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**Do we trust the data?
On the validity and reliability
of cross-national environmental surveys***

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Objective. This note provides evidence on the validity and reliability of cross-national environmental surveys – an aspect that has not found much attention so far. Methods. Validity can be checked in examining whether cross-national differences in environmental attitudes are in accordance with theoretical hypotheses. For example, a study can claim some validity if concern about inadequate sanitation is strongly negatively correlated to the actual extent of access to sanitation in a country. Results. Several validity checks were undertaken for the Gallup et al. (1993) survey, all of which tend to support its validity. Next, the reliability of cross-national environmental surveys was checked. Both Pearson and Spearman rank correlations were run for similar questions from differing studies. Most correlations are low and statistically insignificant, however, thus putting some doubt on the reliability of cross-national environmental surveys, at least with respect to the questions examined. Conclusions. The findings support the validity of cross-national environmental surveys, but not their reliability. Future surveys should be designed such that validity and reliability checks become easier to undertake.

Some time ago, this journal served as a forum for a fierce debate about what determines differences in international environmental attitudes (see SSQ, Vol. 78, Number 1, March 1997). The debate was triggered by Brechin and Kempton's (1994) and Dunlap and Mertig's (1995) critique of the 'postmaterialism thesis' for explaining 'global environmentalism' as well as Kidd and Lee's (1997) counter-critique and defense of the theory that environmental

concern is strongly correlated with postmaterialist values. I have nothing to add to this debate. Instead, this short note is concerned with another issue that was raised by Brechin and Kempton (1994: pp. 260f.), but did not find any subsequent attention: the validity and reliability of cross-national survey data with respect to the environment.¹

Brechin and Kempton (1994: p. 260) rightly ask the question whether data from cross-national environmental surveys 'can be truly comparable across diverse languages and nations. That is, even after checking the survey questionnaire via back-translation, how comparable are the cultural contexts in which the questions are interpreted, and how comparable are the meanings of the resulting answers?'. Given the absence of ethnographic studies and pre-tests, they propose to examine whether 'existing independent evidence (...) supports the validity of answers to the environmental questions.' They go on presenting some very casual observations on

- forestry being a high-profile issue in West Germany and Norway, in accordance with citizens of these countries being strongly concerned about world forest issues.
- citizens from Chile and Uruguay being more concerned about ozone depletion than any other global environmental problem, in accordance with these countries being nearer the Antarctic and thus more exposed to increased ultraviolet radiation due to ozone layer depletion.
- the local ecology being impoverished in Saudi Arabia, in accordance with the low environmental concern among Saudi Arabians.

- and finally on the growth in grass roots environmental groups in the Third World, in accordance with high developing-country environmentalism.

Interestingly, Inglehart (1995), the major proponent of the 'postmaterialist thesis' under attack from Brechin and Kempton (1994), puts forward arguments in a similar vein – without explicitly intending to corroborate the validity of cross-national surveys, however. Inglehart reports some casual evidence on the seriousness of environmental problems in developing and Eastern European countries, which he links to high approval rates for the ecology movement in these countries. More systematically, Inglehart (1995: p. 68) constructs an index of pollution levels (which is in effect an index of urban air pollution) and a measure of the extent of postmaterialist values held by citizens of a country. His multiple classification analysis finds that both variables strongly impact upon support for environmental protection as measured by a composite index constructed by Inglehart from results of the 1990-93 World Values Survey (Inglehart, Basanez and Moreno, 1998). Furthermore, Bloom (1995) observes that individuals in developing countries express stronger concern over local environmental problems, which he regards as consistent with 'comparisons of objective measures of environmental quality between developing and industrial countries', without offering any systematic evidence or statistical testing, however.

Unfortunately, both Brechin and Kempton's (1994) explicit and Inglehart's (1995) as well as Bloom's (1995) implicit attempt to verify the validity of cross-national environmental survey data are deficient in at least two re-

spects: first, mostly very casual, instead of systematic empirical evidence is used. Apparently, Inglehart's pollution index analysis is an exception. It suffers from a second kind of deficiency, however, which is that it addresses the wrong type of questions to test for validity. Given that Inglehart's pollution index is effectively an index of urban air pollution from mostly one or two cities in each country and nothing else, he should have looked for correlation with concern about local air pollution in these same cities. Unfortunately, the data base he uses is not apt for such a test because only very broad and general questions on support for environmental protection are asked in this survey. Similarly, Brechin and Kempton's attempt, for example, to link *national* forestry issues in West Germany and Norway with concern of their citizens about *world* forest issues is not very convincing as national concern need not extend to the global level.

Checking for validity

Instead what we need are validity checks using hypotheses for which we have strong a priori expectations from theoretical reasoning and using systematic data instead of casual observations. Unfortunately, of the four major international surveys, which include questions concerning the environment – Louis Harris and Associates (1989), Gallup et al. (1993), World Values Survey (Inglehart, Basanez and Moreno, 1998) and International Social Survey Programme (Frizzell and Pammett, 1997) – only Gallup et al. (1993) asks questions that are appropriate for such validity checks. The Louis Harris and Associates (1989) survey asks a few questions about the seriousness

of environmental problems that would be amenable for validity checks if they clearly focused on the interviewee's country of origin. Unfortunately, it asks for whether a specific environmental degradation presents a problem 'in this country *or in other countries such as this around the world*' (my emphasis). As mentioned, the World Values Survey only provides very broad and general data on support for environmental protection. It asks only few questions on the environment and the ones it asks are too broad and unfocused for validity tests. The environmental module of the International Social Survey Programme (ISSP) asks many more questions on the environment. However, it mainly asks questions about what people believe about the environment and the extent of their knowledge about ecological facts.

The Gallup et al. (1993) survey, on the other hand, asks many questions about environmental concern, causes of environmental degradation and support for environmental measures.² For a few of these questions we have good theoretical hypotheses. For example, the survey asks for concern about specified local (as opposed to global) environmental problems. We would expect that the extent of this specific concern is clearly linked to objective conditions in a country with respect to this aspect of the environment. We would not expect that this link is perfect, as many factors presumably affect concern about local environmental problems. But we could give international data some validity if people express greater concern about *local* environmental problems if they are actually faced with more severe environmental problems. Alternatively, given the often spurious existence of good data on these conditions we would expect a clear link of *local* environmental

concern to levels of income, either because *local* environmental problems become ameliorated with higher income levels (see Neumayer, 1999: pp. 77-79) or because richer people are better able to defend themselves against environmental nuisances. Again, we would not expect a perfect relationship, however. Also, this hypothesis does not rule out that individuals from rich countries are as much concerned as poor individuals about the environment more generally, as their concern might stem from more global environmental problems (see again the debate in *SSQ*, Vol. 78, Number 1, March 1997).

INSERT TABLE 1 HERE

Table 1 presents evidence for an environmental problem for which we have relatively good data: access to sanitation. Gallup et al. (1993) asked for the seriousness of inadequate sanitation in the local community. As can be seen from table 1, concern about inadequate sanitation is strongly negatively correlated to the extent of access individuals have to sanitation. The correlation is statistically significant at the .01 level. Similarly, Gallup et al. (1993) asked for the seriousness of air, water and noise pollution in the local community. For these types of pollution, there do not exist good, representative and comparable international data, however. As a substitute, per capita income in purchasing power parity was correlated against concern for local air, water and noise pollution. As can be seen from table 1, all three correlations are negative as expected and highly statistically significant. What is true for specific *local* environmental problems also applies to the state of the *national* environment more generally. Gallup et al. (1993) asked individuals

to rate the national environmental quality. Again, there does not exist an aggregate index of a country's objective environmental conditions, so that per capita income was correlated against this variable. Table 1 shows that this correlation is also negative as expected and is statistically significant at the .05 level.

Gallup et al. (1993) also asked two questions on overpopulation. One asks for the seriousness of overpopulation in the *local* community, the other one for the contribution of overpopulation to the *nation's* environmental problems. We would expect approval of these questions to be clearly correlated to population growth rates. Table 2 presents the evidence. As can be seen, population growth rates are very strongly correlated with both of these variables and both correlations are statistically significant at the .001 level.

INSERT TABLE 2 HERE

Additionally, Gallup et al. (1993) asked a number of further questions on which factors contribute to the nation's environmental problems. Of these questions two are amenable for validity checks: the first one asks for whether the interviewee thinks that a lack of education contributes a 'great deal' to the nation's environmental problems. We would expect approval of this question to be strongly negatively correlated to an index of educational attainment in each country. The second question asks for the contribution of government to a nation's environmental problems. We would expect approving answers to this question to be clearly negatively correlated to the extent of political freedom in a country. This is because the more autocratic and the less accountable a political system is the more likely it is that a coun-

try's government is perceived as a major contributor to environmental degradation. We would expect a similar link to the perceived extent of corruption among public servants. The evidence is given in table 3. As can be seen the perceived contribution of a lack of education is strongly negatively correlated with an index of educational attainment within a country and significantly so at the .01 level. The perceived contribution of government to a nation's environmental problems is very strongly negatively correlated and very significantly so to the extent of political freedom within a country. A similar, but positive, correlation exists with the perceived corruption of its civil servants. All these results are encouraging and comforting as they support the presumption that the validity of cross-national environmental survey data, at least for the Gallup et al. (1993) study, are not severely hampered by cultural differences or language barriers. In order to check more systematically for validity, it would be helpful if all future studies included a number of questions that are easily amenable for validity checks.

INSERT TABLE 3 HERE

Checking for reliability

Apart from testing the validity of international environmental survey data in checking the consistency of data with strong theoretical hypotheses, one can also test for reliability of data coming from different studies. If various studies asked very similar questions and we find that the answers to these questions are strongly correlated with each other or at least that the ranking of countries is strongly correlated for similar questions, then we could give

these studies some more credibility than we would in the absence of such a correlation.

Unfortunately, to perform such a test is not easy, for three reasons: first, questions asked in differing studies are hardly ever the same or very similar; second, the number and range of countries in which surveys are conducted usually differs from study to study; and third, existing studies are usually undertaken in different years and asymmetric changes in the countries under investigation could have changed the attitudes of citizens towards environmental questions. As we will see shortly, for the existing studies the first aspect presents a severe problem, the second aspect decreases the number of observations, whereas the third aspect is negligible as all studies have been undertaken in the late 1980s and early 1990s.

The only questions across the various studies that are sufficiently similar are those asking for the interviewee's willingness to pay either higher prices or taxes for environmental protection. Table 4 presents the concrete wording of the questions together with the correlation results.³ The only correlations that, even if rather low, are at least statistically significant at the .05 level are the Pearson correlation and Spearman rank correlation for the Gallup et al. (1993) study and the World Values Survey. Ironically, however, Gallup et al. (1993) asked for the willingness to pay higher prices, whereas the World Values Survey asked for the willingness to pay higher taxes.

INSERT TABLE 4 HERE

All other correlations are statistically insignificant. These results are rather discomfoting, but their implications are not altogether clear. It would

be premature to conclude that these studies are unreliable as the concrete wording of the questions could be responsible for the failure of statistically significant correlation. On the other hand, what these results do imply is that one cannot rely either on the concrete approval rates or on the ranking of countries from any single study as they are likely to be extremely sensitive to the concrete wording of a question. This holds true at least for the questions examined here and it severely restricts the usefulness of data from one study. In order to more systematically test for the reliability of studies, it would be helpful if future studies included a number of questions that are identical in their wording to former studies. Tests for reliability and inter-studies consistency could then more adequately be undertaken.

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Table 1

First variable	Seriousness inadequate sanitation ¹	Seriousness air pollution ²	Seriousness water pollution ³	Seriousness noise pollution ⁴	Bad quality of nation's environment ⁵
Second variable	Access sanitation ⁶	GDP per capita ⁷	GDP per capita ⁸	GDP per capita ⁸	GDP per capita ⁸
Pearson correlation	-.544	-.530	-.666	-.619	-.505
Significance	.009	.008	.000	.001	.012
N	22	24	24	24	24

¹ % who say inadequate sanitation is 'very serious' in local community (Gallup et al. 1993: Figure 7d).

² % who say air pollution is 'very serious' in local community (Gallup et al. 1993: Figure 7b).

³ % who say water pollution is 'very serious' in local community (Gallup et al. 1993: Figure 7a).

⁴ % who say noise pollution is 'very serious' in local community (Gallup et al. 1993: Figure 7f).

⁵ % who say quality of nation's environment is 'very bad' or 'fairly bad' (Gallup et al. 1993: Figure 4b).

⁶ % of population with access to sanitation in 1995 (World Bank 1998: Table 1.2)

⁷ Real GDP per capita in purchasing power parity in 1992 (UNDP 1995: Table 1).

Table 2

First variable	Seriousness overpopula- tion ⁸	Effect of overpopula- tion ⁹
Second variable	Population growth rate ¹⁰	Population growth rate ^c
Pearson correla- tion	.710	.791
Significance	.000	.000
N	24	24

⁸ % who say overpopulation is 'very serious' in local community (Gallup et al. 1993: Figure 7e).

⁹ % who say that overpopulation contributes a 'great deal' to the nation's environmental problems (Gallup et al. 1993: Figure 9a).

¹⁰ 1990-1994 average annual growth of population (World Bank 1996: Table 4).

Table 3

First variable	Effect of lack of education ¹¹	Effect of government ¹²	Effect of government ^b
Second variable	Index of educational attainment ¹³	Index of political freedom ¹⁴	Index of perceived corruption ¹⁵
Pearson correlation	-.528	.590	-.777
Significance	.008	.002	.000
N	24	24	24

¹¹ % who say that people not knowing what to do contributes a 'great deal' to the nation's environmental problems (Gallup et al. 1993: Figure 9d).

¹² % who say that government contributes a 'great deal' to the nation's environmental problems (Gallup et al. 1993: Figure 9b).

¹³ 1992 Educational attainment index. The index is a combined index of adult literacy (weight two-thirds) and the combined primary, secondary and tertiary enrolment ratio (weight one-third) (UNDP 1995: Table 1).

¹⁴ 1992 Index of political freedom covering existence and fairness of elections, existence of opposition and possibility to take over power via elections. The index is measured on a one-to-seven scale (Freedom House 1999).

¹⁵ 1988-1992 Index of perceived corruption, defined as the perceived corruption in the public sector in terms of abuse of public office for private gain. The index is measured on a zero-to-ten scale (Transparency International 1998).

Table 4

First variable	Higher Prices (Gallup) ¹⁶		Higher (Gallup) ^a	Prices Much (ISSP) ¹⁷	Higher Taxes
Second variable	Much (ISSP) ¹⁸	Higher Prices	Higher Taxes (WVS) ¹⁹	Higher Taxes (WVS) ^d	
Pearson correlation	.467		.448	.303	
Significance	.126		.048	.238	
Spearman rank correlation	.442		.508	.089	
Significance	.150		.022	.733	
N	12		20	17	

¹⁶ % who say they are 'willing' to pay higher prices to protect the environment (Gallup et al. 1993: Figure 16b).

¹⁷ % who say they are 'very willing' or 'fairly willing' to pay much higher taxes in order to protect the environment (Frizzell and Pammett 1997: Table 8b).

¹⁸ % who say they are 'very willing' or 'fairly willing' to pay much higher prices in order to protect the environment (Frizzell and Pammett 1997: Table 8a).

¹⁹ % who 'strongly agree' or 'agree' to an increase in taxes if the extra money is used to prevent environmental pollution (Inglehart, Basanez and Moreno 1998: Table V13).

ENDNOTES

¹ Validity refers here to the degree to which the empirical data genuinely or truly measure the theoretical construct of interest (internal validity). Given that we do not know the 'true' attitudes of respondents, the only way to check validity is to examine whether the answers given are consistent with strong theoretical hypotheses. Reliability refers here to the consistency of data coming from different surveys (comparative reliability).

² The study was undertaken in 1992 comprising 12 developed and 12 developing countries.

³ The Louis Harris and Associates (1989) study is not taken into account here for two reasons. First, contrary to the other three studies its interviewees are not drawn from a representative sample of a country. Second, the range of countries in this study is quite different from the other three studies, so that the number of observations would become very low.