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Ecological Economics 58 (2006) 814–829

ECOLOGICAL ECONOMICS

www.elsevier.com/locate/ecolecon

ANALYSIS

Civic cooperation, pro-environment attitudes, and behavioral intentions

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Received 24 May 2005; received in revised form 2 September 2005; accepted 12 September 2005
Available online 19 October 2005

Abstract

Using data from approximately 30,000 individuals in over 30 countries, we find evidence that an individual's pro-environment attitudes and behavioral intentions to pay higher taxes to protect the natural environment are positively associated with her attitudes toward civic cooperation. The influence of civic cooperation on environmental attitudes varies with the level of development and the environmental quality of the country in which an individual lives. Our results indicate that civic cooperation is a key to promoting pro-environment attitudes in low income countries.
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Keywords: Civic cooperation; Public goods; Environmental preferences; Environmental organizations

1. Introduction

Although the classic treatment of public goods highlights the lack of incentives for self-interested individuals to contribute voluntarily to the provision of public goods, in fact such contributions, in the form of volunteerism and charitable giving, are common and widespread. There is also consistent evidence from laboratory experiments that people cooperate and contribute to public goods more than is expected given their incentives to free ride. Economists generally attribute such behaviors to either preferences that include a concern for altruism and fairness or to the adherence to social norms that penalize free riders (Fehr and Fischbacher, 2002; Sugden, 1999; Brekke et al., 2003). In this paper, we examine whether individuals who are more willing to behave according to civic norms that constrain free riding are also more willing to protect the public good of the natural environment. Using a data set of approximately 30,000 individuals in over 30 countries from the World Values Survey conducted during 2000–2001,[1] we show that attitudes toward civic cooperation vary

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[1] The World Values Survey is conducted on national samples (of approximately 1000 individuals) in about 80 countries. The survey asks respondents about a vast array of values, beliefs, and behaviors.

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doi:10.1016/j.ecolecon.2005.09.007

across individuals and are related to attitudes about environmental protection and stated willingness to pay to provide the public good of environmental quality. We show that attitudes and willingness to protect the environment vary with a country's environmental quality and level of economic development. We also find evidence that the effect of civic cooperation on environmental attitudes can be influenced by a country's economic development and environmental quality.

Our results have implications for environmental policy-making in developing countries and industrialized societies. A society's degree of civic cooperation can have important consequences for the development, implementation, and outcome of environmental policies. In transitional economies and developing countries, the success of technology transfer and sustainable development practices depends crucially on overcoming institutional and cultural hurdles through environmental education and activism (Economy, 2004). Similarly, although public participation in environmental decision-making is increasingly common in industrialized economies, valuable and effective decisions require motivated and well informed participants (Beierle and Cayford, 2002). Although we find that individuals who are willing to constrain their free-riding behavior are in general more likely to be willing to provide the public good of environmental protection, our results also suggest that we may not always be able to count on people's sense of social responsibility to improve environmental quality. Country-level macroeconomic conditions can influence attitudes and intentions to pay. Although in some circumstances policy makers may be able to rely on individuals and the environmental movement to act with less government intervention, in other circumstances a more top-down and heavy-handed approach may be more effective.

Our results also improve the understanding of the determinants of demand for environmental quality and can have methodological implications for environmental valuation research. If civic cooperation is a source of heterogeneity that might explain environmental preferences and stated willingness to pay, then questions regarding justifiable civic behavior could be used to model heterogeneous individuals and to check consistency of willingness-to-pay responses.

Section 2 briefly discusses related literature. Section 3 presents our empirical model and a discussion of our data, Section 4 provides our main estimation results, and Section 5 concludes.

2. Related literature

There is evidence from case studies that attitudes toward civic cooperation influence environmental quality. Pretty and Ward (2001) argue social norms can help prevent the degradation of natural resources. Similarly, Katz (2000) shows that, lacking enforceable property rights, social capital can solve market failures in common property resources. A heightened sense of social responsibility can also be a source of informal enforcement: individuals are more likely to monitor polluters and complain about perceived violations the more they disapprove of free riders (see, for example, Blackman, 1998; Pretty and Ward, 2001; Pargal and Wheeler, 1996.). There is also ample evidence from experimental studies that indicates individuals' contributions are determined by their attitudes towards free riding. Ferraro et al. (2003) is a recent example of a public goods experiment in which participants' willingness to pay for a public environmental good depends on altruism and fair contributions.

There is a growing literature relating social capital to economic behavior and outcomes to which our research is also broadly related (see, for example, Knack and Keefer, 1997; Temple and Johnson, 1998; or Narayan and Pritchett, 1999). While much of this work focuses on the impact of social connections and trust on economic efficiency, our work finds an additional role for civic cooperation through its influence on attitudes and behavioral intentions regarding the provision of the public good of environmental quality. Within this strand of the literature, our work is most closely related to Knack and Keefer (1997) who use the third wave of the World Values Survey data to construct an aggregate index of civic norms and examine the empirical relationship between a country's economic growth and its citizens' attitudes toward free riding. In our empirical analysis, we follow Knack and Keefer (1997) to construct an index of civic norms.

Because we allow environmental attitudes and intentions to depend on country characteristics,

including per capita GDP, our work is also related to the literature on the environmental Kuznets curve: an inverse U-shaped relationship between pollution and income. Grossman and Krueger (1993, 1995), Shafik (1994), Selden and Song (1994, 1995) are important seminal studies in this area. More recently, Harbaugh et al. (2002) and Israel and Levinson (2004) argue that the evidence in favor of the existence of an environmental Kuznets curve is not as robust as commonly thought. Israel (2004) also examines the relationship between country-level income and household support for environmental protection using the 1989 Harris survey. Dasgupta et al. (2002) and Copeland and Taylor (2004) critically examine this literature. Although our work differs from the Kuznets curve literature in that we do not seek empirical evidence of a relationship between pollution and economic development, our results might have implications for the different theories that have been proposed to explain the environmental Kuznets curve (see, for example, Andreoni and Levinson, 2001; Israel and Levinson, 2004). If we interpreted behavioral intentions to pay to protect the environment as measures of marginal willingness to pay, as in Israel and Levinson (2004), then the pattern between willingness to pay and country characteristics might provide some insight about the mechanisms underlying the environmental Kuznets curve. However, we note it is not our goal to test any of these theories but to examine how adherence to norms of civic behavior influences stated willingness to protect the environment.

Our study differs from previous work based on case studies, surveys, and experiments in that the scope of the data that we analyze allows us to draw more general conclusions and also allows us to explore whether willingness to provide the public good of environmental quality at the individual level is associated with country characteristics.

3. Empirical model and data

3.1. Empirical model

In order to empirically examine the relationship between civic cooperation, attitudes, and stated willingness to protect the natural environment, we estimate two basic sets of models. We first estimate attitudes as a function of individual and country characteristics:

$$P(\mathrm{ATTITUDE}_{ij}=1) = \Phi(\beta_0+\beta_1\mathrm{CIVIC}_{ij}+\beta_2\mathrm{DEMOGRAPHICS}_{ij}+\beta_3 Z_j+\mathrm{a}_j), \quad (1)$$

where α is a country-specific random effect for the country j in which individual i lives. While we explain the variables in more detail below, ATTITUDE measures attitudes toward environmental protection held by individual i, CIVIC is an index of civic cooperation, DEMOGRAPHICS is a vector containing the age, gender, political activism, dummy variables for education levels, the relative place in the income distribution in that individual's country (i.e., the quintile), and a dummy variable for the size of the town in which the individual lives. In order to examine how country characteristics may affect attitudes, we also include country characteristics Z: the level of development (the natural log of GDP per capita) and two different measures of environmental quality: energy use normalized by GDP per capita and emissions of organic water pollutant normalized by GDP per capita. More details on the data are provided in Section 3.2.

To study the impact of CIVIC on stated willingness to pay, we estimate a second equation by substituting a measure of behavioral intention to protect the environment for ATTITUDE:

$$P(\mathrm{INTENTION}_{ij}=1) = \Phi(\beta_0+\beta_1\mathrm{CIVIC}_{ij}+\beta_2\mathrm{DEMOGRAPHICS}_{ij}+\beta_3 Z_j+\mathrm{a}_j), \quad (2)$$

where INTENTION measures an individual's stated willingness to sacrifice income to protect the natural environment. In order to check the robustness of the index of civic cooperation, we expand Eq. (2) to include individual characteristics that proxy general environmental values that might correlate with CIVIC.

While we have multiple individuals for each country, we have only one observation per individual in the time period 2000–2001. Thus, our data set is formed by having multiple observations for each country and allows us to estimate a country-specific effect via a

random effects procedure.[2] Note, however, that our "panel" data does not contain multiple time periods.

Country-specific data on energy use, emissions of water pollutants, and GDP per capita were obtained from the World Bank's World Development Indicators. All other data come from the fourth wave of the World Values Survey (WVS) conducted in 2000–2001, a survey of individual attitudes and social behaviors conducted simultaneously in several different developed and developing countries. Many others have used the WVS in a wide variety of applications, including Knack and Keefer (1997), Guiso, Sapienza, and Zingales (2003), and DiTella, MacCulloch, and Oswald (2003).[3]

3.2. Data

3.2.1. Measures of willingness to provide environmental protection

We first explore the determinants of environmental attitudes; in particular, we consider an individual's stated willingness to prioritize environmental protection over economic growth, PROTECTION. PROTECTION equals 1 if the individual claims that the statement "Protecting the environment should be given priority, even if it causes slower economic growth and some lost jobs" is "closer to your point of view" than the statement "Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent." We follow the attitudinal model developed by Green and Tunstall (2001) and interpret PROTECTION as an expression of attitudes toward environmental protection.

Individuals who express pro-environment attitudes are not necessarily willing to sacrifice their own income in order to protect the environment. To measure willingness to pay to protect the environment we use a different variable, TAX. TAX is a binary variable equal to one if the individual strongly agrees to the following statement: "I would agree to an increase in taxes if the extra money were used to prevent environmental pollution" (Our results are qualitatively similar when we code TAX = 1 if individuals strongly agree *or* agree.). Following Green and Tunstall (2001), TAX is a behavioral intention, that is, an expression of intention to sacrifice income to protect the environment. The differences between attitudes and behavioral intentions imply that different processes are likely to determine these two variables.[4] Indeed, although more than half of the respondents in our sample agree that protecting the environment should be given priority over economic growth (PROTECTION), the proportion of respondents supporting taxes to improve the environment (TAX) is smaller at 23.5% (see Table 1 for descriptive statistics). In addition to the variability evident across the entire sample, there is also a good deal of variability in these measures even within countries, with the average of the within country standard deviations for PROTECTION and TAX being .49 and .32, respectively.

One issue in using TAX to measure willingness to pay to protect the natural environment is that the answer to this question might capture attitudes toward the appropriate role of government in providing public goods. It is possible that individuals who are frequent free riders might support taxes to protect the environment, not because they care more about the environment than others, but because they believe that only the government can solve a free-riding problem. To address this possibility we also examined another variable that was equal to one if the individual strongly agrees to the following statement: "I would give part of my income if I were certain that the money would be used to prevent environmental pollution." We received identical results for this variable and TAX, mitigating the concern that TAX is eliciting attitudes about appropriate roles of government and not about willingness to pay for environmental quality. For the sake of brevity, we report only the results for TAX. TAX is comparable to variables used in previous studies such as Israel and Levinson

[2] Due to an incidental parameters problem, probit fixed effects models cannot be estimated. A fixed effect specification would require the assumption that individual responses relate linearly to individual characteristics.

[3] Sociologists have used the World Values Survey and other opinion polls to explore cross-country differences in the support for environmental protection. See, for example, Inglehart (1995) and Brechin and Kempton (1994).

[4] Although individuals could interpret these questions differently for cultural and institutional reasons, these differences can be treated as measurement error in the dependent variable and captured by the error term.

Table 1
Descriptive statistics

Variable	Description	Countries	Mean	S.D.
TAX	=1 if willing to pay higher taxes to support environmental protection	34	.235	.430
PROTECTION	=1 if priority is environmental protection over economic growth	19	.526	.513
CIVIC	0–4 scale of civic behavior	34	2.206	1.610
PROENV	=1 if belong to or do unpaid work for environmental organization	34	.059	.239
TRUST1	=1 if "Not at all" confidence in environmental movement	16	.063	.25
TRUST2	=1 if "Not very much" confidence in environmental movement	16	.25	.447
TRUST3	=1 if "Quite a lot" confidence in environmental movement	16	.437	.512
TRUST4	=1 if "A great deal" confidence in environmental movement	16	.25	.447
GDP	Natural log of GDP ($1995 purchasing power parity adjusted), average 1995–99	31	9.16	.935
BOD	Organic water pollutant emissions (kg per day) per GDP, average 1995–1999	23	70.45	158.58
ENERGY	Energy intensity=kg oil-equivalent energy use per GDP, average 1995–99	30	.263	.152
Age	Age	34	38.09	14.46
Male	=1 if male	34	.441	.504
POLITICAL	0–5 involvement in political activities scale	31	.782	1.06
Educ1	=1 if no formal education	34	.088	.288
Educ2	=1 incomplete primary education	34	.147	.359
Educ3	=1 complete primary education	34	.059	.239
Educ4	=1 if incomplete secondary education (technical/vocational)	34	.118	.327
Educ5	=1 if complete secondary education (technical/vocational)	34	.147	.359
Educ6	=1 if incomplete secondary education	34	.206	.410
Educ7	=1 if complete secondary education	34	.088	.288
Educ8	=1 if university education	34	.147	.359
Income1	=1 if bottom income quintile	34	.176	.387
Income2	=1 if second income quintile	34	.382	.493
Income3	=1 if third income quintile	34	.118	.327
Income4	=1 if fourth income quintile	34	.235	.430
Income5	=1 if highest income quintile	34	.088	.288

(2004) and to elicitation questions commonly used in environmental valuation surveys.

3.2.2. Measure of civic cooperation

A series of questions in the WVS captures individual attitudes toward civic norms that limit free-riding behavior. Using these data, we create an index of civic cooperation, CIVIC. In constructing this index, we follow Knack and Keefer (1997) who use the third wave of the World Values Survey to formulate an indicator of civic cooperation by adding responses to questions regarding whether certain free-riding behaviors can ever be justified. We examine four behaviors that reflect a person's willingness to limit narrow self-interested behavior for the sake of the common good and we add a 1 to CIVIC each time the respondent states that a given behavior is never justifiable. These behaviors are: (i) "Claiming government benefits to which you are not entitled;" (ii) "Avoiding a fare on public transport;" (iii) "Cheating on taxes if you have a chance;" and (iv) "Someone accepting a bribe in the course of their duties." Thus, CIVIC takes on values of 0 to 4, with 4 being associated with the highest levels of civic cooperation. We can interpret a 1-unit change in CIVIC as an additional constraint that the individual states she is willing to impose on herself to limit free-riding behavior.

The sample average of the index of civic cooperation, CIVIC, is 2.2 and the standard deviation is 1.60. Accepting bribes is the behavior most people (75% in the sample) strongly believe is unjustifiable. For 37% of the individuals in the sample, none of the four behaviors is ever justifiable. The second most common pattern is to claim that all the behaviors are justifiable (15% of the sample). Even within countries, there is a good deal of variability in this measure: the average of the within country standard deviation of CIVIC is 1.35. Importantly, these descriptive statistics convey a wide variation in attitudes towards civic cooperation.

If civic cooperation is associated with the desirability of collaborating in the provision of public goods and civic-minded individuals feel a greater sense of responsibility toward public goods provision, then CIVIC should be positively related to pro-environment attitudes and willingness to pay, everything else equal.[5] As we mentioned earlier, high values of CIVIC might be caused by altruistic preferences or by a belief that following rules is optimal. Our data are unable to determine the source of civic cooperation, and we remain agnostic about this point. Instead, we take a conservative approach and focus our analysis on the effects of these constraints, regardless of their genesis. Knack and Keefer (1997) go further in their interpretation of CIVIC, calculating country-wide averages and interpreting them as the level of social capital in a given country. Later, we describe robustness checks that we employ to verify that measuring civic cooperation with an index is appropriate.

3.2.3. Demographics

Although CIVIC explicitly examines attitudes about free-riding behavior, political activism may also be related to civic cooperation and to environmental attitudes. Therefore, we also construct an index of political activism and examine how it influences attitudes and willingness to pay. To control for an individual's political activism, we construct an index by adding 1 if the individual has ever (i) signed a petition, (ii) joined in boycotts, (iii) attended lawful demonstrations, (iv) joined unofficial strikes, and (v) occupied buildings or factories. Thus, the index POLITICAL can take on the values 0 to 5, with five indicating the highest level of political activism. On average, respondents do not engage in political activism. The sample mean of the index POLITICAL is only .78.

Other demographic factors are generally thought to be determinants of the demand for environmental quality. We include the respondent's age, AGE; the respondent's gender: MALE equals 1 if the respondent is male; and income categories. We construct five categorical variables for each income quintile group, from INCOME1 that equals 1 if the respondent's household income is in the bottom income quintile within their country to INCOME5 that equals 1 if the respondent's household income is in the country's top income quintile. In the regressions, we exclude the fifth quintile so that estimates of income categories are interpreted relative to the richest group in each country. Similarly, we include the respondent's education. There are eight categorical variables from EDUCATION1 equal to 1 if the individual has no formal education to EDUCATION8 equal to 1 if the individual has university-level education. In the regressions, we exclude individuals with no formal education so that estimates are interpreted relative to the least educated group. The average individual in our sample is around 40 years old, has some secondary education, and is in the second quintile of the income distribution. Finally, we include dummy variables for the size of the town in which an individual lives because living in urban vs. rural areas affect the benefits derived from environmental protection.

3.2.4. Other individual characteristics: environmental values

In the context of the WVS, we can interpret responses to the question regarding paying higher taxes as a choice variable that can be influenced by a person's environmental values. If being civic-minded correlates with pro-environment values, then CIVIC could influence willingness to pay higher taxes both directly and indirectly through its association with values. To isolate the effect of civic cooperation and check that its coefficient estimates are robust, we include in some of the models explaining TAX variables that capture general values regarding the natural environment. For example, individuals who subscribe to environmental publications or participate in activities promoted by environmental organizations may be more likely to learn about the value of preserving the natural environment. Thus, it is common in stated-preferences surveys to include subscription to environmental publications or membership in environmental groups as a determinant of willingness to pay for a specific environmental or natural resource.[6] In a simi-

[5] Harris and Brown (1992) argue that how individuals ascribe responsibility to improve environmental quality in contingent valuation surveys influences stated willingness to pay.

[6] We thank the referees for their suggestion that we explore the effects of including these individual characteristics as determinants of willingness to pay higher taxes in order to protect the environment.

lar manner, we include in some of our estimations of TAX the variable, PROENV. PROENV equals one if the individual claims he or she belongs to or does unpaid work for conservation, environmental, or animal rights groups.[7]

Civic-minded individuals are arguably more likely to sympathize with and participate in the goals and efforts of social movements than free riders. Thus, we consider an alternative measure of environmental values that proxy for the level of trust in the environmental protection movement. We utilize the answer to an additional question in the World Values Survey that is asked in only about one-third of our sample (around 10,000 individuals): "...how much confidence do you have in...The Environmental Protection Movement?" We use the answer to this question to create four dummy variables, one for each response to this question: "A great deal," TRUST4; "Quite a lot," TRUST3; "Not very much," TRUST2; and "Not at all," TRUST1 with "Not at all" as the default category. Almost 69% of the individuals in the reduced sample claim to have either "a great deal" or "quite a lot" of confidence in the environmental movement. The effect of these trust dummies is a priori ambiguous as it is unclear what "confidence" refers to. It might indicate that the individual believes in the message and objectives of the environmental movement or it might indicate that the individual thinks the environmental movement is effective in improving environmental quality. In the first case, we should expect expressing higher levels of trust has a positive effect on willingness to pay taxes; in the second case, higher levels of trust could have a zero or even negative effect on willingness to pay taxes.[8]

We note that PROENV and level of confidence in the environmental movement could be correlated with the error term of TAX; thus, when presenting our results we do not dwell on the interpretation of the coefficients of these variables and focus instead on how they affect the estimate of CIVIC.

3.2.5. Country-specific factors

Although we include country-specific effects in all our models through the error term of the random effects estimation, we are still interested in examining the role that a country's level of economic development and environmental quality may play in determining an individual's attitudes and behavioral intentions.[9] We estimate models that include a country's per capita GDP (measured in 1995 dollars adjusted for purchasing power parity) to gain insight into the influence of economic development on attitudes and intentions. Because the distribution of GDP is positively skewed, we transform the explanatory variable taking the natural log of average real per capita GDP for the period 1995–1999. We might expect the marginal effect of CIVIC on attitudes and intentions to vary across countries. For example, civic-minded individuals might participate more often and actively in supporting the environment in poor countries where public institutions cannot provide environmental protection. In rich countries where relatively extensive environmental regulations are in place, this effect may not be important. On the other hand, civic-minded individuals in developing countries might weigh aggregate income growth more heavily than environmental protection. To test the hypothesis that the impact of CIVIC varies with GDP, we include an interaction term between GDP and the index of civic cooperation.

We report results for two variables that control for environmental quality. We use average organic water pollutant emissions (kg per day) divided by dollar of real GDP per capita for the period 1995–1999 and label this variable BOD.[10] We also use ENERGY, calculated as the average kilograms of oil-equivalent energy use per dollar of real GDP per capita (or energy intensity) for the period 1995–1999 (Although we also used CO_2 emissions as a third measure of environmental quality, this variable is highly correlated with

[7] Although false reporting can be a problem in social surveys, descriptive statistics show the rate of respondents who claim to belong to environmental groups or who do unpaid work is low, about 6% of the sample.

[8] In some specifications we also included interaction terms between CIVIC and the trust dummies but found statistically insignificant estimates.

[9] Israel and Levinson (2004) find that country fixed effects explain a large proportion of total variability in willingness-to-pay measures; because of their specification, however, they are not able to explore which and how country characteristics influence willingness to pay to protect the environment.

[10] Our measure of water pollution, BOD, is the biochemical oxygen demand. It is the amount of oxygen that bacteria in the water will consume in breaking down waste.

ENERGY and we obtained qualitatively similar results.). We divide organic water pollutant emissions and energy use by per capita GDP because these measures are correlated with a country's economic development. An alternative specification would be to have absolute measures of environmental quality and per capita GDP enter the equation as separate variables. Their high correlation, however, creates multicollinearity. Thus, BOD and ENERGY measure environmental quality relative to a country's economic development. For example, the USA, India, and Russia are in the top 25% of the distribution of water pollution per capita GDP; while Russia and Ukraine are in the top 25% of the distribution of energy use per GDP. We also include in some of our models interaction terms between the measures of environmental quality and CIVIC to explore whether a country's environmental quality influences the effect of being civic-minded. ENERGY, BOD, and GDP were all obtained from the World Bank's World Development Indicators.[11]

4. Results

We present results in Tables 2, 3, and 4. Table 2 presents results for PROTECTION and TAX when only individual characteristics are included. Tables 3 and 4 present results of models including country characteristics. We start our discussion by focusing on Table 2, however, before we discuss the results regarding the index of civic norms, we comment on a number of other findings that generally hold across specifications. First, the index of political activism is a statistically significant and positive predictor of attitudes and willingness to pay. Individuals with more education are more likely to state their support for environmental protection than individuals with low levels of education. Age and gender are generally not significant predictors of attitudes after controlling for other demographic characteristics. Low income individuals are less likely to state they are willing to prioritize environmental protection over economic growth and are also less likely to be willing to pay higher taxes to protect the environment. Estimates of income categorical variables indicate that respondents in the second income quintile are in general less likely to prefer environmental protection over economic growth than respondents in the third, fourth, and fifth income quintiles; and respondents in the second and third income quintiles are in general less likely to be willing to pay higher taxes to protect the environment than respondents in the fourth and fifth income quintiles. Income quintiles are a measure of income relative to others in the individual's country and, therefore, do not tell us anything about absolute levels of income. However, the pattern of responses by income quintile continues to hold in later estimations in which we also include per capita GDP, providing some evidence consistent with the idea that the environment is a luxury good—lower income individuals are less likely to express a willingness to pay for higher environmental quality.

In the base models with individual characteristics only (Table 2), we find consistent evidence for the expected positive relationship between attitudes toward free riding and stated support for environmental protection. The coefficient estimates of CIVIC in the models estimating TAX and PROTECTION are positive and statistically significant at the 1% level. At the bottom of Table 2, we also present the average and the standard deviation of the individual marginal effects of CIVIC. The average marginal effect of CIVIC in explaining PROTECTION is 1.6 percentage points. In the TAX models, the magnitudes of these effects are similar, ranging from 1.35 percentage points to 1.45 percentage points. We also use the base models of columns 1 and 2 to calculate the change in the likelihood of PROTECTION and TAX that result from a one-unit change in CIVIC for the average individual in the sample and obtain values comparable to the average of individual marginal effects. For example, based on the coefficient estimates in Table 2, column 1, for a 40-year old female in the second quintile of the income distribution with some secondary education, imposing an additional constraint on free-riding behavior (i.e., increasing CIVIC by one) increases the probability of being willing to prioritize environmental protection over economic growth by approximately 1.5 percentage

[11] Although one might want to include both GDP and a measure of environmental quality in the same estimation, the two measures are correlated and our random effects probit specification does not converge when both GDP and environmental quality are included at the same time.

Table 2
Random effects probit models (with individual characteristics only)

	(1)	(2)	(3)	(4)	(5)
	PROTECTION	TAX	TAX	TAX	TAX
CIVIC	0.041 (0.008)***	0.065 (0.007)***	0.065 (0.007)***	0.056 (0.010)***	0.055 (0.010)***
TRUST2				0.042 (0.054)	0.037 (0.054)
TRUST3				0.189 (0.052)***	0.177 (0.052)***
TRUST4				0.526 (0.055)***	0.503 (0.056)***
PROENV			0.323 (0.031)***		0.252 (0.044)***
POLITICAL	0.061 (0.012)***	0.105 (0.009)***	0.104 (0.009)***	0.095 (0.012)***	0.092 (0.012)***
Age	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	−0.000 (0.001)	−0.000 (0.001)
Male	0.008 (0.024)	0.031 (0.019)*	0.027 (0.019)	0.012 (0.027)	0.007 (0.027)
Educ2	0.036 (0.048)	−0.089 (0.046)*	−0.069 (0.045)	−0.167 (0.059)***	−0.166 (0.059)***
Educ3	0.158 (0.061)***	0.025 (0.048)	0.082 (0.048)*	0.011 (0.066)	0.011 (0.066)
Educ4	0.228 (0.047)***	0.041 (0.045)	0.057 (0.045)	−0.009 (0.055)	−0.001 (0.055)
Educ5	0.172 (0.056)***	0.082 (0.050)	0.102 (0.049)**	−0.030 (0.069)	−0.032 (0.069)
Educ6	0.295 (0.049)***	0.124 (0.045)***	0.131 (0.045)***	0.049 (0.058)	0.051 (0.058)
Educ7	0.295 (0.055)***	0.134 (0.049)***	0.145 (0.049)***	0.039 (0.065)	0.038 (0.065)
Educ8	0.414 (0.049)***	0.194 (0.045)***	0.181 (0.045)***	0.112 (0.057)*	0.099 (0.057)*
Income1	0.022 (0.050)	0.006 (0.039)	−0.013 (0.039)	−0.008 (0.059)	0.009 (0.059)
Income2	−0.121 (0.047)**	−0.087 (0.037)**	−0.113 (0.036)***	−0.160 (0.054)***	−0.146 (0.055)***
Income3	−0.016 (0.046)	−0.062 (0.036)*	−0.075 (0.036)**	−0.134 (0.053)**	−0.130 (0.054)**
Income4	−0.005 (0.049)	0.011 (0.037)	0.003 (0.037)	−0.040 (0.056)	−0.038 (0.057)
Constant	−0.380 (0.082)***	−1.472 (0.066)***	−1.495 (0.065)***	−1.153 (0.100)***	−1.170 (0.100)***
Individual marginal effects of CIVIC mean (S.D.)	.01607 (.00038)	.01350 (.00284)	.01366 (.00326)	.01450 (.0033)	.01436 (.00342)
Observations	23,207	29,500	29,500	12,724	12,724
Countries	24	33	33	16	16

Standard errors in parentheses; *significant at 10%; **significant at 5%; ***significant at 1%; includes size-of-town dummies.

Table 3
Random effects probit models (with country characteristics), PROTECTION

	(1)	(2)	(3)
	PROTECTION	PROTECTION	PROTECTION
CIVIC	0.327 (0.081)***	0.102 (0.050)**	−.023 (.019)
GDP	0.189 (0.062)***		
GDP*CIVIC	−0.035 (0.009)***		
ENERGY		1.362 (0.969)	
ENERGY*CIVIC		−0.509 (0.311)	
$ENERGY^2$		−1.605 (1.044)	
$ENERGY^2$*CIVIC		0.791 (0.387)**	
BOD			−0.017 (0.004)***
BOD*CIVIC			0.003 (0.001)**
BOD^2			0.0001 (0.00004)***
BOD^2*CIVIC			−0.00003 (0.00001)**
Constant	−1.895 (0.595)***	−0.438 (0.244)*	0.0182 (0.1326)
Individual marginal effects of CIVIC mean (S.D.)	.0073 (.0143)	.0204 (.0223)	−.0134 (.0657)
Individual marginal effects of country characteristic mean (S.D.)	.0619 (.0285)	.1274 (.1888)	−.0012 (.0021)
Observations	21,050	20,615	13,135
Countries	21	20	15

Standard errors in parentheses; *significant at 10%; **significant at 5%; ***significant at 1%; includes demographics in Table 2 and size-of-town dummies; each column includes interactions between relative income quintiles and country characteristics (GDP, BOD, and ENERGY).

Table 4
Random effects probit models (with country characteristics), TAX

	(1)	(2)	(3)	(4)	(5)	(6)
	TAX	TAX	TAX	TAX	TAX	TAX
CIVIC	0.111 (0.066)*	0.059 (0.090)	0.083 (0.035)**	−0.052 (0.055)	0.055 (0.010)***	0.028 (0.017)*
GDP	−0.065 (0.047)	−0.141 (0.068)**				
GDP * CIVIC	−0.005 (0.007)	−0.003 (0.010)				
ENERGY			−2.579 (0.683)***	−3.987 (1.329)***		
ENERGY * CIVIC			−0.137 (0.213)	0.568 (0.357)		
$ENERGY^2$			2.148 (0.730)***	0.256 (1.407)		
$ENERGY^2$ * CIVIC			0.158 (0.236)	−0.775 (0.465)*		
BOD					0.003 (0.0005)	−0.002 (0.0015)
BOD * CIVIC					−0.00004 (0.0001)	0.0003 (0.0003)
BOD^2					$-0.002*10^{-4}$ $(-0.007*10^{-4})$	$0.003*10^{-4}$ $(-0.002*10^{-4})$
BOD^2 * Civic					$-0.0008*10^{-4}$ $(-0.002*10^{-4})$	$-0.0004*10^{-4}$ $(-0.005*10^{-5})$
TRUST2		−0.014 (0.063)		−0.047 (0.067)		−0.035 (0.063)
TRUST3		0.132 (0.060)**		0.120 (0.063)*		0.099 (0.061)
TRUST4		0.454 (0.063)***		0.440 (0.067)***		0.409 (0.069)***
PROENV		0.225 (0.046)***		0.234 (0.047)***		0.280 (0.048)***
Constant	−0.867 (0.458)*	−0.002 (0.637)	−0.941 (0.137)***	−0.132 (0.271)	−1.075 (0.082)***	−1.268 (0.128)***
Individual marginal effects of CIVIC mean (S.D.)	.0144 (.0036)	.0080 (.0023)	.0139 (.0043)	.0076 (.0047)	.0116 (.0027)	.0092 (.0039)
Individual marginal effects of country characteristic mean (S.D.)	−.0185 (.0074)	−.0228 (.0130)	−.2438 (.2768)	−.4184 (.2361)	.0006 (.0002)	−.0003 (.0002)
Observations	27,337	10,774	26,904	10,371	24,562	10,062
Countries	30	13	29	12	27	12

Standard errors in parentheses; *significant at 10%; **significant at 5%; ***significant at 1%; includes demographics in Table 2 and size−of-town dummies; each column includes interactions between relative income quintiles and country characteristics (GDP, BOD, and ENERGY).

points. Moving from CIVIC = 0 to full cooperation (CIVIC = 4) increases this probability by approximately 6 percentage points. Similarly, for the same 40-year old female, an increase in CIVIC of one increases the probability of being willing to pay higher taxes by approximately 2.5 percentage points; and moving from CIVIC = 0 to full cooperation (CIVIC = 4) increases the probability of being willing to pay higher taxes by approximately 10 percentage points. Given that the sample average for PROTECTION and TAX are .526 and .235, respectively, these changes are economically important.

Focusing now on the models explaining willingness to pay higher taxes, we find that the coefficient on CIVIC is robust to including membership and volunteering in environmental groups (columns 3 through 5 of Table 2). For the reduced sample of countries for which we have data on confidence in the environmental movement, we find that level of trust in the environmental movement is a significant predictor of stated willingness to pay higher taxes. Individuals, who claim to trust the environmental movement "Quite a lot" and "A great deal," are more likely to be willing to pay higher taxes than individuals who do not trust the movement "very much" or "not at all." This result suggests that expressing confidence in the environmental movement is probably an indication of greater environmental concern. Comparing columns 3 and 4, we observe that including the trust dummies reduces the point estimate of CIVIC. To explore whether this change is due to the reduced sample size or to the fact that trust is correlated with CIVIC, we estimated the model in column 2 with the reduced sample of countries and found the estimate of CIVIC is equal to .063 (with a standard error of .010). This result suggests that including trust dummies, and not the reduced sample size, is responsible for the reduction in magnitude of the coefficient on CIVIC. This result is to be expected as civic cooperation and confidence in social movements are likely correlated. Nonetheless, the results show that being civic-minded has a positive statistically significant effect on the likelihood of expressing pro-environmental intentions even after controlling for general values that might correlate with the level of civic cooperation.

Although we have included a country-specific random effect in the estimations in Table 2, the characteristics of the countries in our sample vary a great deal and we further explore the relationship between civic cooperation and attitudes and willingness to pay by examining how country characteristics such as economic development and environmental quality are related to individuals' attitudes and intentions directly as well as indirectly through the impact of country characteristics on the effect of civic cooperation.

Table 3 presents the results of estimating PROTECTION in models that include GDP, energy intensity, and emissions of organic water pollutant per capita GDP. Column 1 in Table 3 adds GDP and GDP * CIVIC; column 2 adds ENERGY, $ENERGY^2$, ENERGY * CIVIC, and $ENERGY^2$ * CIVIC; and column 3 adds BOD, BOD^2, BOD * CIVIC, and BOD^2 * CIVIC.[12] In both Tables 3 and 4, our full specification includes all of the individual characteristics which we included in the estimations in Table 2. We receive results similar to those already discussed on these individual characteristics in these estimations and, for the sake of brevity, do not report them again in Tables 3 and 4.

Focusing first on the results in column 1 that consider the impact of GDP per capita on PROTECTION, we see that at higher levels of GDP, individuals are more likely to state that they would sacrifice GDP growth to protect the environment. The mean of the individual marginal effects of GDP reported at the bottom of column 1 is 6.2 percentage points, indicating a fairly substantial increase in the willingness to protect. The standard deviation of the log of GDP per capita is almost exactly one, so 6.2 percentage points is the expected increase in the response probability for a one standard deviation increase in the log of per capita GDP. This relationship between willingness to protect the environment and GDP might be related to the environmental Kuznets curve. At low levels of income, economic activity may not be high enough to lower environmental quality which generates a posi-

[12] Initially, we estimated the models without the square term of BOD and ENERGY and found decreasing marginal effects with respect to water pollution and energy use. We included the squared term to capture the possible non-linearity. We also estimated the GDP equations with a squared term for GDP and its interaction with CIVIC. However, squared GDP is never significant and we report only the more parsimonious model.

tive relationship between low income and environmental quality. Our results indicate that in the initial stages of development when income per capita is still low, individuals are less willing to trade off economic growth for environmental protection and consequently environmental quality will begin to deteriorate with the increased economic activity. At some point, as the economy continues to grow, the positive marginal effect of GDP per capita in column 1 suggests that more individuals will support environmental protection. To the extent that attitudes affect behaviors and policy, this higher support for environmental protection could be associated with improvements in environmental quality. However, as we discuss below in more detail, we do not find a similar robust relationship between GDP and willingness to pay higher taxes, casting doubt on the ability of our results to explain the environmental Kuznets curve.

When we examine the effect of CIVIC in column 1 of Table 3, we see that it has a positive coefficient when entered by itself and, on average, the effect of CIVIC remains positive with a mean of individual marginal effects of about 1 percentage point. However, the positive effect of being civic-minded decreases as GDP per capita increases. One way of interpreting the negative coefficient on the interaction between GDP and CIVIC is that high levels of civic cooperation are more important in determining support for environmental protection when income per capita is low. As GDP grows, even individuals who are less civic-minded become more willing to sacrifice future economic growth for the environment. Thus, the point estimates we receive indicate that for individuals in countries in the upper quartile of the GDP per capita distribution, civic cooperation has a negligible effect on PROTECTION. One of the implications of this result is that civic cooperation may be especially important in the success of policies aimed at improving the environment in developing countries. To the extent that low aggregate levels of civic cooperation may actually cause low per capita incomes (e.g., as in Knack and Keefer, 1997), this may be a particularly pessimistic finding.

In column 2 of Table 3, we examine the impact of environmental quality as measured by ENERGY on the willingness to protect the environment. As in the previous estimations, we find that CIVIC continues to have a positive effect on the willingness to protect the environment, with an average of the individual marginal effects of about 2 percentage points. We find only one of the terms including ENERGY to be statistically significant, but it indicates that, as might be expected, individuals in countries with high levels of ENERGY (low levels of environmental quality) are more willing to sacrifice economic growth in order to improve the environment. The mean of the individual marginal effect of ENERGY is almost 13 percentage points, suggesting that a one standard deviation increase in ENERGY would yield a 2 percentage point increase in the response probability.

The results in column 3 of Table 3 investigate a different measure of environmental quality, water pollution. Although the coefficient on CIVIC is insignificant, the impact of CIVIC on PROTECTION in this estimation occurs through its interactions with BOD. Specifically, the interaction terms indicate that the impact of CIVIC is greater when water quality, relative to per capita GDP, is worse (though that effect is non-linear). This finding is similar to the results in column 1 with per capita GDP. When water quality is at its lowest, the importance of being civic-minded is greatest. The policy implications here are interesting as well. If pro-environment attitudes translate into pro-environment behaviors, then in countries with the worst environmental quality, policies relying on individual behavior will be more effective if there are high levels of civic cooperation.

The overall impact of water quality on preferences over environmental protection vs. economic growth is non-linear, with about half of the individuals living in high water pollution areas being more likely to be willing to sacrifice economic growth for the environment as water pollution increases and about half, living in areas with less pollution, not being willing to make the sacrifice. This non-linearity is consistent with a declining marginal utility for environmental quality—only when environmental quality is already poor, does future environmental deterioration cause a greater willingness to sacrifice economic growth for the environment.

Table 4 presents the results of estimating TAX in models that include GDP, energy intensity, and

water pollution per GDP. Columns 1 and 2 in Table 4 add GDP and GDP*CIVIC; columns 3 and 4 add ENERGY, $ENERGY^2$, ENERGY*CIVIC, and $ENERGY^2$*CIVIC; and columns 5 and 6 add BOD, BOD^2, BOD*CIVIC, and BOD^2*CIVIC.

The results in Table 4 show again that being civic-minded generally increases the likelihood of stating a willingness to protect the environment, in this case, willingness to pay higher taxes. Average marginal effects range from .76% to 1.44%. We do not find strong evidence that country characteristics influence the effect of being civic-minded. We should note that in the smaller sample (columns two and four and six), the coefficients for CIVIC and its interaction terms are either not statistically significant or have reduced significance. As in the models reported in Table 2, the inclusion of the trust dummies reduces the size of the coefficient on CIVIC in each of these estimations. In the estimations reported in Table 2, however, the reduced coefficient on CIVIC remained statistically significant. In two of the six models in Table 4, adding country characteristics in the smaller sample is also associated with a less precise estimate of the coefficient on CIVIC (i.e., a higher standard error) and the coefficient does not remain significant at any of the conventional significance levels.

Focusing now on the effects of country characteristics, we first discuss the results for the impact of GDP on stated willingness to pay (columns 1 and 2). We do not find strong evidence that stated intention to pay higher taxes is correlated with per capita GDP.[13] Although the coefficient on GDP in column 2 is negative and significant, this result is due to the smaller sample size and is not robust. Specifically, the coefficient is statistically insignificant when we remove the additional variables that reduce the sample size and estimate the same specification in column 1 with the smaller sample. The lack of a robust relationship between per capita GDP and willingness to pay for environmental quality is consistent with the finding by Israel and Levinson (2004) that willingness to sacrifice income does not seem to be systematically related to GDP.[14] This result is in contrast to our findings regarding the pro-environment attitude, PROTECTION, indicating there are evidence attitudes and behavioral intentions follow different processes. Consistent with the lack of significance of GDP in the TAX estimations, we also do not find a relationship between BOD and willingness to pay taxes to improve environmental quality, even though we found a relationship between BOD and PROTECTION (see columns 5 and 6 of Table 4).

The results in column 3 and 4 of Table 4, however, do suggest that willingness to pay for environmental quality is related to the country characteristic, ENERGY. In particular, the coefficient estimate of energy intensity is negative and statistically significant and the coefficient on $ENERGY^2$ is positive and statistically significant at the 1% critical level, indicating non-linearity in this effect. Specifically, for individuals living in countries that are in the top quartile of energy consumption, higher levels of ENERGY are associated with being more willing to pay taxes to improve environmental quality. For individuals living in countries with intermediate or low levels of energy intensity, the effect is the opposite. These results are similar to the relationship that between BOD and PROTECTION, and also implies that policy design must be context-dependent. Specifically, when environmental quality is low, further deterioration in environmental quality is associated with a greater probability of both pro-environment attitudes and behavioral intentions. However, when environmental quality is relatively good, those positive relationships do not exist.

4.1. Robustness checks

Before concluding, we discuss some issues with our specification. Because our main results focus on the impact of CIVIC, it is important to conduct robustness checks to verify the index we use is an appropriate measure of civic cooperation. There are several reasonable alternatives to the index we use:

[13] This conclusion is also supported by a test of joint significance of the coefficients of GDP and its interaction with CIVIC.

[14] Israel and Levinson (2004) argue their finding might not support theories that explain the environmental Kuznets curve in terms of technological or institutional constraints since according to these theories willingness to pay and GDP follow a systematic pattern.

1) the use of a single-item response, 2) a set of dummy variables for each civic response, 3) a set of dummy variables indicating the number of behaviors individuals believe are never justifiable, or 4) a new index that ranges from 0 to 40 based more directly on the responses to the WVS in which individuals respond to each behavior on a scale of one to ten.

To investigate whether any of these approaches would yield different results, we first included the four civic attitudes as dummy variables and found at least two of the attitudes were statistically significant and positively related to both TAX and PROTECTION in each specification. This result suggests that adding another civic attitude has an effect on the dependent variables and that a single response would not capture the observed variability in civic attitudes. We also found that including the four attitudes creates multicollinearity. Although each civic attitude by itself has a positive and statistically significant effect on PROTECTION and TAX, when the four attitudes are included, two become statistically insignificant and one of these coefficients becomes negative, suggesting that including a set of dummy variables for each civic response would be problematic.

We also tested the restriction that we impose on the magnitudes of the coefficients on the dummy variables by using the single index rather than individual dummy variables indicating the number of behaviors that individuals believe are never justifiable (For example, by using the index, we have imposed the restriction that the coefficient of claiming two of the behaviors are never justifiable is statistically equivalent to twice the coefficient of claiming one of the behaviors is never justifiable, and so on.). The results for the base model estimating TAX showed that the restrictions we impose by using the index cannot be rejected at any of the conventional significance levels, indicating that the assumption implicit in the construction of the index that changing CIVIC from 1 to 2 is equivalent to changing CIVIC from 2 to 3, and so on, is appropriate for TAX. For the base model estimating PROTECTION, the results are somewhat inconclusive—we reject the null hypothesis claiming four civic attitudes are equivalent to four times claiming one.

Finally, we also find similar results with a slight recoding of CIVIC that allows us to explore more the variation in the "0" response. Specifically, we calculated a new CIVIC in which individuals receive a 10 for saying a behavior is never justifiable and a 1 for saying it is always justifiable, and allowing for intermediate values for responses in the middle (The original responses in the WVS are on a scale from 1 to 10.). The new variable ranged from 4 to 40 and yielded qualitatively similar results. Overall, because of the advantages in using the index (parsimony and comparability to previous literature) we conclude that the index appears to be a good way to capture variability in civic attitudes.

5. Summary and conclusions

In this paper, we have explored the determinants of pro-environment behavioral intentions and attitudes, with a focus on the effect of norms of civic behavior that constrain free riding. We find that individuals who are willing to limit free-riding behavior are more likely to state pro-environment attitudes and intentions to pay higher taxes to protect the natural environment. We also find that the effect of civic cooperation on stated intentions is fairly robust to adding variables that proxy general environmental values that might correlate with civic cooperation. Because we use individual level data from over 30 countries, these results are very general.

These results can have implications for environmental valuation methods. We find that heterogeneous attitudes toward free riding explain environmental attitudes and behavioral intentions, that is, stated intentions to sacrifice income to protect the environment. The results also indicate that being civic-minded influences willingness to pay even after controlling for individual characteristics that measure pro-environmental values. Thus, questions regarding norms of civic behavior could be used to model heterogeneity that might explain intentions to pay. Finally, the finding that the likelihood of stating a willingness to protect the environment depends on country characteristics in a non-trivial manner suggests that adjusting for aggregate levels of environmental quality in inter-

national benefit transfer might increase the accuracy of these analyses.[15]

The fact that civic cooperation may be more or less effective in generating pro-environment behavioral intentions and attitudes depending on economic development and environmental quality may be also useful for the design and implementation of environmental policies. Although the theoretical and empirical literature on social norms and the environment indicate civic cooperation influences the support for environmental protection, our results suggest that the benefits of civic cooperation might not always be evident: country-level macroeconomic conditions influence the likelihood that individuals support environmental protection. As GDP increases, individuals seem more willing to sacrifice economic growth to obtain environmental protection, consistent with a decreasing marginal utility of income. In addition, high levels of civic cooperation are more important in determining support for environmental protection versus economic growth in low income countries than in high income countries. We also find evidence that individuals are sensitive to the environmental quality: when environmental pollution is high, relative to per capita GDP, further deterioration in environmental quality is associated with a greater probability of stating both pro-environment attitudes and behavioral intentions.

Thus, in some circumstances, policy makers who seek to improve environmental quality may be more able to rely on individuals and social movements to act with less government intervention, while in other circumstances, a more top-down and heavy-handed approach may be more effective. In particular, our results suggest that civic cooperation is fundamental to promoting pro-environment attitudes in low income countries.

Acknowledgments

We thank Chris Georges, Tako Kato, Jennifer Thacher, Robert Turner, Steven Wu, and participants in the CU Environmental and Resource Economics Workshop and the Hamilton-Colgate seminars for helpful comments.

[15] See Shrestha and Loomis (2001) for evidence of benefit transfer across countries.

Appendix A. Table 1: Countries in sample

(*Countries with observations for TRUST, "Trust in environmental movement")

COUNTRY	OBSERVATIONS
Albania*	451
Argentina*	1219
Austria	1106
Bangladesh*	1161
Belgium	1339
Bosnia*	1005
Canada*	1600
Chile*	996
Croatia	776
Czech Republic	1390
Denmark	758
Finland	771
France	1105
Germany	1298
India	1382
Lithuania	511
Macedonia*	578
Mexico*	706
Montenegro	469
Netherlands	901
Peru	1460
Philippines*	1135
Puerto Rico*	617
Russia	1806
Serbia	794
Spain*	656
South Africa	2735
Ukraine	808
United Kingdom	572
USA*	1046
Viet Nam*	760
Zimbabwe*	929
Total	32,840

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