Willingness to Pay for 'the Environment' in Cross-National Perspective

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Refereed paper presented to the

Australasian Political Studies Association Conference

University of Adelaide

29 September - 1 October 2004

Abstract

The threat of global warming has attracted considerable attention from policy makers around the world. As a result, policy reforms focusing on emission reductions have been proposed and implemented in some countries. Public opinion polls suggest that a majority of people in advanced nations support the protection of the natural environment, but to what extent are they prepared to pay for environmental protection?

We analyse potential public support for such policies and the main drivers of support for environmental protection in Australia and cross-nationally. Using international survey data from the 2000 International Social Survey Programme and the 2003 Australian Survey of Social Attitudes, we conceptualise willingness to pay to protect the environment. We measure environmental support as a series of trade off questions based on willingness to increase taxes, willingness to increase prices, and willingness to accept cuts in one's standard of living in order to protect the environment.

In an attempt to bring together important theoretical accounts from economics and political science, we predict willingness to pay on the basis of propensity to engage in environmental risk taking, trust in sources of environmental information, post-material value orientations, and a range of socio-economic controls.

Using regression analysis, we find that trust in the veracity of sources of environmental information, believing that pollution and the greenhouse effect pose significant risks to the environment, tertiary education and post-materialist value orientations all increase willingness to pay to protect the environment. However, income, age and gender are all poor predictors. In the Australian case, we also found considerable variation in willingness to pay between supporters of political parties,

suggesting that support for policy reform on environmental protection relating to climate change will be divided along partisan lines.

Background

The problem of global warming has attracted considerable international attention, with many governments and environmental organizations (such as Greenpeace) attempting to address the consequences of global warming through political and economic means. Global warming is believed to occur as a result of increasing greenhouse gas (GHG) emissions. GHG emissions trap solar radiation in the atmosphere and increase global temperature as a result – analogous to a garden greenhouse. Global warming can result in severe climactic change, such as increased storm activity, rising sea levels and more severe droughts that would of course also impact upon the world economy negatively (although a positive impact is also possible for some countries).

Policies directed at emissions reduction particularly relating to the electricity sector have been adopted in several countries. The success of environmental policies depends on support from both sides of the market, that is, producers and consumers. In this paper we are examining consumer stated willingness to pay to protect the environment as an indirect indicator of consumer support for such policies. If consumers are willing to pay to protect the environment, then it is also likely they will be willing to pay for renewable energy, given it will reduce emissions from electricity generation and result in less damage to the environment. Therefore, a major focus here is on distinguishing between potential support for policy options, that is either imposing environmental taxes upon consumers or upon producers. Either way consumers pay, as imposing environmental taxes on producers tends to result in higher priced goods.

Using Australian and international survey data we also consider cross-national differences in willingness to pay to protect the environment and the socio-economic factors that differentiate such attitudes. We analyse the most recent Australian data from the 2003 Australian Survey of Social Attitudes (AuSSA) to consider important influences on willingness to pay (WTP) higher taxes, prices and cuts in standards of

living in order to protect the environment. We also employ 1993 and 2000 International Social Science Programme (ISSP) data to consider changes in WTP for the environment over time, across a range of countries, and to consider cross-national differences in WTP based on a range of socio-economic factors and value orientations. Although data from some of these sources have been examined previously (*e.g.* Bean 1998; Franzen 2003), the focus of our analysis of these data is to distinguish support for environmental policy options.

How to Measure the Demand for an Environmental Good?

The demand for an environmental good can be measured or approximated by stated willingness to pay for such a good. An indication of consumer willingness to pay to protect the environment (e.g. to reduce pollution) can be gained using the contingent valuation method, that is, through eliciting consumer preferences for certain goods by conducting surveys.

Contingent valuation (CV) surveys however, need to be designed to ask very specific questions about the nature of the good valued, the reference level of utility and property rights, the conditions for provision of the good, relevant prices of other goods and payment for the good (Mitchel and Carson 1989). While there are numerous critics of the contingent valuation methodology (Diamond and Hausman 1994), there is also support for using such methods in evaluating the range of environmental values (Smith 2001). Using contingent evaluation methods it is possible to elicit an individual's marginal willingness to pay in monetary term for a marginal change in the provision of the environmental good, such as protection of the environment in a particular location.

As social surveys, the available data from the ISSP and AuSSA are not in a contingent format. That is, the questions we analyse do not allow us to measure the actual amount respondents would be willing to pay, the good under evaluation is not defined specifically, and the provision of the good is uncertain and unspecified. However, these social data are valuable for assessing the strength (in attitudinal

terms) of willingness to pay for environmental protection, and as they have been drawn using large probability samples, allow us to make inferential claims about the citizens of several countries.

In the next section we outline an important theory we employ to model WTP, Ingelart's thesis of postmaterial value shift.

Postmaterialism and the Environment

Ronald Inglehart (1977, 1990a, 1997) claims that political preferences and behaviour are related to childhood socialisation, as childhood experiences influence the formation of different value priorities. Growing up under circumstances of relative physical safety and economic affluence leads to the prioritisation of postmaterialist (quality of life), issues to a greater extent than materialist (economic) issues. However, experiencing economic hardship, war or social and political upheavals leads to the development of materialist values (Inglehart 1977:23).

Once formed, values tend to remain relatively stable throughout the life course (Inglehart 1997: 34, 46). Younger generations born after the Second World War are more likely to develop postmaterialist values as they have enjoyed relative affluence and safety in their 'formative years'. Therefore, value priorities tend to vary across birth cohorts, with citizens (particularly of advanced industrialised countries) becoming increasingly postmaterialist as younger generations replace older generations.

Postmaterialists tend to prioritise quality of life issues such as the environment, and as such we expect to find higher proportions of postmaterialists among younger cohorts. We also expect that younger people should be more likely to support environmental issues than their older counterparts. However, environmental

concern is also expected to be stronger among postmaterialists than materialists, even controlling for age (Tranter 1996). Postmaterialists are more likely than materialists to be concerned about environmental issues, to join environmental groups and to participate in environmental protest actions (Bean 1998; Crook and Pakulski 1995; Tranter 1996; 1999; Papadakis 1993; Inglehart 1990a; Müller-Rommel 1990). High levels of postmaterial values tend to be found in countries with the world's lowest levels of air and water pollution (i.e. the Nordic countries and The Netherlands), and highest levels of support for environmental protection (Inglehart, 1995, 2).

Through an examination of international survey (ISSP) data from 1993, Bean (1998) has shown a degree of cross-national variation in willingness to accept lower living standards in order to protect the environment. West European countries such as the Netherlands and the former West Germany, as well as countries such as Canada, the USA and Australia seem most willing to accept lower living standards for the environment, while some former soviet bloc countries such as Hungary, the Czech Republic and East Germany score considerably lower on these measures. However, Bean (1998) did not directly model the influence of postmaterial value orientations on his willingness to pay dependent variables. Using Australian Election Study survey data, Tranter (1999) has demonstrated a degree of variation between political parties, and between supporters and leaders of political parties on willingness to pay for the environment measures, but again, he did not model these measures to consider the impact of value orientations or other socio-economic variables on willingness to pay for environmental protection.

Using data from the 2000 ISSP Environment module, we use regression models to examine the influence of postmaterial values and a range of other factors on willingness to pay for the environment across several countries.

Expectations

Less regulation upon the market may be associated with norms of 'user pays' and therefore less willingness to pay higher prices or taxes to improve the quality of the environment. Alternatively, in high taxing countries where levels of public welfare are relatively high, and where governments impose stricter regulations upon the economy, (such the Scandinavian countries), there may be greater public willingness to pay for the environment.

We examine political partisan support for environmental problems on the national and international levels. Australia is given the primary focus. Using new survey data from the Australian Survey of Social Attitudes we examine willingness to pay higher taxes among supporters of various political parties (i.e. party identifiers) in order to gauge their willingness to pay to protect the environment.

With the postmaterial values measure we hypothesise that postmaterialists will be more willing than materialists to pay for the environment. Age is also an explanatory variable associated with postmaterial values, with younger people expected to be more willing to pay than their older counterparts.

Economic theory suggests that if environmental quality is a normal good[1], all else constant, higher-income households will be more willing to pay for environmental protection than lower-income households. We expect that respondents with higher income are willing to pay more for environmental protection in Australia.
The economic literature on emission reduction from electricity generation and for green energy suggests that the main causes that impact upon consumer WTP for environmental protection are not only income, but also education and knowledge of the causes and consequences of climate change (Roe, Teisl, Levy, & Russell, 2001), (Rowlands, Scott, & Parker, 2001) and (Batley, Colbourne, Fleming, & Urwin, 2001).

[1] A **good** for which a change in income causes a comparable change in demand.

In addition to income and education, we expect perceptions of risks associated with climate change to be one of the main factors accounting for willingness to pay to protect the environment (Beck 1992). We also expect that those who perceive global warming to be dangerous for the environment will be willing to pay more than those who do not hold such views.

The novelty of our research is that the analysis of international data enables us to discover cross-national patterns in willingness to pay for the environment, while we also attempt to distinguish the most palatable payment vehicle for delivering environmental policies. That is, we try to assess support for the imposition of higher taxes compared with higher prices. Finally, we examine the impact of our independent variables in an attempt to understand the main drivers of consumer willingness to pay for environmental protection. We consider these issues by engaging with the data after describing our methodological approach.

Data and Methods

We use two main data sources. The data used for international comparisons are taken from the International Social Science Program – a series of cross sectional surveys administered across 22 countries in 1993, and 27 countries in 2000. Unfortunately, the 2000 ISSP Environment data for Australia were not available. We therefore substitute data from the 2003 Australian Survey of Social Attitudes (AuSSA).[2] While only one comparable variable relating to willingness to pay higher taxes is available with the AuSSA, we have the advantage of being able to examine the most recent Australian data in this research.

We use logistic regression to analyse the ISSP and AuSSA data in order to consider the relationship between our independent variables and three dependent variables

[2] All data were obtained from the Australian Social Science Data Archive at the Australian National University, Canberra. We express our thanks to Sophie Holloway at the archive.

measuring prices, taxes and standard of living. The dependent variables from the ISSP are derived from the following questions: 'How willing would **you** be to pay **much higher prices** in order to protect the environment?'; 'And how willing would **you** be to pay **much higher taxes** in order to protect the environment?"; 'And how willing would **you** be to **accept cuts** in your **standard of living** in order to protect the environment?' (bold emphasis appears in original questions).

The response categories were 'Very willing', 'Fairly willing', 'Neither willing nor unwilling', 'Fairly unwilling', 'Very unwilling'. We combine the categories 'very' and 'fairly' willing, and the categories 'fairly unwilling' and 'very unwilling' to construct dichotomous dependent variables. In this approach we follow Israel and Levison (2004). However, unlike the questions in the third wave of the World Values Survey that Israel and Levison (2004) analysed - with four response categories - the more recent ISSP surveys conducted in 2000 have 5 response categories. We therefore omit the 'Neither willing nor unwilling' category from the analyses. This approach does reduce the number of cases available for analysis, but has the advantage of allowing us to compare those who state they are willing to pay more to improve the environment, with those who are not willing - in a 'yes' versus 'no' dichotomy.[3] All analyses were conducted using SPSS version 11.5.

International Analysis

In this section the relationship between WTP to protect the environment and the various socioeconomic variables are examined. The aim is to determine how much of the variation in WTP across, and within countries can be explained by differences

[3] We also conducted OLS regression analyses with the original 5 category ordinal scale variables as dependent, and achieved comparable results. However, for the purposes of these analysis, a dichotomous dependent variable, where those who are undecided or fence sitting regarding the questions are omitted, seems to us a more appropriate means of conceptualising our research question.

in observed characteristics. The results of these analyses are relevant, not only for socio-economic models that explain the factors affecting consumer willingness to pay to protect environment, but also for policy formulation.

We begin by considering the mean scores for each country on the three dependent variables using data from the 1993 and 2000 International Social Science Programme surveys (Table 1).

The first thing to notice is that in almost all countries where results are available from both the 1993 and 2000 surveys, a decrease is evident in willingness to pay for all three dependent variables. Ireland is the notable exception, where improved economic circumstances may have led to a greater willingness to pay among citizens. However, for all other countries (except Japan and the Philippines where the results are slightly mixed but relatively stable), citizens are less willing to pay higher prices or taxes, and less willing to cut their standards of living for the environment in 2000, than they were in 1993! This is perhaps understandable in the former soviet controlled countries that have undergone drastic changes to their economies, but less explainable in the advanced industrialized nations of Europe, North America and Australasia. Unfortunately data are only available for Australia for 1993, though we may speculate that levels have also decreased here in a similar manner.

Table 1: Mean Scores for selected countries on Willingness to pay higher Prices, higher Taxes and Cut Standards of Living (Means) .

	D-W	Nethl.	Switz.	GB	Ireland	Norway	Sweden	Denmark	Finland	Canada	USA
Prices 1993	54.9	66.8	-	56.1	49.5	56.9	-	-	-	60.1	57.6
Prices 2000	49.6	62.1	58.9	54.0	54.1	52.0	45.7	55.1	40.3	52.9	54.5
Taxes 1993	45.1	53.2	-	48.8	29.0	44.8	-	-	-	45.5	48.7
Taxes 2000	36.1	52.6	44.9	44.3	41.6	37.1	35.2	42.3	29.6	37.0	43.6
Standard Living 1993	58.2	54.7	-	42.4	34.5	57.3	-	-	-	52.6	45.7
Standard Living 2000	52.5	49.4	60.7	39.3	42.9	49.0	54.3	48.4	51.9	44.8	41.9

Table 1 continued: Mean Scores for selected countries on Willingness to pay higher Prices, higher Taxes and Cut Standards of Living (Means). continued

	Australia	NZ	Japan	Russia	Czech
Prices 1993	56.2	57.7	55.3	55.6	43.5
Prices 2000	-	54.3	57.2	38.0	42.3
Taxes 1993	48.0	46.8	48.8	53.7	34.2
Taxes 2000	-	42.2	46.1	38.2	31.9
Standard Living 1993	51.3	48.1	49.1	47.4	34.7
Standard Living 2000	-	44.2	49.0	44.6	33.7

Source: International Social Survey Programme (1993)

The second important point here is that the mean scores for the 'prices' dependent variable are much higher than the 'taxes' variable for all countries shown here. In other words, it seems that people are more willing to approve of paying higher prices in order to protect the environment than they are to pay higher taxes. These results may be related to perceptions of freedom of choice. Paying higher prices for certain goods may be perceived as an issue that can be managed (to an extent) by consumption practices, while the imposition of higher personal taxes may be seen to offer less choice. Nevertheless, the country whose citizens appear most willing to pay higher taxes *and* prices to protect the environment is the Netherlands. The Netherlands had the highest means scores of all countries for these variables for both the 1993 and 2000 surveys.

Having considered changes in willingness to pay over time, we now examine some predictors of WTP higher taxes, higher prices and cuts in standards of living in 11 countries (West Germany, Great Britain, the United States, the Netherlands, Canada, Norway, Sweden, the Czech Republic, the Russian Federation, New Zealand and Japan) in Tables 2-4. The results presented are odds ratios calculated using logistic regression analysis. Odds ratios presented for dummy variables are interpretable in relation to their respective reference group. For example, in Table 2 for Great Britain, those with a university degree are about 3.7 times (OR 3.65) as likely as those without a degree to say they would pay higher taxes to protect the environment. Odds ratios for dummy variables less than unity suggest a negative relationship. Again using an example, from Table 2, this time for the USA, women are approximately 1.8 times *less likely* than men to pay higher taxes (i.e. 1 / 0.55 = 1.818). Odds ratios for scale independent variables represent the change in odds for a one unit change on the scale - with estimates greater than 1 again suggesting a positive association, and less than 1 indicating negative relationships. Statistical significance at the 95% and 99% levels is indicated by one and two asterisks respectively.

Table 2: Predictors of Willingness to Pay Higher TAXES to Protect the Environment (Odds ratios)

	D-W	GB	USA	Neth	Canada	Norway	Sweden	Czech	Russia	NZ	Japan
Women	0.71	0.095	0.55**	1.41	0.94	0.71	1.29	0.99	0.75	0.71	0.88
Age 18-24	1.31	0.33*	1.59	0.92	0.22**	0.41*	2.62*	1.78	1.29	0.88	0.52
35-34	1.76	0.33**	2.19	0.71	0.55	0.20**	2.09	1.38	1.18	1.18	0.64
35-44	0.98	1.12	1.77	0.79	0.77	0.29**	0.83	1.68	1.50	1.25	0.86
45-54	1.71	1.10	1.66	1.49	0.73	0.40*	0.92	1.37	1.10	0.91	0.70
55-64	1.59	1.12	1.05	2.20	0.81	0.45*	1.08	1.18	1.36	1.81	0.96
65+ (reference)	1	1	1	1	1	1	1	1	1	1	1
Degree	1.85	3.65**	1.74*	2.24*	2.96**	2.66**	1.44	3.16**	1.76**	1.92*	2.30**
Big City	1.01	2.47**	1.36	0.81	0.88	0.83	1.11	1.11	1.60*	1.32	2.04*
Suburb	0.77	0.99	1.19	0.78	0.79	0.77	1.23	1.24	1.67	-	1.38
Postmaterial Values Scale	2.42**	1.39	1.47*	1.81**	1.19	1.86**	2.03**	1.53*	1.31	1.67**	1.64*
Environmental Risk Scale	1.21**	1.15**	1.24**	1.28**	1.16**	1.16**	1.16**	1.13**	0.99	1.14**	1.13**
Private Enterprise solve economic problems? (>1 disagr.)	1.06	1.15	0.96	1.42**	1.11	0.97	1.44**	0.94	0.83**	0.88	0.97
Information about Pollution Trust Industry? (>1 = no)	0.88	0.89	0.94	0.99	0.96	1.02	0.96	0.94	1.02	1.21	0.75*
Trust Govt. Dept.? (>1 = no)	0.67*	0.73*	0.76	0.48**	1.02	0.85	0.61**	0.75*	1.06	0.69**	0.81
Trust Uni. Research? (>1 = no)	0.97	0.74	0.91	0.76	0.78*	0.80	0.92	0.91	0.73**	0.76*	0.89
Party ID (< 1 = left)	0.78	0.80	0.62**	0.67**	-	0.50**	0.78	1.02	1.12	0.74**	0.91
R squared	.22	.25	.26	.32	.15	.29	.24	.12	.10	.20	.16

* p<0.05 ** p<0.01 Source: International Social Survey Programme (1993).

Education is an important indicator of willingness to pay higher taxes (Table 2). Those with a tertiary degree are more likely than the non-tertiary educated to say they will pay more tax in nine of the eleven countries, and in the remaining two (West Germany and Sweden) the odds are also greater than 1. Postmaterial values also show a positive association with willingness to pay in all countries, with postmaterialists more willing to pay higher taxes than materialists in all countries.

The scale measuring environmental risk is also an important predictor in all countries with the exception of the Russian Federation. Those who are concerned about the environment tend to be much more willing to pay higher taxes. The other independent variables are less consistent predictors across the eleven nations. For the questions that asked respondents if they trust certain sources of information about pollution (i.e. industry, government departments, university research) to predict willingness to pay, the results are more mixed. In several countries, those who trust advice from government departments and universities regarding pollution are willing to pay more. Interestingly, in the Netherlands and Sweden, people who believe that private enterprise can solve economic problems are less likely to pay, however in the Russian Federation, the opposite effect is apparent.

Identification in most countries with political parties of the left increases the likelihood of paying more tax for the environment, even after controlling for a range of socio-demographic factors. The fact that support for paying for the environment appears to be divided along partisan lines in many countries suggests that the introduction of policy initiatives may lead to tension in the political arena.

Table 3: Predictors of Willingness to Pay Higher PRICES to Protect the Environment (Odds ratios)

	D-W	GB	USA	Neth	Canada	Norway	Sweden	Czech	Russia	NZ	Japan
Women	0.73	1.10	0.60*	1.62*	0.81	0.95	0.97	0.95	0.71*	0.60*	1.52
Age 18-24	1.57	0.45	1.32	1.87	0.31*	0.28**	0.94	2.46*	2.02*	1.11	0.40
35-34	2.03	0.67*	1.31	0.97	1.17	0.15**	1.26	1.66	1.50	1.57	0.63
35-44	1.15	0.60	1.53	2.04*	0.55	0.23**	0.43*	1.90*	1.63	2.00*	1.13
45-54	1.33	1.06	1.27	2.30*	0.89	0.34**	0.57	2.02*	1.37	1.56	0.79
55-64	2.59*	1.14	1.32	1.72	0.78	0.58	0.75	1.66	1.21	1.84	0.76
65+ (reference)	1	1	1	1	1	1	1	1	1	1	1
Degree	3.97**	2.20*	1.40	1.96*	3.24**	2.60**	1.52	2.78**	1.83**	2.01*	4.43**
Big City	0.76	2.46	1.07	0.65	1.14	1.38	0.83	1.14	1.78**	0.85	1.20
Suburb	0.85	1.16	1.28	0.77	0.60*	0.76	0.75	1.15	1.28	-	1.17
Postmaterial Values Scale	2.95**	1.56*	1.56*	1.48*	1.36	1.18	1.96**	1.54**	1.25	1.64*	2.37**
Environmental Risk Scale	1.28**	1.15**	1.26**	1.29**	1.22**	1.22**	1.18**	1.14**	0.99	1.20**	1.14**
Private Enterprise solve economic problems? (>1 disagr.)	1.13	0.93	0.82	1.02	0.89	0.87	1.03	0.85*	0.82	0.73**	0.89
Information about Pollution											
Trust Industry? (>1 = no)	1.13	0.90	1.16	0.83	0.85	0.54	0.94	0.95	0.93	1.12	0.87
Trust Govt. Dept.? (>1 = no)	0.60**	0.95	0.76	0.73*	0.96	0.76*	0.82	0.76*	1.02	0.64**	0.87
Trust Uni. Research? (>1 = no)	0.90	0.51**	0.88	0.92	0.90	0.65**	0.94	0.85	0.80*	0.75*	0.70**
Party ID (< 1 = left)	0.82	0.74*	0.79	0.84	-	0.54**	0.84	1.03	0.95	0.88	1.36
R squared	.35	.24	.23	.20	.20	.33	.16	.15	.10	.23	.20

* p<0.05 ** p<0.01 Source: International Social Survey Programme (1993).

Table 4: Predictors of Willingness to Accept Cuts in your Standard of Living to Protect the Environment (Odds ratios)

	D-W	GB	USA	Neth	Canada	Norway	Sweden	Czech	Russia	NZ	Japan
Women	0.84	1.06	0.62*	1.19	1.25	0.72	1.69*	0.99	0.81	0.78	1.50*
Age 18-24	2.48	0.85	0.84	1.07	0.26*	0.45	1.11	1.60	1.50	0.62	0.44*
35-34	1.78	0.54	0.94	0.80	0.68	0.41*	1.18	1.93*	1.92*	0.91	0.50
35-44	1.71	0.95	1.53	1.08	0.76	0.66	1.31	0.99	1.85*	1.13	0.82
45-54	2.19*	0.76	1.11	1.15	0.85	0.78	1.23	1.40	1.56	0.99	1.21
55-64	1.84	0.96	0.97	1.80	0.82	1.41	0.82	1.62	1.46	1.26	1.31
65+ (reference)	1	1	1	1	1	1	1	1	1	1	1
Degree	3.57**	5.07**	0.98	1.72**	2.41**	2.35**	1.95*	1.57	1.36	1.81*	2.07**
Big City	0.64	2.24	0.92	0.74	0.92	0.84	2.01	1.59	1.35	0.83	1.54
Suburb	0.55*	0.93	0.96	0.87	0.68	0.82	1.94	1.27	1.06	-	1.06
Postmaterial Values Scale	1.23	1.45	1.23	1.45**	1.60**	1.61**	1.48	1.56**	1.12	1.65**	1.59*
Environmental Risk Scale	1.12**	1.15**	1.24**	1.27**	1.13**	1.21**	1.17**	1.09**	0.99	1.15**	1.14**
Private Enterprise solve economic problems? (+ disagree)	0.68**	1.00	0.79*	1.10	0.97	1.07	1.12	0.80**	0.86*	0.92	1.07
Information about Pollution Trust Industry? (>1 = no)	1.03	0.96	1.04	0.99	1.12	1.07	1.10	1.23	0.86	1.16	0.96
Trust Govt. Dept.? (>1 = no)	0.79	1.06	1.02	0.84	0.86	0.92	0.96	0.74*	1.13	0.85	0.93
Trust Uni. Research? (>1 = no)	0.94	0.63**	0.75*	0.83	0.82	0.73**	0.75	0.87	0.76**	0.68**	0.73**
Party ID (< 1 = left)	0.73*	0.84	0.85	0.71**	-	0.64**	0.76	0.95	0.82*	0.91	0.88
R squared	.16	.24	.19	.23	.15	.28	.19	.12	.07	.18	.16

* $p<0.05$ ** $p<0.01$ Source: International Social Survey Programme (1993).

With a few exceptions, gender and age have little impact on willingness to pay, in contrast to other indicators of environmental support, where in particular, younger people tend to be more concerned about the environment, and more likely to participate in environmental organizations and groups (e.g. Inglehart 1990b; Bean 1998). Overall though, the associations with these demographic variables are weak.

Similar patterns are apparent for the willingness to pay higher prices and accepting cuts in standard of living dependent variable (Tables 3 and 4). For most countries, the R-squared statistics indicate that the models 'explain' a reasonable amount of variation in the dependent variables given we are analyzing survey data, although the Czech Republic and in particular, the Russian Federation are exceptions here. Value orientations appear to be far less important in the Russian Federation, as are perceptions of environmental risk in this country that is undergoing substantial economic and social reforms.

Nevertheless, in almost all countries, tertiary education, value orientations and concern about risks to the environment appear to be the main drivers of support for all three measures of WTP for the protection of the environment, in cross national context. We now consider support for environmental protection in Australia.

Australian Analysis

The international data show that education, values and environmental concern are important predictors of willingness to pay. Unfortunately the ISSP data did not include an Australian survey for 2000, so in order to consider the Australian case, we examine data from the 2003 Australian Survey of Social Attitudes (AuSSA), and present Australian data from the 1993 ISSP. While the available questions on willingness to pay in the 2003 data are limited, a question was included that is of particular interest here. Respondents were asked if they "would be willing to pay higher taxes so the government could spend more" on "environmental protection".

In 2003 (we concentrate on the 2003 AuSSA results in this section although the 1993 ISSP results are also presented in Table 5), we found that only 10.5% of Australians were willing to pay quite a bit more, with 43.3% claiming they were willing to pay a little more, although 40.2% were not willing to pay any more tax to protect the environment. The remaining 6.0% were unable to choose between the options.

The multivariate analysis (Table 5) suggests that several factors are likely to be important predictors of WP in the Australian population, although not all of those we expected to be important. Tertiary qualifications increased the odds of paying for environmental protection by approximately 60% (OR 1.6) over those without a degree, while those on the 'left' of the ideological spectrum were almost twice as likely as the 'right' to say they would pay higher taxes. Consistent with our international findings, value orientations are also important. Postmaterialists were again much more likely than materialists to indicate an intent to pay more tax for the environment. The self-identified middle class were more likely to pay than the working class (or those who did not claim any class location), or at least to say that they were.

However, perhaps more interesting are the independent variables that have little or no impact. Like the international findings, age and gender effects were notably weak and non-significant even at the 95% level, as was location in a large city, but income is the most surprising example here. Income in the international data was problematic to model, as there were difficulties in standardising between countries. However, with the Australian data, we were able to model several income categories against a low income ($0-20799) reference group, expecting to find willingness to pay would increase with income level.

This was not the case. Only one income group showed statistically significant odds of influencing the dependent variable in the population, but even with the large AuSSA sample this finding was significant at only the .05 level.

Table 5: Willingness to Pay Higher TAXES for Protect the Environment in Australia (Odds Ratios)

	1993 Prices	1993 S.O.L.	1993 Taxes	2003 Taxes
Women	1.61**	1.20	1.27	0.95
Age 18-24	2.09	2.09*	1.46	1.08
35-34	0.93	0.86	0.63	0.96
35-44	0.80	0.96	0.63*	0.88
45-54	0.96	1.00	0.86	0.87
55-64	0.90	1.18	0.73	0.83
65+ (reference)	1	1	1	1
Degree	1.47*	1.66**	1.70**	1.61**
Income $				
$0-20,799 (reference) [1993: 0-$19,999)	1	1	1	1
$20,800-31,199 [1993: 20-29,999]	1.16	1.05	1.03	1.14
$31,200-41,599 [1993: 30-39,999]	1.48	1.28	1.31	1.22
$41,600-51,999 [1993: 40-49,999]	1.20	0.88	1.13	1.10
$52,000-77,999 [1993: 50-69,999]	0.91	1.36	0.84	1.33*
$78,000+ [1993: 70 +]	2.03	2.61	2.63*	1.25
Inner Metropolitan Area	1.10	1.07	1.15	1.05
Live elsewhere (reference)	1	1	1	1
Postmaterial Values Scale (+ = postmaterial)	2.08**	2.38**	1.99**	2.11**
Political Party Identification				
Liberal/National Coalition (reference)	1	1	1	1
Labor	1.82**	1.40*	2.37**	1.34**
Greens	5.09*	5.37*	6.39**	6.61**
Australian Democrats	2.20*	1.91	2.62**	2.35**
No Party allegiance	2.06	0.82	1.42	1.47**
Self Assessed Middle Class Location	1.36*	1.43*	1.41*	1.36**
Working + No class (reference)	1	1	1	1
Political Ideology				
Left (0-3)	-	-	-	1.67**
Middle (4-6)	-	-	-	1.17
Right (7-10) (reference)	-	-	-	1
Pseudo R squared	.08	.09	.11	.12
N	(1040)	(1014)	(1050)	(2543)

* < .05 ** < .01

Notes: The dependent variable was derived from the following question: 'Here is a list of areas where the Federal Government spends money. Please tell us if you would be willing to pay higher taxes so the government could spend more in each of these areas' (Environmental Protection). We dichotomise the original categories by combining willing to pay 'quite a bit more' and willing to pay 'a little more', then contrast these against those who were 'not willing' to pay more tax. Question wording and response categories vary somewhat between surveys, so the results are not directly comparable.

Sources: International Social Survey Programme (1993); Australian Survey of Social Attitudes (2003).

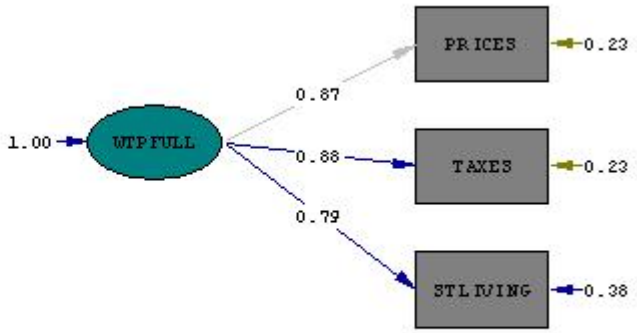
Controlling for other influences, those earning between $52,000 and $77,999 (i.e. $1000 to $1499 per week) were 1.3 times more likely than the lowest income group to state they would pay more for the environment, quite a weak (and lonely) effect. In separate analyses (not shown here) we found that when only income variables were entered into the regression equation, the two highest income groups showed significantly larger odds than the reference groups, but the r-squared for this model was only .01, a very small percentage of variation 'explained'. Income then, is a very poor predictor of willingness to pay higher taxes for environmental protection in Australia (both in 1993 and 2000).

Finally, some large effects were apparent for political party identification. It seems that the party one identifies with has a fairly strong association with intent to pay higher taxes to protect the environment, even after we hold constant the influence of a range of other socio-economic variables. Labor and Australian Democrat partisans, as well as those who do not identity with any political party were all more likely than supporters of the Coalition to pay more tax. Greens of course, were the standouts here - they were almost seven times as likely to pay more tax for the environment as Coalition supporters were. Again, for Australia there is evidence of a strong partisan divide over the willingness to pay higher taxes for the environment. To an extent this divide may reflect voter perceptions of the respective taxation policies of the parties (at least the major parties), with Coalition supporters perhaps more opposed ideologically to high taxing governments. In any case, these results suggest that policy reforms to protect the environment in Australia may cause serious tensions across partisan lines.

Measuring Willingness to Pay: an Exploratory Approach using Confirmatory Factor Analysis

So far we have considered willingness to pay for the protection of the environment using three single dependent variables – taxes, prices and cuts in standard of living. Taken individually, each of these indicators taps an aspect of WTP for the environment, and while these individual measures offer the advantage of assessing responses to different aspects of this concept, we suggest an alternative approach that may be beneficial. In order to measure the multi-dimensional nature of the concept willingness to pay to protect the environment, we argue that a more valid approach would be to develop a measure that combines all three measures.

This can be achieved in a variety of ways, for example, by constructing a simple additive scale from the three variables, or by constructing a scale using exploratory factor analysis. However, structural equation models allow the construction of highly reliable scales, with the aim of measuring the latent concept (in this case willingness to pay for environmental protection) on the basis of observable indicators (variables). The advantages of the confirmatory factor analytic approach include the ability to measure the associations between this and other latent variables. The model we present below is a confirmatory factor model for WTP constructed using the three dependent variables we analysed above with the 1993 ISSP Australian data (i.e. Table 5). It shows that all three indicators load strongly on the latent factor, and that the unexplained variance for each of the individual indicators is relative low, particularly for the prices and taxes variables.



Chi-Square=1.11, df=1, P-value=0.29279, RMSEA=0.009

Figure 1: Confirmatory Factor Analysis LISREL model of Willingness to Pay for Environmental Protection (Source: 1993 Australian ISSP Environment Module).

We use LISREL here to illustrate the structure of the latent construct WTP. We present this model in order to highlight an alternative, although we believe superior approach to conceptualising and operationalising WTP using separate indicators that measure 'prices' and 'taxes' individually (e.g. Israel and Levison, 2004). This approach is extended in separate contingent valuation research being conducted by Ivanova.

Conclusions

We have shown that in most countries, willingness to pay for the protection of the environment has actually decreased from 1993 to 2000. This may suggest that people are less concerned about the environment than they were ten years ago. An alternative view is that the environment as an issue in the public arena has become increasingly 'routinsed' (see Pakulski et al. 1998). That is, the environment is no longer seen as a new issue, or as likely to attract the same levels of public concern as it did a decade or so ago. It has now entered mainstream culture, at least in advanced industrialized societies. Signifiers of the environment such as

'environmentally friendly' abound, while 'green-speak' is apparent even in the triple bottom line of financial reports (Elkington 1998). The routinisation and popularization of 'the environment' may lead citizens to believe that in an environmental sense they are being 'looked after' (presumably by governments), and that they (the citizens) no longer need to be as concerned, or as willing to pay to protect the environment.

Using multivariate analyses of survey data from Australia and a range of other countries, we have also shown that willingness to pay for the protection of the environment is associated with three key factors - education, postmaterial values, and perceptions of the risk of environmental destruction. These effects hold, regardless of whether we use increasing taxes, raising prices, or cutting standards of living to protect the environment as our indicators. The tertiary educated are much more likely to pay for environmental protection than the non-tertiary, postmaterialists are more willing to pay than materialists, and those concerned about environmental risks are prepared to pay to avoid them. Somewhat surprisingly, age and gender are poor predictors, while having a high income seems to have little impact on willingness to pay, at least in Australia.

Opinion polls suggest that the environment is important to many people, at least in advanced industrialised nations, but if this is the case, how should we pay to protect it from threats such as greenhouse? That is, what are the implications for policy makers? There is, not surprisingly, less support in the data for increasing taxes than for paying higher prices, although the outcome may be similar in terms of how much consumers end up paying for goods and services. Imposing taxes on producers, for example, on producers of electricity in order to pay to produce 'cleaner' power, will also appear to the consumer as an increased charge. This may be more palatable than increases to personal income tax, or options such as one off levies or increases to indirect taxes like the GST.

Yet it may come down to freedom of choice. The freedom to choose may appear greater when levies are applied to consumption practices in the form of higher prices, as opposed to 'enforced' increases in the form of taxes. No one likes taxes, but consumers may feel that they have greater control over their consumption practices – perhaps seen as a way of free riding.

Perhaps policies for environmental protection will receive higher support if they are aimed at certain local conditions. For example, consumer willingness to pay to protect particular aspects of the environment may be greater for localised air or water pollution problems. Those proposing policies aimed at attacking more abstract environmental problems, such as global warming, may find it more difficult to garner support.

There is an important qualifier in our findings however. Our political partisan results imply that in several countries, identifying with political parties of the right reduces the likelihood of paying higher taxes or prices for the environment. In Australia, for example, Coalition supporters are less likely to pay higher taxes than Labor, Australian Democrat and particularly Green supporters. This implies that there is unlikely to be bi-partisan support for policies advocating that citizens should pay to protect the environment in Australia.

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