lead to false conclusions when comparing effects between countries. Hence, the model is based on micro-level differences only. Our results show that the coefficient and the standard error of the interaction term remain unaffected.

[9] Lianne Ippel and colleagues (2014) studied the measurement invariance of Inglehart's postmaterialism scale. They found that the scale reaches metric invariance, but is faced with some problems with scalar invariance. Hence, we use a binary indicator of postmaterialism that rests on weaker, easier-to-meet assumptions of metric invariance. In a study of factorial invariance of a seven-indicator scale of environmental concern using ISSP 2010 data, Mayerl (2016) showed that this scale reaches full metric but only partial scalar invariance analyzing 32 countries all over the world. Our present ISSP study is based on nine indicators of environmental concern including all seven indicators used by Mayerl (2016).