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Is Accurate Understanding of Global Warming Necessary to Promote Willingness to Sacrifice?*

Richard J. Bord, Ann Fisher & Robert E. O'Connor**

Introduction

Politicians and agency decision makers often use survey results to support policy initiatives. This makes it important to know what these surveys do and do not tell us. A key issue is estimating the link between survey response and actual support for specific policy initiatives. For example, if respondents report that they support a particular policy proposal, would they actually vote for it or urge their neighbors to do so? Less well researched, but equally important, is the link between expressed support and actual acceptance of significant changes in patterns of everyday life. Does concern translate into a willingness to sacrifice? We explore these linkages in the context of environmental issues and, in particular, global warming.

Just How “Green” are We?

Inferences about the meaning of environmental poll data range from exuberant celebration of a green revolution or “post material” society¹ to more measured judgments that acknowledge heightened

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¹ Ronald Inglehart, *Post-Materialism in an Environment of Insecurity*, 4 *Am. Pol. Rev.* 880 (1981); Lester W. Milbrath, *Environmentalists: Vanguard for a New Society* (1984).

concern and increased support for environmental cleanup initiatives,² to downright pessimism about the degree of public commitment.³ The pessimists question the relative concern for environmental issues versus other societal problems, the extent to which individuals take responsibility for environmental degradation, and the meaning of statements claiming a willingness to pay for environmental cleanup.

Environmental opinion polls consistently demonstrate substantial levels of concern for the environment and an expressed willingness to pay to ameliorate or mitigate environmental problems. At the same time, polls indicate relatively low levels of involvement in environmental activities: the greater the commitment demanded by the activity, the less the involvement.⁴ What reasonable inferences can be made on the basis of these data?

First, the American public expresses substantial concern for a wide variety of issues, institutions, and values.⁵ It is not unusual to have a majority of respondents, in the same survey, indicate that "we are spending too little..." to solve problems of homelessness, poverty, drug addiction, national health, crime, educational improvement, environment protection, and AIDS.⁶ Is it reasonable to assume that these respondents are actually willing to accept the increases in taxes necessary to deal effectively with all these issues? Or are these types of questions eliciting symbolic gestures of general support for the common good? It is highly unlikely that most of these issues have any direct impact on the daily lives of most respondents. Thus, high levels of concern, expressed in surveys, need not imply high issue involvement.⁷

² Riley E. Dunlap & Rik Scarce, *The Polls-Poll Trends: Environmental Problems Protection*, 55 *Pub. Opinion Q.* 651 (1991).

³ R. Cohn, *American's Beliefs About Environmental Problems*, 59 *Response Anal.* 1 (June 1991); Everett C. Ladd, *What Do Americans Really Think about the Environment?* *The Pub. Perspective*, May/June 1990, at 11.

⁴ Dunlap & Scarce, *supra* note 2; Everett C. Ladd & Kenneth H. Bowman, *Attitudes Toward the Environment: Twenty-Five Years After Earth Day* (1995).

⁵ Richard F. Hamilton & James D. Wright, *The State of the Masses* (Aldine Publishing Company) (1986); Ladd, *supra* note 4.

⁶ Robert C. Mitchell, *Public Opinion and the Green Lobby: Poised for the 1990s*, *Environmental Politics in the 1990s* (1989).

⁷ Kent D. Van Liere & Riley E. Dunlap, *The Social Bases of Environmental Concern: A Review of Hypotheses, Explanations, and Empirical Evidence*, 44 *Pub. Opinion Q.* 181 (1980).

Second, expressed concern is most likely to be meaningful, i.e., have affective, cognitive, and behavioral implications, when linked to attitudes that are salient,⁸ i.e., attitudes which are rooted in experiences and challenges of everyday life. The problem of assessing the salience of questionnaire items related to natural hazards has been dramatically depicted by Whyte.⁹ After noting that people living in flood plains or along the side of active volcanos seldom pay attention to problems of flooding or eruption she states: "... (this) has not deterred researchers from framing questionnaires as though even the most unlikely natural hazards were part of every family's breakfast table conversation."¹⁰ Many social and economic reasons hold people to particular places, even high-risk places. If, however, people who actually risk and experience floods and volcanic eruptions tend not to significantly alter their behavior, is it reasonable to expect that less proximate and more ambiguous hazards, such as global warming, will promote significant behavior change?

Hamilton and Wright argue the salience of everyday demands and criticize academic preoccupation with issues that "should" occupy public attention:¹¹

A peculiar bias appears to be operating here. There is a refusal to see, face, or think about the everyday routines of human existence. One might even put this forward as a general proposition: advanced intellectuals ordinarily prefer exotic explanations to those involving everyday human routines.

Based on approximately 40 years of survey data, they argue for the salience of issues related to family, interpersonal relationships and routine economic problems.

Environmental surveys also support this interpretation. Concerns about personal and family health and safety appear to motivate environmental sensitivity more so than ecological concerns.¹²

⁸ K. L. Petersen & Jane E. Dutton, *Centrality, Extremity, Intensity: Neglected Variables in Research on Attitude-Behavior Consistency*, 54 Soc. Forces 393 (1975).

⁹ A. V. T. Whyte *From Hazard Perception to Human Ecology*, Themes From the Work of Gilbert F. White 240-271 (Robert W. Kates & Ian Burton, eds. 1986).

¹⁰ *Id.* at 256.

¹¹ Hamilton & Wright, *supra* note 5, at 390.

¹² Gregory W. Fisher et al., *What Risks are People Concerned About?* 11 Risk

Furthermore, research indicates that domain-specific measures, i.e., measures of intentions to behave in specified ways in delimited contexts, link much more powerfully to behavior than generalized environmental attitudes do.¹³

If the demands of routine life preoccupy most people, then what do high levels of concern for environmental issues mean in terms of potential support? One answer might be that concern correlates significantly with an expressed willingness to pay for environmental clean-up and mitigation. Research on expressed willingness to pay (WTP) for environmental action is well established and the problems in measuring WTP have been discussed in great detail.¹⁴ But, following the previous arguments, are the WTP items themselves reflecting salient underlying attitudes? There are reasons to doubt that they are.

First, willingness to pay measures assume a set of preferences that can be elicited in a survey. Zaller¹⁵ raises serious doubts that people have stable sets of preferences for any attitude domain, particularly for those domains usually explored in opinion polls. His arguments suggest that stable sets of preferences are unlikely to exist for things not having noticeable impacts on the everyday lives of people.

Second, the pattern of results consistently characterizing WTP studies on environmental issues strongly hint at an unnoticed contingency. While pollsters note a substantial public willingness-to-pay they also note a public belief that environmental concerns can be successfully addressed without economic sacrifice.¹⁶ A substantial majority of Americans believe that a clean environment and economic growth are complementary.¹⁷ Rather than indicating unbridled enthusiasm, however, these results may imply that public support for environmental initiatives is contingent upon economic stability and growth. That is,

Anal. 303 (1991); T. A. W. Miller & E. B. Keller, *What the Public Thinks*, EPA J., Mar./Apr. 1991, at 40.

¹³ James D. Gill et al., *Ecological Concern, Attitudes, and Social Norms in Voting Behavior*, 50 *Pub. Opinion Q.* 537 (1986).

¹⁴ Robert C. Mitchell & Richard T. Carson, *Using Surveys to Value Public Goods* (1989); Kenneth Arrow et al., *Report to the NOAA Panel on Contingent Valuation*, 58 *F.R.* 4601 (1993).

¹⁵ John R. Zaller, *The Nature and Origin of Mass Opinion* (1992).

¹⁶ Dunlap & Scarce, *supra* note 4.

¹⁷ Frederick T. Steeper & G. Schneiders, *Environment Opinion Study, Inc., Second National Survey*, Market Strategies, June 1991, at 1.

the public may be willing to have more societal resources devoted to the environment only if it will not require substantial personal sacrifice. While these same survey respondents select issues such as wildlife protection over local industry in the abstract, their actual responses to real job loss threats are, at best, problematic.

Finally, certain types of WTP questions tend not to elicit majority support: those that suggest the possibility of real personal inconvenience or sacrifice.¹⁸ Issues requiring personal sacrifice are precisely those that can be considered salient for most respondents. In other words, most WTP questions are probably not tapping salient underlying attitudes. In the research reported below, we do not assess WTP as it is typically measured by economists. We do, however, measure the willingness to support policies that require either monetary or life-style sacrifices.

If salience is crucial in inferring solid support for environmental issues in general, how important is it in inferring solid support for low-signal environmental issues, such as global warming?¹⁹

Polls indicate that a majority of U.S. citizens report having heard something about global warming and express support for government policies to slow or reduce the build-up of greenhouse gasses.²⁰ However, this issue's scientific uncertainties and complexities are reflected in public confusion over the causes, nature, and likely outcomes of global warming.²¹ Public interest in global warming may reflect a socially normative concern for environmental issues in general rather than a well-differentiated set of beliefs and concerns about global warming specifically.²² The link may be very weak between the

¹⁸ Cohn, *supra* note 3.

¹⁹ Silvio O. Funtowicz & Jerome R. Ravetz, *Three Types of Risk Assessment and the Emergence of Post-Normal Science*, *Social Theories of Risk* 880 (Sheldon Krimsky & Dominic Golding, eds., 1992).

²⁰ Willett Kempton, *Public Understanding of Global Warming*, 4 *Soc'y & Nat. Resources* 331 (1991); 3 John Doble, et al., *Science and the Public: A Report in Three Volumes* (1990); Bord, et al., *Communicating Cumulative Long-Term Risks; Report to the U.S. EPA* (1993).

²¹ Ann Bostrom et al., *What Do People Know About Global Climate Change? 1. Mental Models; 2 Survey Studies of Educated Laypeople*, 14 *Risk Anal.* 959 (1994); E. William Colglazier, *Scientific Uncertainties, Public Policy, and Global Warming: How Sure is Sure Enough*, 19 *Pol'y Stud. J.* 61 (1991); Roger E. Kasperson et al., *Sustainable Development, Science, and Policy* 467 (1990); Kempton, *supra* note 20; Willett Kempton, *Will Public Environment Concern Lead to Action on Global Warming*, 18 *Ann. Rev. of Energy & Env't* 217 (1993).

socially normative responses expressed in opinion polls and actual support for initiatives to moderate global warming or its effects.

If public interest in global warming, as reflected in opinion polls, primarily reflects a socially normative concern for anything labeled "environmental," there should be noteworthy differences in cognitive structures between those who are well-informed and those who are not. Well-formed attitudes are characterized by greater complexity: reflected in greater content and more intricate relationships.²³ The poorly informed are likely to simply lump environmental issues in a general category of social good. Thus, poll questions focusing on environmental issues of all kinds should cluster in the poorly-informed but demonstrate greater differentiation in the well-informed.

Research indicates that the impact of low-signal environmental issues on public opinion may be especially susceptible to media attention accompanying sporadic natural events. Ungar²⁴ argues that a correspondence between public concern and public action depends on the experience of "dramatic, real-world events." He demonstrates that the salience of global warming, as both a critical national and global concern, peaked with the oppressive heat of 1988 and virtually evaporated in the unusually cold winter of 1989.

Kempton²⁵ suggests that greater public education on global warming may help insure public motivation to support environmental initiatives while providing information to choose those policy initiatives most likely to be effective in mitigating global warming. Policy initiatives, however, also vary in terms of their demands for personal sacrifice. Does more knowledge about global warming translate into a greater acceptance of personal responsibility and increased willingness to sacrifice valued life-styles?

This study examines attitudes toward global warming. The attitude items are somewhat standard survey fare but the patterns of responses provide insight into the salience of the global warming issue. Given the discussion above, it is with some trepidation that we attempt to assess

²² Doble, *supra* note 20.

²³ John R. Anderson, *The Architecture of Cognition* (1983).

²⁴ Sheldon Ungar, *The Rise and (Relative) Decline of Global Warming as a Social Problem*, 33 Soc. Q. 483 (1992).

²⁵ Kempton, *supra* note 20, at 343.

preferences related to this potential environmental process that, so far, is not having obvious impacts on daily life. Based on the above discussion, the following hypotheses are offered:

H1 in a list of both social and environmental issues, expressed concern will be highest for issues that are directly related to individual health and well-being;

H2 measures of knowledge about global warming will demonstrate some accurate understanding but will also reflect substantial error;

H3 accurate knowledge of causes of global warming will be predictive of level of concern but may not be the most important predictor;

H4 willingness to pay for policies that could slow global warming will be higher for policies that affect business and industry directly and lower for policies that demand personal sacrifice; and

H5 accurate knowledge of the causes of global warming will be somewhat predictive of willingness to pay.

Research Methods

In December of 1994 and January of 1995 questionnaires were completed by 654 undergraduate students at a large state university. Questionnaire items were modifications, additions, and in some cases replicas, of those used in the Report, "Science and the Public... Volume III: Global Warming Caused by the Greenhouse Effect".²⁶ Four subsets of questions are discussed below:

- measures of concern for four environmental and six social problems (a five-point scale with verbal designations ranging from "no need for concern" to "moderate concern," to "a lot of concern plus a sixth option entitled "haven't thought about it");
- estimates of whether various activities are causes of global warming (a four-point scale with the verbal designations "not a cause at all", "minor cause", "major cause", and "not sure");
- judgments of six possible outcomes of global warming (almost sure to happen, might happen, almost sure not to happen, not sure);
- the relative urgency of policy options requiring personal sacrifice or burdens placed on business (a four-point scale with the verbal designations "don't do — no matter

²⁶ Doble, *supra* note 20.

what”, “do only if future evidence suggests global warming will have catastrophic effects by the year 2050”, “phase it in gradually over the next 10 years or so”, or “do it immediately”).

The first set of questions provides comparisons between environmental and social concerns. The second and third set assess levels of knowledge. The final set provides a means to judge whether greater knowledge and concern is associated with policy judgments that vary in their demand for personal sacrifice.

Results

Hypothesis one suggests that levels of concern will vary by issue salience: issues that directly affect health and well being will generate more concern than those having more ambiguous or complex relationships to health and well being.²⁷ Table 1 presents levels of concern, in percentages, for social and environmental issues, ordered by relative levels of concern.

Table 1
Level of Concern for Ten Social & Environmental Issues

	<i>Level of Concern</i>					
	<i>n/a</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Job layoffs and difficulty getting jobs	1	1	6	17	36	39
Violent crime	1	1	9	21	32	36
Hazardous wastes in lakes and rivers	2	—	8	26	30	34
Air pollution in major cities	1	1	12	29	38	19
Quality of education in the U.S.	2	2	11	38	28	19
Affordable health care	8	3	16	30	26	17
Global warming	3	5	25	34	22	11
Acid rain	5	3	23	37	23	9
Food shortages in U.S.	10	15	26	22	19	8
Federal budget deficit	9	3	31	33	18	6

N/a indicates no thought about the issue, 1 no need for, and 5 a lot of concern.

Four issues — jobs, violent crime, hazardous wastes and air pollution — are given the top two levels of concern by a majority of respondents. Each, especially jobs, violent crime, and hazardous wastes, has been widely publicized as major social/environmental problems

²⁷ Timothy L. McDaniels et al., *Risk Perception and the Value of Safety*, 12 Risk Anal. 495 (1992).

presenting clear perceived threats to individual health and well-being. Air pollution also elicits majority concern but is substantially below the levels of the other three issues.

Global warming and acid rain rank with the federal budget deficit and food shortages at the bottom of expressed concerns. Public attention to acid rain has greatly diminished in the past decade, and recent long, cold winters are unlikely to focus attention on global warming. The first hypothesis is strongly supported by the data pattern in Table 1.

The second hypothesis reflects findings by Kempton²⁸ and Bostrom et al.²⁹ that there is modest understanding of the global warming issue and substantial misunderstanding among the American public. Table 2 presents the results, in percentages, of judgments about the culpability of eleven potential causes of global warming.³⁰ The table is organized in three sections: problems that are truly causes; problems that are not significant causes and unrelated to nuclear issues; and, problems that are not causes but are related to nuclear issues. This differentiation of "causes" emerged in a factor analysis of all 11 items. Factor analysis indicates the degree to which items in a series correlate or fail to correlate with other items. It reflects a tendency for items to "clump" statistically. Each of the three groups reflects distinct factors with eigenvalues of 2.03 for actual causes, 2.19 for noncauses unrelated to nuclear issues and, 1.56 for noncauses related to nuclear issues. It is a statistical convention to view eigenvalues of at least 1.00 as necessary to indicate a robust factor. Each of these factors also display acceptable levels of internal reliability as reflected by their respective reliability coefficients (Alpha) of .62, .71, and .72, respectively.

Majorities of respondents accurately identify emissions from business, industry, and automobiles, and tropical forest destruction as major causes of global warming. There is, however, substantial misidentification of the use of coal by utilities and the burning of fossil fuels to heat and cool homes.

²⁸ Kempton, *supra* note 20.

²⁹ Bostrom, *supra* note 21.

³⁰ Decisions about causes of global warming, and other issues of expert opinion, were taken from EPA (1989) and President William J. Clinton & Vice President Albert Gore, Jr., *The Climate Change Action Plan* (1993).

Table 2
 Evaluation of 11 Potential Causes of Global Warming (in %)

	<i>Not Sure</i>	<i>Not a Cause</i>	<i>Minor Cause</i>	<i>Major Cause</i>
Causes				
Pollution/Business & Industry	2	1	24	73
Automobile Use	2	3	36	59
Tropical Forest Destruction	5	5	25	65
Use of Coal by Utilities	11	9	36	44
Heating and Cooling Homes	10	21	56	14
Not Causes — Nonnuclear				
Aerosol Spray Cans	2	14	52	32
Chemicals to Control Insects	13	20	49	18
Depletion of Atmospheric Ozone	4	13	19	64
Leaks of Refrigeration Chemicals	9	16	48	27
Not Causes — Nuclear				
Nuclear Plant Emissions	10	34	37	19
Testing Nuclear Weapons	34	22	29	15

The other six issues have little, or nothing, to do with global warming but responses show a significant misidentification of several as causes of global warming. As other researchers have noted,³¹ there is a great deal of public confusion over the depletion of atmospheric ozone: a large majority misidentifies atmospheric ozone depletion as a major cause of global warming.

It is common practice in surveys to ask respondents a general question concerning their familiarity with an issue. Our survey asked if respondents had "heard or read anything about global warming." Forty percent answered "a lot," 44% "some," 15% "a little," and only 2% "nothing at all." While we do not expect this self-identification to be a good predictor of concern for, or support for policies designed to slow, global warming, it will be entered in subsequent multi-variate models as a possible predictor.

Table 3 includes a list of six possible outcomes of global warming. All but "reduction of the ozone layer" are considered realistic possibilities by climate experts. Most respondents reflect choices compatible with expert opinion. A substantial minority, however, fails to perceive local climate shifts as a potential outcome while large

³¹ Kempton, *supra* note 20; Bostrom, *supra* note 21.

majorities see the reduction of the ozone layer as likely. The confusion between global warming and atmospheric ozone depletion is again obvious. Hypothesis two is strongly supported.

Table 3
Evaluation of Potential Impacts of Global Warming;
How Likely are the Following? (in %)

Impacts	<i>Not Sure</i>	<i>Almost Sure Not to Happen</i>	<i>Might Happen</i>	<i>Almost Sure to Happen</i>
4-5 degree rise by 2050	8	9	48	35
Melting ice caps at the poles	7	8	47	38
Reduction of ozone layer	12	9	37	42
Local climate shifts	14	33	38	15
Sea level rise	9	5	39	46
Animals/plants — extinct	5	6	40	49

In addition to the specific outcome questions, a single item asked the respondent's opinion about how "...likely it is that human activities will cause global warming in the next 50 years." Only 2% of respondents chose "definitely will not," 15% chose "it is doubtful...", 29% selected "it probably will happen in the next 50 years, 10% selected "it might not be happening now but is sure to happen within the next 50 years, while 44% decided it is "already" happening. This item may reflect perceived risk and will also be entered as a possible predictor in subsequent multi variate analysis.

Hypothesis 3 questions the assumed relationship between knowledge and concern. Is a detailed understanding of the global warming phenomenon necessary to muster increased concern for this issue? Table 4 suggests not. While the correct identification of causes is a strong predictor of concern, so is the incorrect identification of non-nuclear causes, the self-identification of level of informedness item, the judgement of the likelihood of the six suggested impacts (one of which is completely false), and an estimate of how likely global warming is in the next 50 years.

A correct understanding of causes increases concern as does misunderstanding, the feeling of relative awareness and the tendency to view global warming as likely and risky. Consistent with the third hypothesis, concern is a function of much more than accurate knowledge.

Table 4
 OLS Analysis, b Coefficients, of Correlates of Degree of Concern
 for Global Warming (Standard Errors in Parentheses)

Correctly Identifies Major Causes of Global Warming	.12*** (.02)
Incorrectly Identifies Causes of Global Warming (non-N.C.)	-.11*** (.02)
Incorrectly Identifies Causes of Global Warming (N.C.)	.05 (.03)
Have you Heard Anything About Global Warming?	.17*** (.06)
Judgment of the Likelihood of 6 Global Warming Impacts	.15*** (.02)
How Likely is Global Warming in the Next 50 years?	.28*** (.03)
<hr/>	
$R^2 = .28$	

Hypothesis 4 suggests that respondents are more willing to levy costs on business and industry than to accept personal costs to slow global warming. Table 5 presents answers to the willingness to pay questions divided into those that affect individuals directly and those that target primarily business and industry. These two clusters of items are also supported by factor analysis. The (alpha) reliability for the “people pay” cluster is .73; it is .62 for the “business pay” cluster. Their respective eigenvalues are 2.45 and 1.87.

Except for a fossil fuels tax levied on households, the majority of respondents appear reluctant to accept the banning of low-mileage cars, the regulation of thermostats for heating and cooling, and a significant gas tax increase. There is overwhelming support, however, for requiring businesses to meet energy efficiency standards and forcing them to improve fuel use efficiency.

While hypothesis 4 appears to be supported by the pattern of results in Table 5 it is difficult to unambiguously interpret what the “people pay” items indicated to respondents. Consistent with hypothesis 4, they may have been adverse to accepting significant personal costs. They may also have viewed these policies as draconian and beyond the limits of reasonable government. Two factors argue for their unwillingness to accept personal cost: first, all four items formed a solid factor which indicates an underlying similarity in interpretation by respondents;

second, other surveys that have included personal cost items find similar results.³² In either case, these respondents are much more supportive of regulating industry than of regulating themselves.

Table 5
Support for Policies Having the Potential to Slow Global Warming (In %)

	<i>Don't Do</i>	<i>Wait for Evidence</i>	<i>Phase in Gradually</i>	<i>Do Now</i>
People Pay				
Add household fossil fuels tax	17	26	45	12
Ban low-mileage cars	30	27	33	10
Regulate thermostat settings	34	27	23	16
Raise gas tax significantly	32	20	35	13
Business Pays				
Require firms to meet energy efficiency standards	2	9	51	38
Require business/industry to improve fuel efficiency	3	15	59	24

Hypothesis 5 suggests a link between accurate knowledge and support for policies designed to slow global warming. Equally important, however, is the implication in Hypothesis 5 that accurate knowledge is only part of the support equation. In other words, the fifth hypothesis implies that teaching people objective truths about global warming may not be necessary to muster support for mitigation policies.

Table 6 presents the results of ordinary least squares regression analyses in which “people pay” and “business pay” scales are the dependent variables. Because the dependent variable is an ordinal scale OLS is a legitimate technique to use in this circumstance. Seven independent variables are entered in the analyses: the simple, single, question about concern for global warming reflected in Table 1; the single item concerning how informed one is about global warming; the five-item scale reflecting “major causes,” the four-item scale reflecting “not causes — non nuclear,” and the two item scale reflecting “not causes — nuclear” (Table 2); the six-item scale asking for judgments about the certainty of six outcomes (Table 3); and, the single item asking for an estimation of how likely global warming is in the next 50 years. In the case of those items that included “don’t know” type

³² Doble, *supra* note 20.

responses, the don't knows were consigned to the mid-category which is a common procedure. This is a conservative technique. Analyses done omitting the "don't know" responses have considerably higher R2.

Table 6

OLS Analysis — Correlates of Willingness to Incur Personal Costs ("People Pay") and Willingness to Support Increased Costs on Business and Industry ("Business Pays") to Moderate Global Warming Impacts ("b" coefficients & S.E. in parentheses)

	<i>People Pay</i>	<i>Business Pay</i>
General measure of concern	.57** (.14)	.32*** (.08)
Consider self informed	.14 (.20)	.04 (.12)
Correctly identifies major causes of GW	.31*** (.08)	.23*** (.05)
Incorrectly identifies causes of GW (non-nuc)	-.06 (.08)	.04 (.05)
Incorrectly identifies causes of GW (nuclear)	.18 (.13)	-.25*** (.08)
Judgment of the degree of certainty of six outcomes	.08 (.06)	.08* (.04)
How likely is GW in the next 50 years	.17 (.12)	.11 (.08)
Adjusted R ²	.12	.14

Table 6 demonstrates that only two variables significantly relate to "people pay": overall concern and the correct identification of "major causes." There are four significant predictors for "business pay"; the two items significant for "people pay"; the incorrect identification of nuclear causes of global warming (a negative relationship); and, the scale measuring judgments of the certainty of six global warming outcomes. Note that the item asking for a self-estimate of degree of informedness has no predictive value.

The first noteworthy aspect of Table 6 is the low R2 coefficients. Judgments of monetary expenditures are a product of multiple inputs, many of which are not measured in this study. There are, for example, no measures of ability to pay or attitudes toward specific or general tax policies. It would be unrealistic to expect the variables included in Table 6 to explain a high percentage of variance in the dependent variables.

The pattern of results, however, is provocative. Those who have high levels of concern for global warming and an accurate understanding of its causes are more willing to accept personal costs. The willingness to support costs levied on business and industry, however, reflects a mix of concern, both accurate and inaccurate perceptions, and an estimate of risk as reflected in the probabilities of the six suggested outcomes. The statistical significance of the incorrect identification — nuclear causes variable suggests that those sensitive to nuclear contributions to environmental problems are also more likely to support taxes levied on industry. Hypothesis 5 receives only partial support.

Conclusions

These findings suggest that the relationship between knowledge and concern, and between knowledge, concern and support for policies designed to slow global warming, may be more complex than usually acknowledged.

Global warming is not a salient attitudinal issue. Job difficulties, violent crime, and hazardous chemical wastes — clear perceived threats to health and well-being — are salient. The general assumption that attitude-relevant behaviors are more likely to flow from salient attitudes bodes ill for the hope that people will consciously alter their lifestyles to slow global warming impacts. However, those respondents who do report greater concern for global warming also indicate a greater willingness to sacrifice.

Consistent with Ungar's³³ argument, concern for global warming may be increased at least as much by misinformation as it is by an accurate understanding of the facts. Anything that heightens perceptions of risk, whether accurate or not, appears to increase concern.

Concern and support for policies, however, have somewhat different correlates. Support for policies designed to slow global warming, both those demanding personal sacrifice and those levying taxes on industry, is significantly related to an accurate understanding while the only inaccurate understandings that relate to policy support are those linking nuclear events and global warming. Furthermore, the latter is only significantly related to policies that levy taxes on industry. Assumptions

³³ Ungar, *supra* note 24.

of a link between nuclear events and global warming increase the likelihood of supporting taxes levied on industry but not taxes that indicate a personal sacrifice.

The propensity to favor taxes on business and industry over those levied on individuals could reflect an anti-business bias, a failure to understand the link between business costs and the costs of goods and services, or a sense that global problems require large-scale solutions. Because the policy issues stated the average cost to the consumer of increased taxes on business and industry, the respondent was aware of the personal economic consequences. The finding that those seeing nuclear causes to global warming are more likely to favor taxes on business and industry might reflect a tendency to blame business and industry for our most serious environmental problems. Also, there has been relatively little effort to make people aware that their personal consumption patterns are the ultimate engine driving environmental degradation.

Although not definitive, the data suggests that there may be real benefits to raising the knowledge level of the general public concerning global climate change. Heightened concern, based on either accurate or inaccurate information, can promote support for environmentally friendly policies. Accurate information, however, may increase the willingness to accept personal sacrifices. Inaccurate information does not appear to have this effect, at least not in the case of global warming.

