Acquiescence and the Willingness to Pay for Environmental Protection: A Comparison of the ISSP, WVS, and EVS*

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Objectives. This study examines the effect of countries' wealth on individuals' willingness to pay for environmental protection. Former studies using the International Social Survey Programme (ISSP) report a positive effect, while studies using the World Values Survey (WVS) or the European Values Study (EVS) find the opposite. In this article, we explain and reconcile these opposing findings. *Methods.* First, we analyze the three data sets (ISSP, WVS, and EVS) separately by applying multilevel analyses and replicate the different findings. Second, we take respondents' acquiescence into account and demonstrate that wealth has a positive effect on the willingness to pay in the combined data set. *Results.* Respondents in poorer nations in Asia and Eastern Europe have higher levels of acquiescence than respondents in richer Western nations. This difference conceals the wealth effect of studies analyzing the WVS or EVS. If acquiescence is properly taken into account, the wealth effect is confirmed. *Conclusion.* Theory predicts that wealth and the willingness to protect the environment should be positively associated. This wealth effect is confirmed by our analyses of the ISSP, WVS, and EVS.

Concern about the state of the natural environment has been on the public agenda since the 1970s in many countries. Much of the debate has focused on the increase of CO_2 emissions and related global warming. Since the Intergovernmental Panel on Climate Change (IPCC) was founded in 1988, it published four reports, which document the increase in global temperature. According to the latest report, the average global temperature has risen by 0.74°C during the last 100 years (1906–2006), and the IPCC estimates that it will increase by another 4–6°C by the end of this century if CO_2 emissions are not reduced (IPCC, 2007). This forecast motivated the EU to announce cutting CO_2 emissions by 20 percent from 1990 to 2020 and to increase the proportion of renewable resources to 20 percent of their total energy consumption. Simultaneously, the EU announced its willingness to reduce CO_2 emissions by 30 percent if other industrial countries would

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SOCIAL SCIENCE QUARTERLY

DOI: 10.1111/j.1540-6237.2012.00903.x

follow (Commission of the European Communities, 2008). Many scientists (e.g., the Nobel Prize winner and Minister of Energy of the United States, Steven Chu) believe that global CO_2 emissions need to be reduced by at least half by 2050. The G8 countries, as well as the G5, have, at least in principle, agreed to these goals (G8 Declaration, 2009).

The realization of these goals demands fundamental behavioral adjustments from citizens and private enterprises. In addition, democratic governments will need constant support from voters in order to implement relevant policies. Environmental sociology is, therefore, concerned with questions of how seriously citizens and voters are concerned with environmental protection and how to explain the differences in concern found between individuals, as well as between nations. To investigate these issues, a number of internationally coordinated surveys included questions to measure environmental concern. The International Social Survey Programme (ISSP) in 1993 and 2000 focused on environmental attitudes. The World Values Survey (WVS) and the European Values Study (EVS) also included some indicators of support for environmental protection in their coordinated surveys. These surveys allow an assessment of individual support for the environment as well as international comparisons. However, analyses based on these surveys have come to very different conclusions regarding both the observed level of environmental concern and the assumed causes of it. On the one hand, Dunlap and York (2008) and Gelissen (2007) recently presented an analysis of different waves of the WVS, concluding that support for environmental protection is stronger in developing countries than in industrial societies, which would indeed challenge fundamental assumptions about determinants of environmental concern. Brechin and Bhandari (2011) repeated the same arguments. On the other hand, Franzen and Meyer (2010) presented evidence based on the 1993 and 2000 ISSP, finding that environmental concern is more pronounced in wealthy nations. Thus, the aim of this article is to reanalyze the three data sources and explain the contradictory findings.

This study is structured into four sections. In the second section, we will briefly describe the theoretical arguments for why wealthy individuals and nations should be more likely to develop stronger environmental concerns. The third section is concerned with the measurement of environmental concern in the WVS, ISSP, and EVS. Measurements are slightly different in the surveys but are still comparable. We replicate the results when data sources are analyzed separately. In the fourth section, we combine the three data sources and apply a multilevel analysis to the pooled database. Moreover, we measure respondents' acquiescence and incorporate it into the analyses. We demonstrate that the inconclusive evidence of previous research is caused by differences in respondents' acquiescence and that the puzzle is resolved when this is taken into account. In the last section, results are summarized and discussed.

The Demand for a Clean Environment

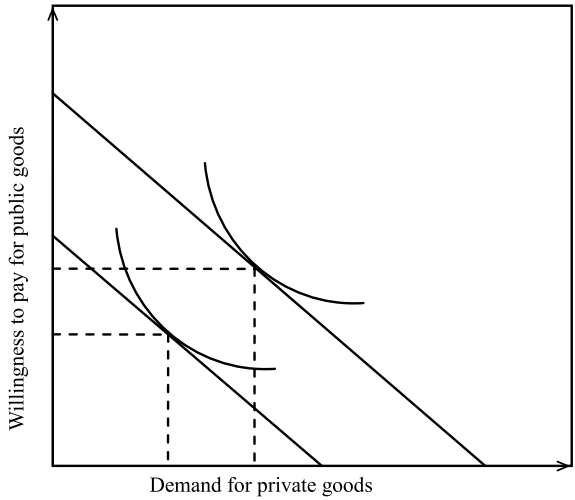
One of the most fundamental laws of economic theory is that an individual's consumption of private goods will increase if he/she experiences an increase in income. Let us assume two private goods or two bundles of private goods in which an individual is interested. All consumption options can then be depicted in a diagram in which the amount demanded of one good is indicated on the *X*-axis and the amount demanded of the other good on the *Y*-axis. The budget line connecting the two axes indicates all consumption options. Usually, the consumption of a good is subject to decreasing marginal returns to utility. Thus, an individual prefers a mix of the consumption of the two goods rather than spending the entire income on one good. The optimal combination of the two goods is usually indicated by an indifference curve tangent to the budget line. Increases in income result in a shift of the budget line away from the origin, which allows the individual to afford more of both goods.

This basic economic model can be extended to explain the demand for public goods. Let us assume that one of the bundles consists of all private goods and that the other consists of all public goods. Pure public goods are characterized by nonexcludability and nonrivalry of consumption. Thus, an individual does not need to contribute any resources to the provision of a public good in order to consume it. Hence, the demand for public goods is independent of any income restriction. As an example, let us assume that the individual is interested in coffee (private good) and spending time in a public park (public good). The consumption of coffee decreases when income declines, but the use of the public park should not change. However, if we could theoretically measure the demand for the public good by an individual's willingness to pay for it, then, of course, the willingness to pay should also decrease when income decreases. This relation between the budget restriction (or income), the consumption of private goods, and the demand or willingness to pay for public goods is depicted in Figure 1. In other words, the theory predicts that the willingness to pay for a public good will increase if the budget restriction moves away from the origin. In the literature, environmental concern is usually defined as a multidimensional concept (e.g., Franzen and Meyer, 2010; Marquart-Pyatt, 2008; Xiao and Dunlap, 2007), yet the willingness to pay is a central dimension in every conceptualization. Therefore, the willingness to pay for a clean environment can be interpreted as the environmental concern of an individual, or as an important part of it. Hence, more wealthy individuals should have a higher environmental concern than less wealthy individuals.

If we aggregate the willingness to pay of all individuals of one society, then more wealthy nations should, on average, have a higher willingness to pay for the environment. This predicted positive correlation between the wealth of nations and the average environmental concern has been empirically

FIGURE 1

The Willingness to Pay for Public Goods and the Demand for Private Goods



confirmed using the 1993 and 2000 ISSP (Diekmann and Franzen, 1999; Franzen, 2003; Franzen and Meyer, 2010). However, studies using the WVS show opposing results. Dunlap and York (2008) analyzed three waves of the WVS (1990–1993, 1995–1998, and 1999–2001) and found negative correlations between the average reported environmental concern and the gross national product (GNP) of countries. According to these results, inhabitants of poorer countries report a higher willingness to pay in order to protect the environment than citizens of wealthier nations. Most of the correlations reported by Dunlap and York (2008) are not statistically significant, but even null results contradict the theory and, as such, Dunlap and York (2008) assert that their results challenge standard economic and sociological theories.

In addition to the ISSP and WVS, there is a third international data source, namely, the EVS. Gelissen (2007) combined data from the 1999–2001 WVS with the 1999 EVS and conducted a multilevel analysis based on the combined data. His results also show a negative correlation between countries' wealth and environmental concern. However, he finds a positive correlation between countries' economic growth during the last decade and its citizens' willingness to pay. Thus, overall all three analyses using the ISSP, WVS, and EVS reach contradictory or at least mixed results.

The differences among these results could have three different causes. First, all three data sets consist of different country samples. The 2000 ISSP contains mainly countries from the OECD and only a few nations from Asia (Japan and the Philippines) or South America (Mexico and Chile), while the WVS includes more countries from Asia and Africa, and the EVS contains

only European countries (see Table 2). Second, the country-specific samples of respondents were constructed differently in each survey. All the countries that participated in the ISSP, WVS, and EVS agreed to conduct surveys according to similar standards, including using random sampling of the adult population, presenting the same questionnaire, and conducting either written or personal (face-to-face) interviews. However, in some of the countries, these methodological standards are difficult to meet and national reports on surveying methods indicate that certain countries deviated from the agreed upon standards. It must be considered that it is hard to conduct random sampling in countries in which a large part of the population is not officially listed or where a large portion of the population does not have a permanent residential address. The WVS explicitly allows quota sampling when costs of random sampling are prohibitively high. Even if random samples were achieved, the response rates in the national surveys strongly depend on the resources invested. Furthermore, survey results can change based on how the interviews were conducted, for example, how well the interviewers were trained. Third, measurement of environmental concern differs in studies conducted with the ISSP, WVS, and EVS. In this study we concentrate on the first and third points, the different selection of countries, and the different measurement of environmental concern. A discussion of how each country constructed the national sample and how the interviews were conducted is beyond the scope of this article.

Comparisons of the ISSP, WVS, and EVS

The first concern in trying to compare the three data sets is that they were not conducted simultaneously. The ISSP on the environment was conducted in 1993 and 2000, the WVS in 1990–1993, 1995–1998, 1999–2001, and 2005–2008, and the EVS in 1999. Thus, a comparison among the three surveys can best be accomplished for the 2000 ISSP, the 1999–2001 WVS, and the 1999 EVS. The second challenge is locating a comparable measure of environmental concern in the three surveys. The WVS and the EVS contain two statements that respondents could agree or disagree with on a four-point scale: "I would give part of my income if I were certain that the money would be used to prevent environmental pollution" and "I would agree to an increase in taxes if the extra money were used to prevent environmental pollution." Both items were analyzed in Dunlap and York (2008) and Gelissen (2007) for the combined analysis of the EVS and the WVS. The 2000 ISSP contains two similar, but not identical, items (see Table 1 for exact question wording). The second item asked how willing respondents would be to pay higher taxes in order to protect the environment. However, the first item differs slightly more from the formulation in the WVS or EVS, asking how willing respondents are to pay much higher prices in order to protect the environment rather than to give "part of" their income as in the WVS or

TABLE 1

Items for Measuring Environmental Concern in the ISSP 2000, WVS 1999–2001, and EVS 1999

	Question Wording	Answer Categories
Item 1: WVS/ EVS	I would give part of my income if I were certain that the money would be used to prevent environmental pollution.	(1) Strongly agree (2) Agree (3) Disagree (4) Strongly disagree
Item 2: WVS/ EVS	I would agree to an increase in taxes if the extra money were used to prevent environmental pollution.	(1) Strongly agree (2) Agree (3) Disagree (4) Strongly disagree
Item 1: ISSP	How willing would you be to pay much higher prices in order to protect the environment?	(1) Very willing (2) Fairly willing (3) Neither willing nor unwilling (4) Fairly unwilling (5) Very unwilling
Item 2: ISSP	How willing would you be to pay much higher taxes in order to protect the environment?	(1) Very willing (2) Fairly willing (3) Neither willing nor unwilling (4) Fairly unwilling (5) Very unwilling

EVS. The formulation "much higher prices" might imply a more substantial amount than the expression "part of income" and could deter respondents from agreeing with the statement. Nevertheless, the two items have a high correlation in each survey. In the ISSP, the smallest correlation can be observed in Japan (0.53) and the highest in Bulgaria (0.82). In the WVS, the two items correlate lowest in Peru (0.33) and highest in Uganda (0.86), and in the EVS the correlations vary from 0.40 in Iceland to 0.75 in Great Britain. Moreover, an explorative factor analysis using the principal component method with varimax rotation provides a one-dimensional solution for every country, suggesting that the two items measure the same latent variable. Therefore, we combined both items for every country by adding them up to an index. This is of course a rather crude measure of the latent construct "willingness to pay" or "environmental concern." However, these are the only two items that are contained in all three survey programs, thus providing the only opportunity to compare the three surveys.

More problematic than these differences in the wording of the questions is the fact that the ISSP uses five answering categories, whereas both the WVS and EVS use four-point scales. Having more answer categories should reduce the proportion of those agreeing with a statement since respondents can disperse more over all available categories. This assumption is clearly

supported if we look into the proportion of respondents agreeing in the three largest economies—United States, China, and Japan. According to the results obtained from the WVS, 62 percent of respondents in the United States agree with both items, in China the proportion is 72 percent, and in Japan 60 percent. These are very high proportions that are not reached in any country within the ISSP. The United States and Japan are also in the ISSP and here rates of agreement are 33 and 38 percent, respectively—more than 20 percentage points below the rates reported in the WVS. In the WVS, proportions of respondents that agree to both statements range from 40 percent in Moldova to 90 percent in Vietnam. In the ISSP, the range varies from 12 percent in Finland to 38 percent in Japan. If we compare the seven countries that are listed in the WVS and the ISSP (Canada, Chile, Japan, Mexico, Philippines, Spain, United States), the average difference in the agreement rate is 31 percentage points. This comparison demonstrates that small changes in the wording of questions or the number of answer categories can have considerable consequences.

Also, comparison of results between the ISSP with the EVS reveals substantial differences. The highest willingness to pay within the EVS can be observed in Sweden where 77 percent of the respondents agreed on average with on both items. The lowest level is measured in Lithuania where only 23 percent agreed. There are 15 identical countries in both surveys. On average, the willingness to pay is 28 percentage points higher in the EVS than in the ISSP.

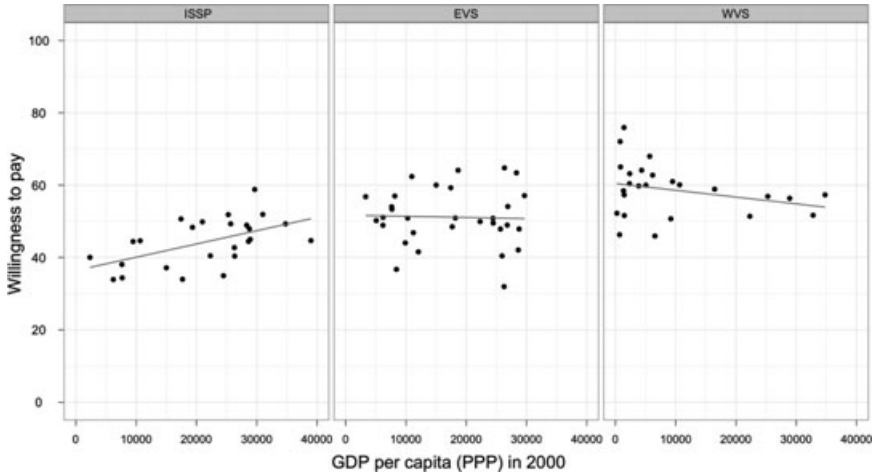
Comparing all three surveys suggests that the variation in results is due to the difference in the answering scale. The lack of a middle category in the WVS and EVS seems to push respondents toward the agreement categories. However, there are also some differences between the WVS and EVS. This is demonstrated with the case of Spain, which is the only country that has participated in all three surveys. Analysis of the ISSP results in an agreement rate of 24 percent, the EVS reports 48 percent, and the WVS 52 percent. Thus, the results for Spain reflect the fact that the willingness to pay for the environment is highest in the WVS, followed by the EVS and the ISSP.

Considering these findings, we next use the complete information of the answer scales instead of only the two agreeing categories to compare the three surveys. We did this by treating the items as interval scales and recoding them so that higher values indicate stronger agreement. We standardized them by dividing the sum of the values obtained from both items by the sum of the answer categories available. Thus, the new scale is standardized between 0 and 1, where 1 indicates the highest willingness to pay and 0 the lowest. On average, the countries in the WVS reach a value of 0.58, the ISSP a value of 0.44, and the EVS a value of 0.51. Next, we calculated the bivariate correlation between the measured willingness to pay and the purchasing power adjusted GDP (PPP) for every survey separately (see Figure 2 where the index displayed on the *Y*-axis is multiplied by 100).

Using the ISSP data, we find a positive correlation of 0.54, which is statistically significant ($p = 0.005$), an analysis of the WVS generates a nonsignificant

FIGURE 2

The Correlation Between Wealth and Environmental Concern for the ISSP, EVS, and WVS



negative correlation of -0.28 ($p = 0.177$), and an analysis of the EVS data results in a correlation of -0.04 ($p = 0.85$). These results replicate previous findings using the ISSP (Franzen, 2003; Franzen and Meyer, 2010) and the WVS (Dunlap and York, 2008). Dunlap and York report a negative correlation of -0.32 using the same measurement of environmental concern and taking the natural logarithm of the countries' GNP per capita. In our case, taking the natural logarithm of the adjusted GDP (PPP) per capita does not change the reported results. Also, using the Spearman rank correlation instead of the Pearson correlation does not lead to any substantial differences in the reported correlation or significance levels. The results also remain robust if other waves of the ISSP (Diekmann and Franzen, 1999; Franzen, 2003; Franzen and Meyer, 2010) or the WVS (Dunlap and York, 2008) are analyzed. Thus, an analysis of the three international surveys shows that the ISSP data produce a positive correlation, the EVS data produce no association, and the WVS data produce a negative correlation. Hence, curiously, the three surveys generate all three possible outcomes.

A possible solution to the puzzle is combining all countries from the three data sets. However, the higher levels of agreement in the WVS and EVS as compared to the ISSP, which are due to different measurements, are an obvious problem when pooling the data. In addition, cross-cultural research has often pointed out that some countries generally have a higher level of acquiescence than Western cultures. One reason for this is that some countries (presumably Asian countries) have a more collectivistic value orientation as compared to the individualistic cultures of Western nations (Bosau, 2009; Hofstede, 2001; Smith and Fischer, 2008; Van de Vijver and Leung, 1997).

Thus, the higher level of acquiescence could be an additional explanation for the higher willingness to pay in the WVS and EVS countries as opposed to the countries contained in the ISSP. To test this assumption, we calculated the level of acquiescence for every country in the three surveys. We did this, as recommended in the literature (e.g., Hofstede, 1980; Matsumoto and Yoo, 2006; Smith, 2004), by selecting as many statements on diverse topics as possible from each questionnaire, which respondents had to agree or disagree with.

The 2000 ISSP contains 28 statements respondents could more or less agree with in addition to the two items measuring the willingness to pay. Fifteen of these 28 items are related to environmental issues; the other 13 are related to questions of economic development or technology and science. We constructed the acquiescence coefficient by first recoding the rating items so that a value of zero is assigned to the most disagreeing category and a value of four to the most agreeing category. Second, we summed up all answers to the 28 items and divided it by the maximum possible sum. This way the coefficient of acquiescence ranges from 0 to 1 for every respondent. A value of zero denotes a respondent who never agreed to a statement, irrespective of the content or formulation of the item. A value of 1 denotes the other extreme, a respondent who agreed to every statement. The average of all respondents in a given country is then an estimate of acquiescence in that country (see Table 2). From the countries included in the ISSP, New Zealand has the lowest acquiescence with a value of 0.47, and Portugal the highest, 0.66.[1] On average, the countries contained in the ISSP have a coefficient of acquiescence of 0.54. Since more than half of the items considered for measuring acquiescence are related to environmental issues, the index might not be completely independent from the willingness to pay items. To test whether the measure of acquiescence depends on the environmental topic of the 2000 ISSP, we calculated acquiescence using the 1999 ISSP and the 2001 ISSP, which were on the topics of inequality and social networks, respectively. The correlation of acquiescence is 0.78 when calculated with the 1999 and 2000 ISSP and 0.85 when calculated with the 2000 and 2001. Therefore, our measure of acquiescence seems to be independent of the specific topic and very reliable.

The WVS contains a total of 24 items that can be used to calculate the coefficient of acquiescence. These items concern attitudes on employment, political issues, gender equality, and religion. As expected, the average acquiescence for the countries in the WVS is 0.60 and thus higher than in the ISSP. The lowest value of 0.53 is found in the United States and the highest value of 0.68 is found in the Philippines. Finally, the EVS has 34 items suitable for the calculation of the tendency of agreement that are on topics such as

[1]Note that Table 2 contains the average acquiescence when a country is contained in more than one survey. Thus, the reported coefficients in the text might deviate from Table 2 if we refer to survey specific acquiescence.

TABLE 2

The Willingness to Pay for Environmental Protection in the ISSP, WVS, and EVS

Number	Country	ISSP 2000		WVS 1999–2001		EVS 1999		Acquiescence	GDP per Capita PPP
		N	Willingness to Pay (%)	*N*	Willingness to Pay (%)	*N*	Willingness to Pay (%)		
1	Albania (ALB)			939	63.37			0.65	3,864
2	Argentina (ARG)			1,252	46.33			0.60	9,189
3	Austria (AUT)	997	21.16			1,493	39.12	0.53	28,632
4	Bangladesh (BGD)			1,394	76.47			0.64	840
5	Belarus (BLR)					930	48.82	0.63	5,071
6	Belgium (BEL)					1,887	47.43	0.59	26,795
7	Bosnia (BIH)			1,170	70.77	1,170	70.77	0.61	4,353
8	Bulgaria (BGR)	946	18.29			944	49.36	0.62	6,200
9	Canada (CAN)	1,091	25.48	1,911	60.49			0.53	28,910
10	Chile (CHL)	1,437	31.32	1,181	65.37			0.58	9,479
11	China (CHN)			907	72.22			0.61	2,372
12	Croatia (HRV)					983	63.48	0.60	10,972
13	Czech Republic (CZE)	1,212	17.66			1,874	64.94	0.58	15,008
14	Denmark (DNK)	1,047	28.75			1,000	68.40	0.52	28,325
15	Estonia (EST)					953	33.68	0.61	9,894
16	Finland (FIN)	1,437	12.25			1,013	51.04	0.52	24,476
17	France (FRA)					1,591	39.03	0.61	25,938
18	Germany (DEU)	947	21.75			1,015	27.09	0.52	26,281
19	Great Britain (GBR)	956	32.11			940	49.68	0.52	25,673
20	Greece (GRC)					1,128	67.82	0.62	18,644
21	Hungary (HUN)					982	36.56	0.64	12,057
22	Iceland (ISL)					959	58.39	0.53	26,890
23	India (IND)			1,498	56.14			0.65	1,446

TABLE 2—continued

Number	Country	ISSP 2000		WVS 1999–2001		EVS 1999		Acquiescence	GDP per Capita PPP
		N	Willingness to Pay (%)	*N*	Willingness to Pay (%)	*N*	Willingness to Pay (%)		
24	Ireland (IRL)	1,192	34.82			988	40.59	0.53	28,768
25	Israel (ISR)	1,204	30.98					0.57	20,985
26	Italy (ITA)					1,951	44.95	0.61	24,431
27	Japan (JPN)	1,166	38.16	1,214	59.64			0.53	25,274
28	Kyrgyz (KGZ)			1,042	61.90			0.63	1,335
29	Latvia (LVA)	976	17.62			971	46.65	0.59	7,670
30	Lithuania (LTU)					939	22.90	0.64	8,417
31	Luxembourg (LUX)					1,172	55.89	0.59	55,151
32	Macedonia (MKD)			1,003	68.10			0.62	6,170
33	Malta (MLT)					992	49.09	0.61	18,190
34	Mexico (MEX)	1,249	32.83	1,453	62.84			0.59	10,647
35	Moldova (MDA)			921	40.50			0.61	1,472
36	Netherlands (NLD)	1,583	37.59			1,002	56.79	0.51	29,663
37	New Zealand (NZL)	1,092	31.87					0.47	19,333
38	Norway (NOR)	1,431	24.25					0.49	38,988
39	Peru (PER)			1,476	62.20			0.61	5,055
40	Philippines (PHL)	1,170	28.29	1,194	65.75			0.63	2,333
41	Poland (POL)					1,053	50.71	0.67	10,281
42	Portugal (PRT)	929	18.62			961	45.27	0.64	17,680
43	Romania (ROM)					992	46.88	0.68	6,181
44	Russia (RUS)	1,641	29.37			2,328	53.09	0.60	7,628

TABLE 2—continued

Number	Country	ISSP 2000		WVS 1999–2001		EVS 1999		Acquiescence	GDP per Capita PPP
		N	Willingness to Pay (%)	*N*	Willingness to Pay (%)	*N*	Willingness to Pay (%)		
45	Serbia (SRB)			1,112	74.01			0.61	5,685
46	Singapore (SGP)			1,497	46.16			0.60	32,787
47	Slovakia (SVK)					1,288	41.77	0.62	11,229
48	Slovenia (SVN)	1,036	32.34			979	63.02	0.59	17,429
49	South Africa (ZAF)			2,804	42.76			0.60	6,552
50	South Korea (KOR)			1,138	55.89			0.59	16,456
51	Spain (ESP)	917	23.56	1,155	52.38	1,154	48.18	0.56	22,296
52	Sweden (SWE)	1,019	20.22			1,012	77.17	0.52	26,336
53	Switzerland (CHE)	975	35.28					0.50	31,001
54	Tanzania (TZA)			1,146	78.10			0.65	778
55	Turkey (TUR)					1,166	59.86	0.67	8,150
56	Uganda (UGA)			994	44.16			0.61	690
57	Ukraine (UKR)					1,110	52.79	0.65	3,317
58	USA (USA)	1,184	33.36	1,196	61.71			0.52	34,776
59	Vietnam (VNM)			961	90.22			0.64	1,420
60	Zimbabwe (ZWE)			955	48.59			0.59	247
	Mean		27.12		61.04		50.64		

NOTE: If a country is included in more than one survey, we report the average acquiescence.

employment, religion, family, and political issues. Among the European nations, the Netherlands shows the lowest acquiescence with a value of 0.49 and respondents from Romania the highest level of 0.68. On average, the index of acquiescence for countries contained in the EVS is 0.60. Comparing the coefficient of acquiescence among countries shows high values of agreement in Asian countries (India, Bangladesh, Vietnam, but not Japan) and in Eastern European nations (Romania, Poland, and Turkey; see Table 2).

In order to compare individuals' willingness to pay for the environment cross-culturally, we now take the different levels of acquiescence into consideration. Note that acquiescence might be due to two reasons. The first is the methodological effect: respondents have a higher tendency to agree when confronted with four answer categories instead of five. Second, there are obvious cultural differences in respondents' tendency to agree with a statement. In order to compare all 60 countries, we took the standardized index of a country's willingness to pay and weighted it by the inverse of the coefficient of acquiescence. Thus, we measure the willingness to pay in relation to respondents' overall tendency of agreement. Theoretically, the ratio can vary between zero and infinity. A value of zero indicates a respondent who answered "strongly disagree" or "very unwilling" to both items. The value approaches infinity if a respondent disagrees with all rating questions but shows the maximum willingness to pay.[2] For example, the United States has an average willingness-to-pay-value of 0.53.[3] This willingness to pay is compared to the general agreement tendency (acquiescence) by multiplying it by the inverse of the acquiescence level ($0.53/0.52 = 1.02$). Thus, for the United States, this weighting results in a value very close to 1, indicating a similar willingness to pay as compared to the general acquiescence. The correlation of the weighted willingness to pay with countries' wealth (purchasing power adjusted GDP per capita) for all 59 countries from the ISSP, WVS, and EVS[4] results in a statistically significant value of $r = 0.46$. This correlation is depicted in Figure 3.[5]

The data sets for the 60 countries do not only contain information about environmental concern but also data on the sociodemographic characteristics of respondents. In addition, more statistical information about the countries' characteristics is available from the United Nations Development Programme or the European Commission. The data can be analyzed using multilevel analysis (Snijders and Boske, 1999; Rabe-Hesketh and Skrondal, 2008). At the individual level (level 1), previous studies (e.g., Franzen and Meyer, 2010)

[2]Theoretically, an undefined division of zero can occur. However, the lowest value of acquiescence observed in the data is 0.02.

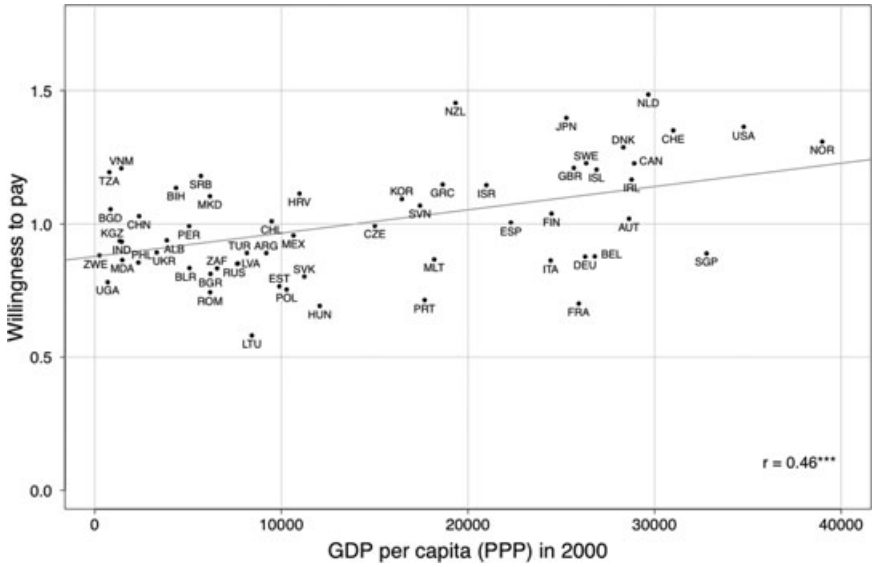
[3]The average of the willingness to pay from the ISSP and the WVS is 0.53.

[4]Luxembourg is an outlier with respect to GDP and is therefore not included in Figure 3.

[5]A different measurement of acquiescence and a different weighting procedure is used in Franzen and Vogl (2011). The methods used here use the full information of the answering scales whereas Franzen and Vogl (2011) treat the agreement items used for the measurement of acquiescence as ordinal scales. However, the results are affected only marginally and do not depend on the difference in measurement of acquiescence.

FIGURE 3

The Correlation Between Environmental Concern and Wealth in the 59 Countries from the ISSP, WVS, and EVS



show that respondents' income, education, and age should affect environmental concern. The wealth effect discussed above should not only affect environmental concern at the macro level of countries as demonstrated in Figure 3, but it should also explain the interindividual differences found within countries.

In the analyses that follow, we calculate individuals' household equivalent income by dividing the households' income by the square root of the number of individuals living in one household. This procedure has the advantage of measuring the standard of living more accurately than if only personal incomes were included. Taking the household income also allows us to measure the standard of living for respondents who are not active in the labor market or have no personal income. Instead of trying to adjust these personal incomes by the purchasing power, we conducted a *z*-standardization with the income variable and measured the standardized difference from the country's average income for every respondent. This procedure allows us to measure the income position of a respondent relative to the average income of the country in which he/she lives.

In addition, environmental concern depends on the level of education. Well-educated respondents are more informed about the state of the environment, which should also increase the concern for and understanding of environmental protection. People with little information and knowledge about the state of the planet will not be as concerned with the environment. Furthermore,

older people should have lower concern for the environment than younger people. This should be due to a cohort effect rather than to the effect of aging itself. When growing up, younger cohorts were more exposed to environmental concern through public discussions, political debates, and media reports than older cohorts. Accordingly, younger generations should be more sensitive to environmental issues. The literature also points to the effect of gender on environmental concern (see Blocker and Eckberg, 1997; Wilson et al., 1996). Some studies find concern higher among women than men. Previous studies also report higher levels of environmental concern among individuals with a postmaterialistic value orientation (Inglehart, 1995) and we also include a measure of postmaterialistic values (see Table 3).

At the macro level, certain characteristics of countries could influence environmental concern in addition to wealth. Since some of these variables are correlated with wealth, they must be included in the analysis as control variables in order to avoid an estimation bias with respect to the wealth effect. In addition to overall wealth, the distribution of it could matter as well. A high level of inequality could direct public attention more toward economic issues and redistribution. Such goals could be in competition with environmental issues. To test this hypothesis, we calculated the Gini-coefficient from the surveys' income data. We expect that the Gini-coefficient is negatively correlated with the willingness to pay for better environmental protection.

Environmental quality could also affect environmental concern. Low local environmental quality should sensitize respondents and increase the willingness to pay to improve it. We therefore included the environmental sustainability index from 2001 calculated jointly by the Yale Center of Environmental Law and Policy (YCELP), the Center for International Earth Science Information Network of Columbia University (CIESIN), the World Economic Forum (WEF), and the European Commission (EU). The index consists of different subscales from which we took a country's index of air and water quality as well as the index of biodiversity and soil erosion. A high value indicates that a country's environmental quality is above average. Hence, if objective environmental quality matters, it should be negatively correlated with the willingness to pay.

In most countries environmental quality is not evenly distributed but is worse in urban areas than in the sparsely populated countryside. As a general rule, heavily populated regions are supposed to have poorer air and water quality. Therefore, we also included the population density of a country as well as the proportion of the population living in cities. The denser the population and the higher the proportion of respondents living in urban areas, the worse the objectively and subjectively perceived environmental quality should be. Thus, higher population density and a higher proportion of inhabitants living in cities should increase the willingness to pay for environmental protection.

Because we expect both individual effects (level 1) and country-specific effects (context effects or level 2), hierarchical linear regression analysis is a suitable statistical tool that allows the simultaneous estimation of micro- and

TABLE 3

Description of the Variables

Variable	Min.	Max.	Description	Data Source
Individual-level variables				
Sex	0	1	0 = male, 1 = female	ISSP, WVS, EVS
Age	18	80	Age in years	ISSP, WVS, EVS
Postmaterialism	0	2	Number of postmaterilistic goals a country should have from a list of four: 0 = none, 1 = one, 2 = two	ISSP, WVS, EVS
Education	1	4	Education is classified into four categories: 1 = Primary education and no formal education 2 = Secondary education 3 = Degree before university entrance 4 = University education	ISSP, WVS, EVS
Relative household income	−1.98	13.62	Household income divided by the square root of the number of persons living in the household, *z*-transformed	ISSP, WVS, EVS
Acquiescence	0.18	1.00	Sum of answered categories of four- or five-point scales divided by the highest possible score	ISSP, WVS, EVS
Country-level variables				
GDP per capita (PPP)	0.25	38.99	Per capita GDP 2000 converted to measure the purchasing power in each country in 1,000s of US$	International Monetary Fund (IMF) World Economic Outlook Database, April 2009
Population density	0.003	5.88	Number of 1,000 inhabitants per square kilometer of country	United Nations: World Population Prospects
Proportion urban population	12	100	Proportion of population living in areas classified as urban according to the criteria used by each country	UN-DATA, WHO-Data
Environmental quality	−0.81	1.36	Part of the Environmental Sustainability Index 2001 (Environmental Systems Component), measures air quality, water quality, water availability, biodiversity, and terrestrial systems; mean of these five sectors *z*-transformed	YCELP, CIESIN, WEF, and the Joint Research Centre of the European Commission
Gini-coefficient	0.21	0.69	Measures income inequality: 0 = equal distribution, 1 = maximally unequal distribution	Own calculations with ISSP, WVS, and EVS data

macro effects (Gelman and Hill, 2007; Snijders and Bosker, 1999; Rabe-Hesketh and Skrondal, 2008). We apply a varying-intercept model and estimate coefficients via the maximum likelihood method.[6] The willingness to pay Y_{ij} depends on the characteristics (x_1 through x_8) of the individuals (i to n) as denoted by Equation (1). The country-specific characteristics (z_1 through z_5) are incorporated by varying the intercept β_{0j} depending on the macro-level variables of the j to k countries. This is formulated in Equation (2):

$$Y_{ij} = \beta_{0j} + \beta_1 x_{1ij} + \cdots + \beta_8 x_{8ij} + \varepsilon_{ij} \tag{1}$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01} z_{1j} + \cdots + \gamma_{05} z_{5j} + \zeta_j. \tag{2}$$

In principle, the model could be extended in order to also consider cross-level interaction effects so that the slope of the individual effects may depend on context effects (varying slope model). However, our main focus is the estimation of the macro-level effect of countries' wealth on the willingness to pay and not the possibly varying slopes of individual effects. Furthermore, investigating cross-level effects requires well-founded theoretical hypotheses. Otherwise, the number of all empirically possible cross-level effects is too large and the selection arbitrary. Therefore, the analyses are restricted to the varying-intercept model, which suits our purpose and the theoretical hypotheses.

We start the statistical analyses using the 2000 ISSP data (first column of Table 4). The first step in multilevel analysis is to test via a likelihood-ratio test for any variance at the context level. If the null hypothesis of no variance cannot be rejected, then there is no need to consider any context effects. In our case the χ^2-value is highly significant ($p = 0.00$) indicating that some context effects should be taken into account. Next, we estimate the intraclass correlation coefficient (ICC) of the null model. The ICC indicates how much variation of the dependent variable is due to the macro variables and how much of it is due to the micro variables. The ICC of the null model results in a value of 0.06 when taking only the 24 countries of the ISSP into consideration.[7] The coefficient indicates that a relatively small proportion (6 percent) of the overall variance is due to the macro-level variation and that the rest is due to the variation at the micro level. The results of the first model using only the ISSP data indicate that respondents with higher educational degrees and higher relative income are more willing to pay for environmental protection. Gender and age do not have statistically significant effects on the willingness to pay. Furthermore, Model 1 shows that postmaterialistic values are also positively related to the willingness to pay. These results replicate existing

[6]We used the statistical software STATA 11.1.

[7]The ISSP 2000 had 25 participating nations. Some data (household size) are missing for Ireland, which is necessary for calculating the income variable. The sample is therefore reduced to 24 countries.

TABLE 4

Multilevel Analysis of the Willingness to Pay (WtP) for the Environment

	Model 1 WtP: ISSP	Model 2 WtP: ISSP/ WVS/EVS	Model 3 WtP: ISSP/ WVS/EVS	Model 4 Weighted WtP ISSP/WVS/EVS
Individual-level variables				
Sex (1 = female)	−0.40	0.40*	0.50*	3.75***
	(0.38)	(0.20)	(0.20)	(0.47)
Age in years (18–80)	−0.006	−0.02***	−0.05***	−0.32***
	(0.01)	(0.007)	(0.007)	(0.02)
Secondary education	4.49***	3.53***	3.96***	11.73***
	(0.50)	(0.27)	(0.27)	(0.64)
High school diploma	6.63***	5.20***	5.88***	17.09***
	(0.64)	(0.29)	(0.29)	(0.69)
University degree	10.73***	8.47***	9.45***	28.91***
	(0.62)	(0.35)	(0.35)	(0.82)
Relative income within country	2.07***	1.06***	1.22***	3.72***
	(0.21)	(0.10)	(0.10)	(0.25)
Postmaterialism	6.02***	4.48***	4.72***	11.58***
	(0.33)	(0.17)	(0.17)	(0.40)
Acquiescence			28.45***	
			(1.12)	
Data set WVS		11.84***	10.91***	−0.33
		(0.43)	(0.43)	(1.01)
Data set EVS		10.96***	9.76***	−3.42***
		(0.34)	(0.34)	(0.79)
Country-level variables				
GDP (PPP) in 1,000	0.38*	0.18	0.28*	1.52***
	(0.15)	(0.12)	(0.12)	(0.30)
Proportion urban pop.	0.06	0.02	0.02	0.05
	(0.09)	(0.06)	(0.06)	(0.16)
Population density	27.52**	−1.39	−1.80	−7.67**
	(10.47)	(1.16)	(1.20)	(2.91)
Environmental quality	−2.03	−2.87	−2.28	0.06
	(2.92)	(2.10)	(2.17)	(5.30)
Gini-coefficient	22.67	15.56	17.64	44.00
	(14.72)	(9.29)	(9.59)	(23.34)
Constant	13.31	27.28***	9.20	50.16**
	(8.27)	(6.22)	(6.46)	(15.63)
Standard deviation				
Country level	4.20***	5.82***	6.01***	14.65***
Individual level	25.77***	24.78***	24.65***	58.49***
Intraclass correlation (ICC)				
Null model	0.061	0.058	0.058	0.12
Model with covariates	0.026	0.052	0.056	0.059
Explained variance				
Country level	0.61	0.16	0.10	0.56
Individual level	0.05	0.06	0.07	0.07
Number of countries	24	51	51	51
Number of observations	19,300	64,341	64,341	64,341

NOTE: Reported are the unstandardized regression coefficients. Numbers in parentheses denote the standard errors of the coefficients.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

findings (Franzen and Meyer, 2010; Xiao and Dunlap, 2007; Marquart-Pyatt, 2008).

At the macro level, the finding that countries' wealth (measured by the purchasing power adjusted GDP) is positively related to environmental concern is also replicated in our analysis (Franzen and Meyer, 2010). Thus, respondents from wealthier countries are more willing to pay higher prices or higher taxes for improved environmental protection. However, the effect of GDP is rather small. An increase of $1,000 per capita results in an increase of the willingness to pay by 0.38 points on a scale that varies from 0 to 100. In comparison, population density has a strong positive influence on the willingness to pay. In contrast, inequality, environmental quality, and the proportion living in urban areas are not statistically related to the willingness to pay.

Next, Model 2 takes all 51 countries from the three surveys into consideration.[8] At the individual level, all findings remain robust as in Model 1. Additionally, women have a slightly higher willingness to pay, whereas older people are less willing to do so. Thus, the pooled data analysis of more than 64,000 respondents in 51 countries shows the expected effects of income, education, and age on the willingness to pay. At the macro level, the wealth of nations has a positive, though insignificant, effect on the willingness to pay and the effect of population density disappears when the whole country sample is taken into account.

Model 3 in Table 4 takes acquiescence into account by including it as an individual-level variable. As described above, the variable contains an acquiescence value for every individual that ranges from 0 to 1. Acquiescence has a strong influence on the willingness to pay. Since it is coded between 0 and 1, the coefficient shows the difference of an individual with the lowest and highest acquiescence with respect to the willingness to pay. However, more importantly, the effect of GDP per capita is statistically significant when we control for acquiescence. Thus, the multivariate analysis mirrors the bivariate correlation results between GDP and the willingness to pay as shown in Figure 3.

Finally, Model 4 demonstrates an alternative procedure for incorporating acquiescence. It controls for acquiescence by weighting the dependent variable instead of including it as an independent variable. The weighting of the individual responses was done analogously to the weighting of countries in Table 2. Hence, we took a respondent's willingness to pay (index from 0 to 1) and multiplied it by the inverse of his/her acquiescence value. The results basically remain the same as the results of Model 3. Note, however, that the size of coefficients cannot be compared to Model 3 since the dependent variable is not the willingness to pay but the weighted willingness to pay. The

[8] Bosnia, Kyrgyz Republic, Luxembourg, Malta, Macedonia, Serbia, and Tanzania miss data on environmental quality, population density, and income and had to be dropped from the analysis. Vietnam and Bangladesh show extremely high willingness to pay values. They were identified as outliers by a whiskers box plot and were therefore dropped from the analyses.

difference between Models 3 and 4 is that the former estimates the influence of acquiescence on the willingness to pay while the latter assumes that the willingness to pay should be seen in relation to it. Therefore, Model 3 makes less far reaching assumptions than Model 4.

Examining the explained variances of the different models at the macro level shows that the countries' GDP explains a relatively large proportion of the variance (e.g., 61 percent of the ISSP differences and 10 percent if all countries are included). Explained variance on the individual level is much lower (7 percent).

Conclusion and Discussion

This article analyzes why different studies scrutinizing the determinants of environmental concern in cross-cultural perspective come to different conclusions. On the one hand, studies based on the ISSP support the wealth effect (Diekmann and Franzen, 1999; Franzen, 2003; Franzen and Meyer, 2010). On the other hand, Dunlap and York (2008) find higher environmental concern in poorer nations when analyzing the WVS or EVS; thus refuting the wealth effect. In this article, we measure environmental concern using two items that ask respondents whether they would be willing to pay higher prices and higher taxes in order to improve the environment. These two items are contained in an almost identical format in all three surveys, and therefore allow comparison across the three surveys. We first analyze the three data sets separately and replicate previous findings, showing that there is a positive correlation between countries' wealth and inhabitants' environmental concern using the ISSP, a negative correlation using the WVS, and no correlation using the EVS. Willingness to pay is comparatively higher in the WVS and EVS than in the ISSP, likely due to a slight variation in the answering scales of the surveys (four-point vs. five-point scales), differences in the sample of countries in each survey, and varying levels of acquiescence in each country.

If acquiescence is taken into consideration, the analysis of the pooled data of 59 countries shows a positive and statistically significant correlation between the countries' wealth and their environmental concern. This fundamental result is robust when we apply multilevel analysis to the data and take further individual- and country-level effects into consideration. On the individual level, respondents' relative income position, their education, and age affect their willingness to pay. At the macro level, willingness to pay is determined by countries' wealth.

Overall, our analyses of the pooled data from the ISSP, WVS, and EVS support the wealth hypothesis and refute the conclusions of Dunlap and York (2008). The puzzle of contradictory findings is thus resolved when the countries' acquiescence is incorporated into the analysis. Many poorer nations in Asia and Eastern Europe have a stronger collective culture, which is manifested as a high tendency to agree to all kinds of statements. This tendency

of general agreement can also be observed in industrialized countries. However, the industrialized nations generally have a stronger individualistic culture and respondents seem to be less sensitive to acquiescence. These cultural differences have to be taken into consideration in cross-cultural comparisons. When doing so, the combined data clearly shows that wealth increases the willingness to pay for environmental protection as predicted by standard economic theory.

It is often argued (e.g., Brechin and Kempton, 1994) that "willingness to pay" is not an ideal measurement of environmental concern. Critics point out that inhabitants of developing countries are so poor that they have no financial resources left that could possibly be devoted to environmental protection. Thus, they might be concerned but are unable to pay anything. This argument might indeed apply to some very poor countries such as Uganda, which had a PPP of $690 per capita in 2000. However, our sample of countries does not consist of either very poor or very rich countries, and the correlation reported in Figure 3 holds cross-nationally for the entire wealth range.

However, willingness to pay is only one dimension of environmental concern. There are other dimensions, such as cognitive and affective components. Previous research demonstrates that the positive correlation of wealth and environmental concern holds even if the analysis is restricted to items that do not deal with the willingness to pay, at least with the ISSP data (see Franzen and Meyer, 2010). Thus, there is some evidence suggesting that our results hold even if different measurements of environmental concern are used. Unfortunately, the comparison of the ISSP, WVS, and EVS as intended in this article is only possible with respect to the willingness to pay items. Therefore, an empirical investigation of to what extent the wealth effect holds with respect to alternative measurements must be left to future research.

It is difficult to judge what this finding implies for the future state of the environment. On the one hand, the perspective that people will be more willing to pay for environmental protection if they become wealthier is promising for anybody who is concerned with environmental protection. Since the world has grown richer in the past and will most likely continue to do so in the future, further increases in wealth should be accompanied by increases in environmental concern. On the other hand, if economic development is a prerequisite for higher levels of environmental concern, and given that economic growth is usually linked to environmental destruction, the environment might decay before concern increases. The challenge is, therefore, to disconnect economic growth from environmental destruction.

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