Testing crucial model assumptions: the *income/willingness to pay for the environment* nexus in the Environmental Kutznetz Curve

Abstract

Several theoretical models investigating the relationship between economic growth and environmental degradation postulate that consumers' willingness to pay for it gets higher as far as per capita income grows. We test this hypothesis on willingness to pay (WTP) for the environment data collected from the World Value Survey database for a large number of countries and find strong support for it after controlling for demographics, personal values and country variables such as domestic institutional quality and pollution intensity. We also document that the additional and most robust determinants of the WTP are age, education, religious practice, proxies of civic values (tax morale, sense of belonging to a wider community) and quality of domestic institutions.

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1. Introduction

The Environmental Kuznets Curve (EKC) hypothesis postulates the existence of an inverse U-shape relationship between per capita GDP and measures of environmental degradation (Panayotou, 1993 and 2000; Grossman and Krueger, 1991 and 1995; Selden and Song, 1994; Shafik and Bandyopadhyay, 1992; Hettige, Lucas and Wheeler, 1992, Koop, 1998, Stern 2004; Copeland and Taylor, 2004).
According to the EKC literature such relationship may be determined by a series of concurring supply and demand side factors such as: i) economies of scale in pollution abatement, ii) changes in the industry mix and evolution from physical to human capital intensive activities, iii) changes in input mix; iv) changes in the elasticity of income to the marginal damage generated by environmental degradation; v) changes in environmental regulation (Stern, 2004; Copeland and Taylor, 2004).
Early EKC empirical models, with a few exceptions, share the limit of being built on heuristic theories or *ex post* theoretical justifications of their findings rather than *ex ante* formal derivations from individual optimizing behaviour (Panayotou, 2000). More recently, however, a wide range of theoretical models have been developed whose results are broadly consistent with the findings of the empirical literature.
Each of these models focuses on specific mechanisms from which the inverted U-shape relationship may be derived. Lopez (1994) and Selden and Song (1995) provide an overlapping generation framework with exogenous technological growth, in which pollution is generated on the supply side. Brock and Taylor (2004) show that, once technological progress in abatement is incorporated into a Solow exogenous growth model, the EKC is a necessary by-product of convergence to a sustainable growth path. John and Pecchenino (1994), John, Pecchenino, Schimmelpfennig, and Schreft (1995), and McConnell (1997) focus on demand side determinants. Finally, Copeland and Taylor (2004) show that the EKC may be solely generated on the demand side when the

government maximizes the utility of a representative consumer and the latter has an elasticity of income to the marginal damage suffered from pollution, which varies in the level of income, or is subject to some threshold effects.

The *consumption side changing elasticity of income hypothesis* has therefore a crucial role in the EKC literature but has seldom been tested. The first relevant attempts come from Israeli and Levinson (2001), Ivanova and Tranter (2005) for Australia and Garcia and Togler (2005) for Spain.
Our study aims to test this hypothesis and differs from the previous ones in several respects: i) we outline in a microfunded theoretical model the theoretical link between the inverse U-shape of the EKC and the changing elasticity of income hypothesis; ii) we decompose the impact of income into absolute and relative effects; iii) we use a richer set of variables at individual level, controlling not only for standard demographics (education, age, gender and town size), but also for individual values (sense of belonging to a wider community, tax morale, national proudness, etc.) and for country variables related to pollution intensity, institutional quality and tax pressure.

The paper is divided into five sections (introduction and conclusions included). In the second section we sketch the theoretical framework outlining the link between the shape of the EKC and the relationship between per capita income and the willingness to pay for the environment which we are going to test. In the third section we illustrate characteristics of the database and our descriptive empirical findings. In the fourth section we comment econometric findings. The fifth section concludes

2. The theoretical framework for a consumer driven environmental Kutznets curve

To illustrate the relevance of our empirical analysis, and to highlight the role of consumer preferences in the EKC literature, we illustrate the general equilibrium framework presented by Copeland and Taylor (2004) and show that, in this framework, the inverse U-shape of the EKC may be solely determined by the changing elasticity of income hypothesis. We further explain how our empirical analysis represents a direct test of this hypothesis.
In the supply side of the Copeland and Taylor (2004) model there are two goods (X and Y) produced with constant returns to scale, where p is the price of product X and product Y is the numeraire. The authors assume that the productive process of X generates pollution, while the same does not occur for Y.
Pollution is considered as an input (but the model may be represented equivalently by considering it as a joint output) in the following production function

$$x = z^{\alpha}[F(K_x, L_x)]^{1-\alpha}$$

where x is the output of product X, z is pollution, F(.) is the production function of good X, K and L are the usual production inputs (capital and labour) and $0<\alpha<1$. The government sets a price τ for each emission unit and, due to the Cobb-Douglas functional form, emission costs on total output are $\alpha=\tau z/px$. The interior solution of the firm which minimizes emission intensity is equal to $e=z/x=\alpha/p\tau$. With non positive profits and full employment it is possible to derive output functions of the type $x=x(p,\tau,K,L)$ and $y=y(p,\tau,K,L)$ for the two goods.
In the model the private sector maximizes national income for a given pollution level z

$$G(p,K,L,z)= \max_{\{x,y\}} \{ px + y : (x, y) \in T(K, L, z) \}$$

with T being the feasible technology set. In this framework it is possible to demonstrate that, in equilibrium, the price of pollution (τ) is equal to the value of the marginal product of emissions.
In the Copeland-Taylor (2004) model the economy is populated by identical consumers with the following indirect utility function V(p,I,z)=v(I/β(p))-h(z), where I stands for per capita income, β is a price index, h'>0, h''>0, v'>0 and v''<0.
From the model it is possible to derive the following corporate demand for pollution, z= α(p/τ)x(p,τ,K,L), which is downward sloping in the (τ,z) space.
Pollution supply is chosen by a benevolent planner who can obtain exactly the target level of emission z_0, either by imposing it, or by choosing the price τ_0 such that the horizontal supply of emissions crosses the downward sloping demand curve in z_0.
The more reasonable assumption, though, is that the benevolent planner does not act as a dictator, but maximizes the following indirect utility function of the representative consumer

$\max_{\{z\}} \{V(I/\beta(p),z) \text{ s.t. } I=G(p,K,L,z)/N\}$.

If the economy is small, and *p* is given, the first order condition will be

$$\frac{V_I G_z}{N} + V_z = 0 .$$

By rearranging this first order condition it is possible to obtain the following upward sloping supply of pollution

$$\tau = N * \left[-V_Z / V_I\right] = N * MD(p, R, z)$$

where R=I/β is real income and MD is the consumer's marginal damage from pollution, or the marginal rate of substitution between pollution and income.
By setting demand of pollution equal to supply we obtain the market clearing equilibrium level of emissions

$$G_z(p, K, L, z), z) = N * MD(p, R(p, K, L, z), z) .$$

At this point the authors evaluate the effect of a neutral technological progress shift λ.
The shift moves demand to the right and supply to the left since

$$\lambda G_z(p, K, L, z), z) = N * MD(p, \lambda G(p, K, L, z) / \beta(p), z) .$$

Given that $\frac{dz}{d\lambda} = \frac{1 - \varepsilon_{MD,R}}{\Delta}$, we know that the new equilibrium level of pollution on the horizontal axis will be lower than before if the income elasticity of the marginal damage is higher than one. Hence, as far as per capita income rises, if the above mentioned elasticity grows and passes from less to more than one, we obtain the classical inverse U-shaped pattern of the EKC.
To provide an example with a specific functional form, in order to have an EKC generated by a pure income driven explanation, we need an indirect utility function of the type $V(p,I,z)=c_1 - c_2 e^{-R/\xi} - h(z)$.
In such case, the income elasticity of the marginal damage from pollution is R/ξ and, therefore, as far as real income grows and moves from R<ξ to R>ξ, we obtain the inverse U-shaped pattern of the EKC.

2.1 The model and our empirical test

Consider now the relationship between our empirical test and the Copeland-Taylor (2004) model. In the empirical section we test whether the willingness to pay grows in income quintiles, net of all the other possible country effects and of the impact of other control variables. If we have coefficients of income quintiles that are increasing and positive after some income quintile threshold (and if the magnitudes are significantly different at a given distance among quintiles), we definitely demonstrate that the willingness to pay for the environment grows as far as income gets higher.

Consider also that a passage from a zero to a nonzero willingness to pay *for the same individual* must be necessarily related to an increase in the income elasticity of marginal damage since the ratio between the disutility of pollution and the utility of income must necessarily rise to obtain this result.

Nonetheless, our result does not exactly coincide with the assumption of the model, where the representative consumer (the same individual) is modeled as having an income elasticity of marginal damage which grows in real income. To what extent is our finding close to what the model assumes and, under what conditions may we conclude that it produces equivalent results ?
Consider that we will try to control for all possible covariates in our econometric estimate. This is important as we isolate the income effect from all other possible concurring effects which may have an impact on the willingness to pay for the environment. The richer our set of controls, the more confident we are that we are measuring the true *willingness to pay-real income* relationship.
Second, what our result exactly tells us is that, coeteris paribus, a higher share of individuals will be willing to pay something for the environment when we move up across income quantiles.
If we aggregate all our respondents into a representative individual, and translate the share of those who are willing to pay for any given income quantile into a measure of the amount of the willingness to pay of the representative consumer, we have a relationship which is correspondent to the one described in the model.
Hence, under the reasonable assumption of a one to one mapping from i) the share of those willing to pay in a given income quintile into ii) the income elasticity of the marginal damage of the representative individual, we may establish an equivalence between our finding (*coeteris paribus*, at higher income quantiles more people are willing to pay for the environment) and the model assumption (the representative consumer has an increasing income elasticity of marginal damage as far as real income rises) which is crucial to obtain a pure consumption driven EKC.

3. The database and the descriptive evidence

We test our hypothesis on the cross-sectional database of the World Value Survey which joins representative samples from more than 60 countries in the world[1]

The two questions related to the WTP for the environment, relevant for our empirical work, are the following: i) I would agree to an increase in **taxes** if the extra money were used to prevent environmental damage (in WVSs 1990–1993 and 1995-1997), I would agree to an increase in **taxes** if the extra money were used to prevent environmental pollution (in WVS 2001); ii) I would give part of my **income** if I were certain that the money would be used to prevent environmental pollution (in WVS 2001).
As it is well known, the literature on contingent valuation highlights some potential biases arising from the investigation of the willingness to pay for a given good based on a direct demand on it from survey data (Mitchel-Carson, 1989; Diamond-Hausman, 1994). A first bias is represented by strategic behaviour when the respondent knows that his response may affect the decision on the quantity of a public good and service provided. A second bias arises when the hypothetic scenario prospected by the interviewer is too unrealistic. This bias may be reduced if the respondent is familiar with such scenario. A third bias is the so called "embedding effect". Many empirical results

[1] The World Values Survey is a worldwide investigation of sociocultural and political change. It has carried out representative national surveys of the basic values and beliefs of publics in more than 65 societies on all six continents, containing almost 80 percent of the world's population. It builds on the European Values Surveys, first carried out in 1981. A second wave of surveys, designed for global use, was completed in 1990-1991, a third wave was carried out in 1995-1996 and a fourth wave took place in 1999-2001. The surveys are based on stratified, multistage random samples of adult citizens aged 18 and older. Each study contains information from interviews conducted with 300 to 4,000 respondents per country.

(see, among others, Kahneman-Knetsch, 1992; Carson et al. 1995; Randall-Hoehn, 1996) show that quantitative responses tend to be strikingly similar, in spite of the different situations presented within the same scenario. The rationale is that individuals have a clear idea of their general WTP for a given good, but not of its exact quantitative amount and of its variation according to changes in the side conditions prospected in the hypothetical demands. As a consequence, they tend to round up or to converge to average values. The fourth is an upward bias on WTP findings generated by the desire of the respondent to please the interviewer when it is costless to do so.

By looking at the WVS questions we may conclude that the first bias might lead to an underestimation of the willingness to pay for the environment, provided that some individuals who care for it believe that their answers might have economic consequences and want to free ride to shift the burden on other respondents. With regard to the second bias, paying more taxes for the environment does not appear to be particularly unrealistic and therefore this distortion should not be significant.

The third bias should not apply since all of the three questions carefully avoid to ask respondents to quantify exactly their willingness to pay. The fourth bias should not apply as well since the questionnaire has a large number of questions on different issues concerning values and it is difficult to figure out that the interviewer desires a positive response on the two questions above.

Consider finally that a fifth bias (similar but not identical to the fourth) might apply since respondents are generally inclined to provide a positive image of themselves when there are no costs for doing it. This is likely to induce to an overestimation of the willingness to pay. In support of this hypothesis we may observe a gap between the declared willingness to pay, on the one side, and, on the other side, the revealed preferences of consumers toward green or "socially responsible" products whose market shares are far below those implied by willingness to pay answers.[2] Part of this difference, though, may be explained by the fact that consumer choice occurs in reality in a framework of imperfect information on the environmentally responsible characteristics of the products and that (due to the presence of a limited range of environmental products) consumers seldom have the opportunity to choose without differences in search costs between two identical products, differentiated only on the basis of the environmental friendly characteristics.

To conclude on this point, consider however that the focus of our paper is not on the evaluation of the exact share of respondents who declare a willingness to pay for environmental quality, but on the determinants of the latter and, more specifically, on the difference in the impact on our dependent variable of different income classes, net of all relevant control factors. We may therefore reasonably assume that such difference should not be affected by the above mentioned possible distortions on willingness to pay responses. This is likely to be true under the non particularly restrictive assumption that the desire to please the interviewer is uncorrelated with income.

3. 1 Descriptive evidence

Descriptive evidence shows that around 17 percent of respondents would strongly agree (and around 48 would agree) to an increase in taxes when the latter are used to prevent environmental damage (Table 1).[3] The share is surprisingly lower for high income than for non high income countries, most of them being emerging countries (14 percent against 20 percent would strongly agree and 46 against 48 would agree). Remember, though, that what we are measuring here is the

[2] Information on market shares of green and socially responsible products in different countries may be found, among others, from Demos & Pi / Coop (2004) for Italy, Moore (2004) and Bird and Hughes (1997) for the UK, De Pelsmacker, Driesen and Rayp (2003) for Belgium and TNS Emnid for Germany (www.fairtrade.net/sites/aboutflo/aboutflo).

[3] Note the slight difference in the tax question between the 1990-93 and 1995-1997 WVSs (taxes used to prevent environmental damage) and the 2001 WVS (taxes used to prevent environmental pollution). In Table 1 we pool information from these two questions while in the econometric analysis country dummies will control for time effects and therefore for differences in demand formulation.

"excess demand" of environmental protection, that is, the demand not already covered by domestic environmental policies. In this perspective, it may be reasonable to assume that the willingness to pay extra taxes for environmental protection may be lower in countries in which environmental policies are already well developed.
Keeping this in mind, we look at descriptive evidence on country rankings (Tables 2A-2B) and observe some findings which are expected (countries such as Sweden and Norway are among the first ten in terms of the willigness to pay more taxes, Eastern European countries are almost all on the bottom of the ranking) and some others that may be puzzling (why Vietnam and some Central American countries are on the top ?). Country rankings on the willingness to give part of the income question are substantially similar (Table 2B). To interpret these descriptive findings consider that country differences may be affected by sample composition effects related to the factors which affect the willingness to pay for the environment and that there may be some relevant cultural differences in the way interwieved individuals declare their willingness to pay (most Asian countries are for example on the top, and Eastern European countries are at the bottom, in the same World Value Survey in terms of tax morale). In the rest of the paper we will not focus on country differences and take into account the problem of cultural disparities by controlling with country dummies our test on the relationship between the dependent variable and individual income.

Descriptive evidence on the relationship between the willingness to pay for the environment (in terms of payment of higher taxes or destinatition of part of the respondent's income) and progression across income quintiles seems to indicate a significant link between the two variables in the tax question (Tables 3A-3B), even though when we aggregate disagreement and agreement (regardless of the intensity) we do not find a monotone relationship across quintiles. The sum of the shares of those who agree and strongly agree is at 57 percent in the first quintile and goes monotonically up to 64 percent in the fourth quintile (but it slightly falls to 63 percent in the last). The relationship appears stronger in the income question (Table 3B). The sum of the shares of those who agree and strongly agree monotonically grows from 61 percent in the first to 74 percent in the last quintile.
These findings do not imply *per se* that a significant relationship between income and WTP for the environment exists. Before accepting this conclusion we need to control for several factors which can affect it. First, what matters is not just domestic relative income, but also absolute cross-country comparable income in PPP, corrected for household size. Furthermore, the WTP for the environment is highly likely to be affected from other individual characteristics such as age, gender, education, individual values and domestic variables related to pollution intensity, institutional quality and tax pressure. To all these variables we must obviously add country fixed effects which capture here both cultural factors and domestic supply of pro environment policies. Only after correcting for all these variables we can evaluate whether the hypothesis of the increasing concern for the environment as far as income rises, postulated by several theoretical models in the EKC literature, is supported by the data.
With this respect, the advantage of our database is that it allows to control not only for traditional demographic variables used in standard econometric analyses, but also for variables measuring individual values. In this way we can evaluate the effect of income for a given level of concern for local and global public goods which can be independent from income itself, but also control whether the same concern for local and global public goods is higher for those earning higher income. In simple words, in case of a positive relationship between per capita income and WTP for the environment, we may discriminate between the hypothesis that richer people are more willing to pay because they have higher social capital and care for public goods, or if this finding depends on a pure income effect which persists after controlling for individual values.

4. The econometric specification

Given all the above mentioned considerations we estimate the following logit model

$$WTP_t = \beta_0 + \beta_1 equincome_t + \beta_2 [equincome_t]^2 + \sum_k \vartheta_k Dincome_{kt} + \beta_3 age_t + \beta_4 male +$$
$$+ \beta_5 education_t + \beta_6 dchildren_t + \beta_7 unemployed_t + \beta_8 townsize_t + \beta_9 pratrelig_t$$
$$+ \beta_{10} ggbelong_t + \beta_{11} natproud_t + \beta_{12} politideas_t + \beta_{13} cheattax_t + \beta_{14} irrpay_t + \beta_{15} laworder_t +$$
$$+ \beta_{16} [CO_2 pc]_{t-5} + \beta_{17} [taxpress]_{t-5} + \sum_j \gamma_j dyear_j + \sum_l \delta_l dcountry_l$$

where, in the left hand side, we have the dichotomous WTP for the environment variable selected in the estimate between questions i) and ii) (see section 3), which takes the value of one when individuals agree or strongly agree and zero otherwise.
In the right hand side we introduce income in two ways. First, we bring in a continuous measure of (income class median) equivalent income expressed in year 2000 US dollar purchasing power parities in levels and in squares (*Equincome* and [*Equincome]*^{2}).[4] Second, we also we consider a relative income measure by introducing four dummies measuring individual position in the relevant income quintile ($DIncome_k$) .

The set of additional controls includes three types of variables (individual sociodemographic, individual value and country variables). Individual sociodemographic variables include age, a gender dummy (*male*), a dummy for those who completed secondary education (*education*), a dummy measuring whether the interwieved has children (*dchildren*), an additional dummy introduced to pick up the effect of unemployment (*unemployed*) and, finally, the size of the town in which the respondent lives (*townsize*).
Among variables measuring individual's values we include the intensity of religious practice (*pratrelig*), an indicator of care for global public goods (sense of belonging to a wider regional group) (*ggbelong*), a measure of national proudness (*natproud*), a variable measuring the inclination toward rightwing political ideas (*politideas*), an indicator of the individual opinion on tax evation (*cheattax*). Details on the construction of these variables are provided in Table 4.
The addition of these regressors is important as it helps us to net out the income effect from the concurring impact of proxies of personal values. In this way we can rule out the possibility that higher income individuals are more willing to pay for the environment just for the effect of these concurring factors associated with their higher income (i.e. different levels of social capital).
Among country variables we include proxies of domestic corruption (*irrpay*), of quality of institutions (*laworder*), a measure of domestic pollution (CO_2pc) and of tax pressure (*taxpress*) (see Table 4 for details). Year and country dummies are finally added to the specification.

4.1 Estimation approach

[4] The World Value Survey database contains two variables which respectively provide the income decile and the median household income value (in local currency) for that class for the majority of countries. For a second group of countries (Azerbaijan, Australia, Belarus, Israel, Armenia, Bangladesh, Belgium, Brazil, Colombia, Dominican Republic, Finland, Georgia, Hungary, Indonesia, Iran, Korea, Luxembourg, Nigeria, Pakistan, Philippines, Poland, Puerto Rico, Romania, Tanzania, United Kingdom, Viet Nam) sources of the missing median income value are the database of World Bank Development Indicators or, in alternative, Domestic Account data.

We estimate the model under four different specifications by considering alternatively as dependent variables the WTP more taxes and the willingness to provide additional income to prevent environmental pollution.[5] In the first we just consider the impact of demographic variables (including relative and absolute income variables) and country dummies (Table 5, columns 1 and 5). In the second we introduce variables measuring individual values (concern for international public goods, tax morale, national proudness, political stance) (Table 5, columns 2 and 6). In the third, country variables related to corruption and quality of institutions (Table 5, columns 3 and 7). In the fourth two additional country variables (pollution intensity, measured in terms of per capita CO_2, and overall tax pressure) which may be relevant control factors, but must be handled with care because of endogeneity (Table 5, columns 4 and 8). In Table 5 we estimate the model under the logit specification for the world sample by looking alternatively at the WTP more taxes and the willingness to provide additional income. In Tables 6 to 7 we propose robustness checks by estimating four different logit specifications for the subsamples of the high income OECD countries and the complenentary sample.[6]

4.1 Income

The most important finding in terms of income is that, while absolute income is not significant, relative income is significant and in the expected direction. The lack of significance of absolute income is likely to depend from the difficulties we have in measuring this variable (availability of only the income class median for each individual, conversion in dollars and in PPP). These problems, coupled with the presence of relative income and country dummy variables, probably eliminate any explanatory power of our absolute income proxy. When moving to relative income we find that the impact of income quintiles on both the tax and income equation is significantly negative (but increasing as far as we pass to higher income quintiles) below the median income and significantly positive above it. This result is reasonable since the omitted (third) quintile is the central one and therefore quintile dummies included in the estimate capture deviations from the effect of the omitted quintile on the dependent variable. Confidence intervals of the income quintile coefficients confirm that there is a significant change in the share of those willing to pay when we move from low to high income quintiles. To provide an example, the tax equation in the first column of Table 4 shows that coefficient magnitudes of the first and second quintiles are -.19 and -.089 and both significantly different from zero at 99 percent level, while coefficient magnitudes of the fourth and fifth quintile dummies are .12 and .16, and significantly different from zero as well at the same significance level. Hence, individuals in the two highest quintiles exhibit significantly higher willingness to pay than those in the two lowest ones. The income equation also presents positive (negative) and significant coefficients for two upper (lower) quintiles.
This finding is remarkably stable across estimation methods (logit and ordered logit[7]) and subsample splits (high income OECD countries and the complementary sample) (Tables 6 and 7).[8]

[5] Descriptive statistics and pairwise correlation matrix of variables used in the econometric estimates are provided in Appendix A.
[6] The dependent variable takes the value of one if individuals strongly agree or agree (to pay more taxes or to give part of their income to prevent pollution) and the value of zero if they disagree or strongly disagree. In a robustness check we also reestimate the model for the world sample with an ordered logit specification. The dependent variable takes the value of three if individuals strongly agree, two if they agree and one if they disagree. It takes the value of zero otherwise. Estimates are omitted for reasons of space and available upon request.
[7] Estimates are omitted for reasons of space and available upon request.
[8] An additional robustness check on income effects, performed by running our specifications on country specific samples, confirms the presence of an income effect. Estimates are omitted and available upon request.

The hypothesis that the WTP for environmental protection becomes higher at higher income levels is not rejected by our findings even though, given the cross-sectional structure of the database, we cannot directly test whether an individual changes his WTP as far as his income grows.

4.2 Other demographics

Among the effects of other demografics we observe that younger and more educated individuals have higher willingness to pay for the environment. These findigs are also robust in all the reported subsample estimates (Tables 6 to 7) and consistent with those reported by Israely and Levinson (2001). The absence of repeated information for the same individuals is a problem for the age effect, as it is impossible to say whether we observe a temporal or a cohort effect. There are rationales in the literature to support both interpretations: younger generations may have grown with stronger environmental concerns, but also, as far as individuals get older, intertemporal discount rates may become higher in absence of intergenerational altruism.
An interesting finding is the negative and significant effect of the unemployment status on the willingness to give part of the income (Table 4, columns 5-8), but not on the willingness to pay additional taxes for the environment (Table 4, columns 1-4). The different impact on the two answers is reasonable if we assume that the willingness to pay has costs in the first, but presumably not in the second case (an unemployed should be tax exempt).
The positive and significant effect of town size in both equations is also understandable. Larger cities are expected to have relatively more severe environmental problems. What is interesting here is that individuals living in larger towns are also partially willing to internalize such externalities, as they probably clearly perceive their effects on the quality of their life and on their health.
An interesting finding is that a gender effect exists (women have significantly higher willingness to pay), but disappears once controlling for individual values. The most obvious interpretation is that the higher willingness to pay of women is explained by their relatively higher participation to the values (included in our estimates) which positively affect the propensity to pay to avoid pollution.
Finally, the negative and significant effect of the presence of children in the respondent's family in the income equation may be explained by the fact that this variable is likely to be a proxy of the household equivalised income.

4.3 Individual values

Some of the results on individual values are strongly stable across different specifications, estimation approaches and subsample splits. This is the case of the positive effect of religious practice (*pratrelig*), the sense of belonging to a wider regional group (*ggbelong*), national proudness (*natproud*) (all of them positive) and opinion about cheating on taxes (*cheattax*) (negative).
The positive and significant effect of religious practice is consistent with findings of Guiso et al. (2003) showing how religion reinforces civic values.
The sense of belonging to a wider regional group may be considered as a proxy of the respondent's care (aversion) for global public goods (bads) and therefore its positive effect on the dependent variable (many environmental phenomena such as global heating and ozone layer depletion are global public bads) is reasonable. Another strongly significant variable in the estimate is tax morale. Individual blame on tax evasion is strongly positively correlated with the willingness to pay for the environment. Both national proudness and tax morale should be related to individual confidence in the use that domestic government could do of additional income to fight environmental degradation.
Right wing political beliefs have negative and weakly significant effects on the dependent variable, probably showing that individuals with this political orientation put stronger confidence in the capacity of technological development of fighting environmental degradation, or are relatively less worried about the environmental problem. Our finding might also be affected by conditionality of

the interview bias to this variable (i.e. left wing oriented individuals may be more prone to give environmental friendly answers).

4.4 Country specific variables

Results on country specific variables are in some cases controversial (Tables 5,6 and 7, columns 3,4,7 and 8). The most stable and expected ones are the negative (positive) effect of domestic corruption (institutional quality) on the willigness to pay taxes. When moving to evaluate the effects of the other two country specific regressors (domestic pollution intensity and domestic tax pressure) we may have two different expectations according to whether individual preferences shape government behaviour (direct causality) or government behaviour affects individual preferences (reverse causality). With reference to pollution intensity, on the one side, we can think that individuals in their answers are conditioned by what the government already does and therefore their WTP is high if government commitment for the environment is low and pollution intensity high (positive relationship). On the other side, government preferences should reflect those of individuals and therefore, if the population has higher WTP for the environment, the equilibrium level of pollution intensity should be lower (negative relationship)
In a similar way, for tax pressure, the direct causality argument should imply that higher tax pressure has negative effect on the propensity to pay additional taxes against pollution, while the reverse causality argument should imply that higher tax morale should both determine higher tax pressure and willingness to pay for the environment. Given this potential reverse causality effect we introduce these last two variables only in the fourth specification in order to isolate their effects from the previously obtained findings (Tables 5, 6 and 7, columns 4 and 8) and lag of five years the two regressors.[9] Our findings seem to support the direct causality argument in both cases. In short, individual willingness to pay taxes is higher the higher domestic pollution intensity and the lower the overall tax pressure.

4.5 Robustness check on regressors which vary at country level

A major problem in estimates on individuals belonging to different countries in which regressors include some variables varying at individual level and other varying at country level is that coefficients on the latter variables may be highly sensitive to inclusion or exclusion of a single country. In order to test whether it is the case we perform a two-step DFBETA test (for a similar approach see Frey and Stutzer, 2000). In the first step we estimate our fully augmented "tax model" with country dummies but without country variables. In the second step we create a dependent variable represented by coefficients of country dummies from the previous estimate and then regress it on the selected variables which vary at country level (i.e. , cheattax, irrpay, laworder, CO_2pc, taxpress). [10] We then repeat this estimate by excluding any time one of the sample countries. For each repeated estimate the coefficient is subtracted from the one obtained in the regression with all countries and divided by the estimated standard error. Table 8 finally reports the related F-test value. If the latter is lower than 1.96 in absolute value, the null of independence of our result from a country outlier is not rejected. Reported results clearly evidence that, in none of our four regressors varying at country level, we find an influential country outlier. [11]

[9] We also try to instrument the current values of these two variableswith lagged values, but the extremely low variability of these indicators across individuals (country effects are the same for all individuals of a given country) and across time prevents us to do so.
[10] In this second step the number of observations is obviously equal to the number of countries in the sample.
[11] Results on the income model (in which the dependent variable is the willingness to give part of income) also highlight that the null hypothesis is never rejected. They are omitted for reasons of space and available upon request.

4.6 Final comments

The use of a wide set of regressors shows that the relationship between income and WTP for the environment is independent from country specific culture and variables related to quality of institution, tax pressure, pollution intensity and corruption levels. It is also independent from a rich set of individual value indicators. Hence, whatever the country, the culture, the institutional environment and the set of individual values, richer individuals declare that they are more willing to pay for environmental quality. This higher willingness to pay, sufficient in demand side models (such as the one of Copeland and Taylor (2004) discussed in section 3) to generate an inverse U-shaped EKC, does not depend on the fact that higher income may be associated to different values, or to some cultures or countries, but is a pure income driven effect.
The significance of relative, and not absolute, income is important because it rules out the alternative rationale that the correlation between income and the WTP taxes is determined by the higher propensity to pay of richer countries (this last interpretation is also excluded by the fact that our result is robust when estimated in the subsample high income OECD estimate).

5. Conclusions

The link between empirical analyses and theoretical models may be of at least two types. More traditionally, statistical or econometric approaches tend to be used to test a specification derived from a theoretical construct. Alternatively, they may be used to test a crucial assumption on individual preferences which can generate a key result in a given, or in a class of, theoretical models.
We follow the second type of approach by considering that the inverse U-shaped relationship between per capita CO_2 and per capita income, often observed in empirical papers in the Environmental Kutznets Curve literature, may have demand and supply side explanations. A crucial element in the demand side explanation is the hypothesis that individuals have an elasticity of income to the marginal damage suffered from pollution which varies in the level of income.
This assumption has seldom been directly tested.
In this paper we provide a straightforward test of it by controlling the effect of income on the willingness to pay for the environment for several (in some cases unexplored) concurring factors such as standard demographic variables, individual values, domestic corruption, institutional quality and level of pollution.
The richness of our controls helps to disentangle the income effect from other concurring effects. It tells us that the significantly higher willingness to pay for the environment for higher levels of income does not depend on differences in individual values and on domestic factors related to pollution intensity or confidence in domestic institutions.

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Table 1. Willingness to pay for the environment: descriptive evidence at world level

I would agree to an increase in **taxes** if the extra money were used to prevent environmental damage (in WVSs 1990–1993 and 1995-1997), I would agree to an increase in **taxes** if the extra money were used to prevent environmental pollution (in WVS 2001)

	Strongly disagree	*Disagree*	*Agree*	*Strongly agree*	*N. of obs*
World	7,130	17,399	33,504	12,295	70,328
	(10.14%)	(24.74%)	(47.64%)	(17.48%)	(100%)
High income OECD countries	3,486	6,968	12,053	3,544	26,051
	(13.38%)	(26.75%)	(46.27%)	(13.60%)	(37.04%)
Non high income OECD countries	3,644	10,431	21,451	8,751	44,277
	(8.23%)	(23.56%)	(48.45%)	(19.76%)	(62.96%)

I would give part of my **income** if I were certain that the money would be used to prevent environmental pollution (in WVS 2001)

	Strongly disagree	*Disagree*	*Agree*	*Strongly agree*	*N. of obs*
World	21,303	55,831	83,377	30,699	191,210
	(11.14%)	(29.20%)	(43.60%)	(16.06%)	(100%)
High income OECD countries	9,497	21,367	31,688	9,622	72,174
	(13.16%)	(29.60%)	(43.91%)	(13.33%)	(37.74%)
Non high income OECD countries	11,806	34,464	51,689	21,077	119,036
	(38.87%)	(28.95%)	(43.42%)	(17.71%)	(62.26%)

High income OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States of America.

Non high income OECD countries: Albania, Algeria, Azerbaijan, Argentina, Armenia, Bangladesh, Bosnia Herzegovina, Brazil, Bulgaria, Belarus, Chile, China, Taiwan, Colombia, Croatia, Czech Republic, Dominican Republic, Egypt, El Salvador, Estonia, Georgia, Hungary, India, Indonesia, Iran, Israel, Jordan, Korea, Latvia, Lithuania, Macedonia, Malta, Mexico, Moldova, Montenegro, Morocco, Nigeria, North Ireland, Pakistan, Peru, Philippines, Poland, Puerto Rico, Romania, Russian Federation, Serbia, Singapore, Slovakia, Slovenia, South Africa, Tanzania, Turkey, Zimbabwe, Uganda, Ukraine, Uruguay, Venezuela, Viet Nam, Zimbabwe.

Table 2.A Willingness to pay for the environment: country rankings

I would agree to an increase in **taxes** if the extra money were used to prevent environmental damage (in WVSs 1990–1993 and 1995-1997), I would agree to an increase in **taxes** if the extra money were used to prevent environmental pollution (in WVS 2001).

Country	Strongly disagree or disagree		Agree or strongly agree		N. of obs.
VIETNAM	89	9.55%	843	90.45%	932
DOMINICAN REPUBLIC	56	13.76%	351	86.24%	407
EL SALVADOR	193	16.00%	1,013	84.00%	1206
BANGLADESH	478	17.57%	2,243	82.43%	2721
CHINA	737	18.57%	3,231	81.43%	3968
GHANA	19	20.88%	72	79.12%	91
SWEDEN	627	20.90%	2,373	79.10%	3000
PUERTO RICO	406	22.01%	1,439	77.99%	1845
TANZANIA	290	25.44%	850	74.56%	1140
NORWAY	600	25.73%	1,732	74.27%	2332
BRAZIL	812	28.12%	2,076	71.88%	2888
TURKEY	1,161	29.09%	2,830	70.91%	3991
KOREA	1,074	30.09%	2,495	69.91%	3569
SERBIA AND MONTENEGRO	1,035	30.27%	2,384	69.73%	3419
GEORGIA	600	31.12%	1,328	68.88%	1928
AUSTRALIA	630	31.30%	1,383	68.70%	2013
BOSNIA AND HERZEGOVINA	735	31.96%	1,565	68.04%	2300
CHILE	1,173	32.43%	2,444	67.57%	3617
CZECH REPUBLIC	895	32.47%	1,861	67.53%	2756
COLOMBIA	970	32.61%	2,005	67.39%	2975
DENMARK	650	32.68%	1,339	67.32%	1989
SLOVENIA	979	34.31%	1,874	65.69%	2853
GREECE	390	35.20%	718	64.80%	1108
VENEZUELA, RB	409	35.53%	742	64.47%	1151
MACEDONIA, FYR	692	36.54%	1,202	63.46%	1894
SPAIN	4,741	37.05%	8,056	62.95%	12797
CROATIA	784	37.28%	1,319	62.72%	2103
ALBANIA	341	37.39%	571	62.61%	912
RUSSIAN FEDERATION	2,774	37.81%	4,563	62.19%	7337
NETHERLANDS	763	38.17%	1,236	61.83%	1999
BELARUS	1,457	38.28%	2,349	61.72%	3806
CANADA	1,392	38.68%	2,207	61.32%	3599
NIGERIA	1,443	39.30%	2,229	60.70%	3672
JAPAN	1,147	39.66%	1,745	60.34%	2892
UNITED STATES	1,773	39.82%	2,680	60.18%	4453
PHILIPPINES	948	39.98%	1,423	60.02%	2371
BULGARIA	1,116	40.13%	1,665	59.87%	2781
MEXICO	1,750	40.31%	2,591	59.69%	4341
URUGUAY	392	40.37%	579	59.63%	971
PERU	1,060	40.61%	1,550	59.39%	2610
INDIA	2,228	40.74%	3,241	59.26%	5469
ICELAND	682	41.59%	958	58.41%	1640
ARMENIA	821	43.07%	1,085	56.93%	1906

Table 2.A (follows) Willingness to pay for the environment: country rankings*

I would agree to an increase in **taxes** if the extra money were used to prevent environmental damage (in WVS 1990–1993 e 1995 1997), I would agree to an increase in **taxes** if the extra money were used to prevent environmental pollution (in WVS 2001).

Country	Strongly disagree or disagree		Agree or strongly agree		N. of obs.
UNITED KINGDOM	1,533	43.33%	2,005	56.67%	3,538
PORTUGAL	886	43.88%	1,133	56.12%	2,019
LUXEMBOURG	517	44.96%	633	55.04%	1,150
AZERBAIJAN	842	45.12%	1,024	54.88%	1,866
NEW ZEALAND	488	45.14%	593	54.86%	1,081
LATRIA	1,295	45.71%	1,538	54.29%	2,833
UCRAINE	1,514	45.98%	1,779	54.02%	3,293
FINLAND	1,175	46.37%	1,359	53.63%	2,534
MOLDOVA	830	46.42%	958	53.58%	1,788
POLAND	995	47.65%	1,093	52.35%	2,088
ESTONIA	1,413	49.23%	1,457	50.77%	2,870
GERMANY	3,579	50.03%	3,575	49.97%	7,154
ITALY	1,964	50.53%	1,923	49.47%	3,887
MALTA	515	52.13%	473	47.87%	988
LITHUANIA	1,465	53.53%	1,272	46.47%	2,737
ROMANIA	518	53.57%	449	46.43%	967
ZIMBABWE	500	53.82%	429	46.18%	929
ARGENTINA	1,754	54.34%	1,474	45.66%	3,228
IRELAND	1,068	54.66%	886	45.34%	1,954
SINGAPORE	816	54.95%	669	45.05%	1,485
AUSTRIA	1,553	55.21%	1,260	44.79%	2,813
SLOVAK REPUBLIC	963	55.47%	773	44.53%	1,736
UGANDA	556	56.05%	436	43.95%	992
FRANCE	1,425	56.30%	1,106	43.70%	2,531
SWITZERLAND	660	56.99%	498	43.01%	1,158
BELGIUM	2,621	57.82%	1,912	42.18%	4,533
SOUTH AFRICA	3,111	57.83%	2,269	42.17%	5,380
HUNGARY	1,266	65.73%	660	34.27%	1,926
Number of observations	77,134	40.34%	114,076	59.66%	191,210

* Descriptive evidence disaggregated for survey waves is omitted and available upon request.

Table 2.B Willingness to pay for the environment: country rankings

I would give part of my **income** if I were certain that the money would be used to prevent environmental pollution (in WVS 2001)					
Country	**Strongly disagree or disagree**		**Agree or strongly agree**		**N. of obs.**
VIETNAM	38	3.98%	917	96.02%	955
TANZANIA	177	15.62%	956	84.38%	1,133
REPUBLIC OF KOREA	167	16.32%	856	83.68%	1,023
CROATIA	171	17.59%	801	82.41%	972
GREECE	198	17.82%	913	82.18%	1,111
SLOVENIA	174	17.96%	795	82.04%	969
PUERTO RICO	128	18.00%	583	82.00%	711
CHINA	161	18.01%	733	81.99%	894
PERU	275	19.10%	1,165	80.90%	1,440
BANGLADESH	281	20.50%	1,090	79.50%	1,371
MEXICO	301	20.90%	1,139	79.10%	1,440
MACEDONIA	210	21.06%	787	78.94%	997
DENMARK	207	21.14%	772	78.86%	979
SWEDEN	213	21.19%	792	78.81%	1,005
CZECH REPUBLIC	417	22.79%	1,413	77.21%	1,830
TURKEY	272	23.49%	886	76.51%	1,158
BOSNIA-HERZEGOVINA	282	24.33%	877	75.67%	1,159
NETHERLANDS	257	25.73%	742	74.27%	999
PHILIPPINES	325	27.61%	852	72.39%	1,177
SERBIA	590	28.88%	1,453	71.12%	2,043
LATVIA	278	29.54%	663	70.46%	941
CHILE	346	29.65%	821	70.35%	1,167
JAPAN	326	29.80%	768	70.20%	1,094
ALBANIA	272	29.89%	638	70.11%	910
CANADA	575	30.34%	1,320	69.66%	1,895
USA	365	30.70%	824	69.30%	1,189
ZIMBABWE	290	30.82%	651	69.18%	941
MOLDOVA	284	31.66%	613	68.34%	897
INDIA	487	32.97%	990	67.03%	1,477

Table 2.B (follows) Willingness to pay for the environment: country rankings

I would give part of my **income** if I were certain that the money would be used to prevent environmental pollution (in WVS 2001)					
Country	**Strongly disagree or disagree**		**Agree or strongly agree**		**N. of obs.**
ARGENTINA	407	33.22%	818	66.78%	1,225
ITALY	666	35.20%	1,226	64.80%	1,892
LUXEMBOURG	414	36.28%	727	63.72%	1,141
ICELAND	347	36.53%	603	63.47%	950
SINGAPORE	548	36.83%	940	63.17%	1,488
UKRAINE	403	36.90%	689	63.10%	1,092
RUSSIA	848	37.36%	1,422	62.64%	2,270
BULGARIA	362	38.97%	567	61.03%	929
POLAND	404	39.19%	627	60.81%	1,031
MALTA	392	39.72%	595	60.28%	987
PORTUGAL	375	40.41%	553	59.59%	928
BELGIUM	750	40.45%	1,104	59.55%	1,854
SPAIN	941	41.53%	1,325	58.47%	2,266
BELARUS	390	42.30%	532	57.70%	922
SLOVAKIA	552	43.29%	723	56.71%	1,275
IRELAND	435	45.17%	528	54.83%	963
FINLAND	460	46.28%	534	53.72%	994
HUNGARY	452	46.45%	521	53.55%	973
SOUTH AFRICA	1,289	47.32%	1,435	52.68%	2,724
ROMANIA	465	47.79%	508	52.21%	973
AUSTRIA	754	51.36%	714	48.64%	1,468
ESTONIA	477	51.90%	442	48.10%	919
UNITED KINGDOM	959	53.25%	842	46.75%	1,801
FRANCE	851	54.17%	720	45.83%	1,571
UGANDA	531	55.03%	434	44.97%	965
GERMANY	1,361	69.76%	590	30.24%	1,951
LITHUANIA	629	69.97%	270	30.03%	899
Number of observations	24,529	34.88%	45,799	65.12%	**70,328**

Table 3.A Willingness to pay for the environment and income quintiles

	I would agree to an increase in **taxes** if the extra money were used to prevent environmental damage (in WVSs 1990–1993 and 1995-1997), I would agree to an increase in **taxes** if the extra money were used to prevent environmental pollution (in WVS 2001). (Total number of observations 163,620)					
Income ranges	***Disagree***	***Strongly disagree***	***Agree***	***Strongly agree***	***N. of obs.***	***Cumulative distr.***
1st quintile	4,690	11,051	14,818	6,061	36,620	
	12.81%	30.18%	40.46%	16.55%	22.38%	22.38%
2nd quintile	5,346	14,446	20,917	7,471	48,180	
	11.10%	29.98%	43.41%	15.51%	29.45%	51.83%
3rd quintile	3,714	10,933	17,851	6,205	38,703	
	9.60%	28.25%	46.12%	16.03%	23.65%	75.48%
4th quintile	2,178	6,561	11,306	4,282	24,327	
	8.95%	26.97%	46.48%	17.60%	14.87%	90.35%
5th quintile	1,688	4,148	7,136	2,818	15,790	
	10.69%	26.27%	45.19%	17.85%	9.65%	100.00%

Table 3.B Willingness to pay for the environment and income quintiles

	I would give part of my **income** if I were certain that the money would be used to prevent environmental pollution (in WVS 2001) (Total number of observations 61,067)					
Income ranges	***Disagree***	***Strongly disagree***	***Agree***	***Strongly agree***	***N. of obs.***	***Cumulative distr.***
1st quintile	1,687	3,427	5,757	2,352	13,223	
	12.76%	25.92%	43.54%	17.79%	21.65%	21.65%
2nd quintile	1,969	4,608	8,168	3,003	17,748	
	11.09%	25.96%	46.02%	16.92%	29.06%	50.72%
3rd quintile	1,203	3,465	7,587	2,754	15,009	
	8.02%	23.09%	50.55%	18.35%	24.58%	75.29%
4th quintile	673	2,135	4,892	1,793	9,493	
	7.09%	22.49%	51.53%	18.89%	15.55%	90.84%
5th quintile	362	1,106	2,939	1,187	5,594	
	6.47%	19.77%	52.54%	21.22%	9.16%	100.00%

Table 4. Variables used in our econometric analysis

VARIABLE NAME	ORIGINAL INFORMATION	VARIABLE	SOURCE
Envirtax	I would agree or not to an increasing in *taxes* if the extra money are used to prevent environmental damage (1=strongly disagree; 2=disagree; 3=agree, 4=strongly agree)	Modified in binary variable (1=agree or strongl agree; 0=disagree or strongly disagree)	World Value Survey
Envirincome	I would agree or not to give part of own *income* if those money would be used to prevent environmental pollution (1=strongly disagree; 2=disagree; 3=agree, 4=strongly agree)	Modified in binary variable (1=agree or strongl agree; 0=disagree or strongly disagree)	World Value Survey
Equincome	Median income value of the domestic income decile	Modified in an equivalent income variable at PPP $ of GDP divided by the OECD modified equivalence scales	World Value Survey
Dincome#	Here is a scale of incomes from 1 to 10. We would like to know in what group your household is, counting all wages, salaries, pensions and other incomes that come in. Just choose from 1=lowest decile to 10=highest decile your household income level before taxes and other deductions.	Modified in five quintile (0/1) dummies	World Value Survey
Age	Age of the interviewed	Not modified	World Value Survey
Male	Sex of respondent: 1=Male; 2=Female	Modified in a male (0/1) dummy	World Value Survey
Education	Level of education of the interviewed: 1=low education; 2=middle education; 3=high education	Not modified	World Value Survey
Dchildren	Have you had any children? : 0=None; 1=1 child; 2=2 children; ….; 8=8 or more children	Modified in binary variable (0=None; 1=one or more children)	World Value Survey
Unemployed	Are you employed now or not? If yes, About how many hours a week? 1=Full time (30 hours a week or more); 2=Part time (less than 30 hours a week); 3=Self employed; 4=Retired/pensioned; 5=Housewife not otherwise employed; 6=Student; 7=Unemployed; 8=Other	Modified in binary variable (0= employed; 1= unemployed)	World Value Survey
Townsize	Size of town: 1=Under 2,000; 2=2,000 - 5,000; 3=5 - 10,000; 4=10 - 20,000; 5=20 - 50,000; 6=50 - 100,000; 7=100 - 500,000; 8=500,000 and more	Not modified	World Value Survey
Pratrelig	How often do you attend religious services these days: 1= never, practically never; 2= Less often; 3= Once a year; 4= Only on special holy days; 5= Once a month; 6= Once a week; 7= More than once a week	Not modified	World Value Survey
Ggbelong	To which of these geographical groups would you say you belong: 1=town; 2=region; 3=nation; 4=national country; 5=world	Not modified	World Value Survey
Natproud	How proud you are of own nation: 1=not at all; 2=not very much; 3=quite; 4= very much	Not modified	World Value Survey
Politideas	In political matters, people talk of "the left" and "the right." How would you place your views on this scale, generally speaking: from 1= Left to 10=Right	Not modified	World Value Survey
Cheattax	Cheating on taxes if you have a chance: from 1=never to 10=always	Not modified	World Value Survey
Irrpay	Irregular and additional payments connected with import and export permits, business licenses, exchange controls, tax assessments, police protection, or loan applications are very rare: from 0 to 10	Not modified	The Fraser Institute - Economic Freedom
Laworder	Political Risk Component: from 1 to 10	Not modified	The Fraser Institute - Economic Freedom
CO_2pc	Carbon dioxide emissions per capita. Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include contributions to the carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring	Not modified	World Bank - World Development Indicators
Taxpress	Top marginal income and payroll tax rates (and income thresholds at which they apply). Countries with higher marginal tax rates that take effect at lower income thresholds received lower ratings: from 1 to 10	Not modified	The Fraser Institute - Economic Freedom

Table 5. The determinants of the willingness to pay more taxes or to give part of individual income to prevent pollution

	Willingness to pay more taxes to prevent pollution				Willingess to give part of individual income to prevent pollution			
	Demographics	**Demographics + values**	**Demographics + values + (part of) country variables**	**Demographics + values + country variables**	**Demographics**	**Demographics + values**	**Demographics + values + (part of) country variables**	**Demographics + values + country variables**
Equincome	-5.56e-09	-9.74e-09	-9.33e-09	-4.70e-09	-1.09e-08	-1.03e-08	-1.13e-08	7.41e-09
	[-0.62]	[-0.90]	[-0.86]	[-0.38]	[-1.07]	[-0.80]	[-0.88]	[0.55]
$[Equincome]^2$	3.72e-17	1.26e-16	1.24e-16	7.65e-17	1.03e-16	9.10e-17	9.85e-17	-1.29e-16
	[0.32]	[0.90]	[0.88]	[0.48]	[0.76]	[0.53]	[0.57]	[-0.75]
Dincome1	-0.188***	-0.155***	-0.149***	-0.132***	-0.205***	-0.118**	-0.122**	-0.124**
	[-6.39]	[-3.87]	[-3.41]	[-2.66]	[-6.29]	[-2.57]	[-2.45]	[-2.29]
Dincome2	-0.092***	-0.063*	-0.061	-0.082*	-0.152***	-0.125***	-0.115***	-0.145***
	[-3.58]	[-1.86]	[-1.62]	[-1.92]	[-5.27]	[-3.20]	[-2.66]	[-3.13]
Dincome4	0.133***	0.138***	0.126***	0.164***	0.070**	0.088*	0.098*	0.108*
	[4.31]	[3.39]	[2.85]	[3.28]	[1.97]	[1.84]	[1.91]	[1.94]
Dincome5	0.167***	0.184***	0.164***	0.175***	0.241***	0.267***	0.251***	0.290***
	[4.44]	[3.68]	[3.09]	[2.91]	[5.42]	[4.47]	[4.00]	[4.19]
Age	-0.003***	-0.004***	-0.005***	-0.003**	-0.006***	-0.007***	-0.007***	-0.006***
	[-3.74]	[-4.50]	[-4.95]	[-2.32]	[-8.52]	[-6.62]	[-6.45]	[-4.91]
Male	-0.056***	-0.016	-0.019	-0.010	-0.072***	-0.035	-0.029	-0.010
	[-3.00]	[-0.63]	[-0.67]	[-0.31]	[-3.38]	[-1.21]	[-0.90]	[-0.29]
Education	0.274***	0.215***	0.212***	0.226***	0.342***	0.298***	0.293***	0.279***
	[17.44]	[10.40]	[9.45]	[8.93]	[19.21]	[12.39]	[11.22]	[10.08]
Dchildren	-0.017	-0.064*	-0.052	-0.054	-0.046	-0.131***	-0.154***	-0.191***
	[-0.71]	[-1.92]	[-1.42]	[-1.28]	[-1.64]	[-3.30]	[-3.53]	[-4.06]
Unemployed	-0.053	-0.061	-0.009	0.003	-0.119***	-0.152***	-0.146**	-0.127*
	[-1.53]	[-1.29]	[-0.17]	[0.05]	[-3.09]	[-2.81]	[-2.35]	[-1.88]
Townsize	0.010**	0.006	0.012*	0.010	0.018***	0.017***	0.020***	0.017**
	[2.39]	[1.08]	[1.90]	[1.41]	[3.97]	[2.63]	[2.81]	[2.21]
Pratrelig		0.027***	0.027***	0.032***		0.037***	0.038***	0.033***
		[3.72]	[3.47]	[3.51]		[4.41]	[4.12]	[3.28]
Ggbelong		0.058***	0.061***	0.075***		0.063***	0.065***	0.069***
		[5.53]	[5.25]	[5.57]		[4.99]	[4.72]	[4.60]
Natproud		0.136***	0.153***	0.144***		0.141***	0.150***	0.125***
		[7.47]	[7.42]	[6.13]		[6.93]	[6.55]	[4.91]
Politideas		-0.009	-0.013**	-0.029***		-0.012*	-0.014*	-0.029***
		[-1.59]	[-2.10]	[-3.81]		[-1.76]	[-1.88]	[-3.48]
Cheattax		-0.038***	-0.041***	-0.041***		-0.050***	-0.049***	-0.047***
		[-6.39]	[-6.34]	[-5.36]		[-7.64]	[-6.63]	[-5.77]
Irrpay			-0.293***	-0.372***			0.033	-0.210***
			[-7.65]	[-9.75]			[0.91]	[-5.75]
Laworder			0.205***	-0.067**			0.006	-0.305***
			[8.20]	[-2.04]			[0.14]	[-8.01]
$[CO_2pc]_{t-5}$				0.095***				0.117***
				[6.83]				[10.64]
$[Taxpress]_{t-5}$				-0.056***				-0.222***
				[-2.88]				[-5.91]
Observations	52,469	29,922	24,721	18,875	45,456	25,314	20,641	17,319
Wald χ^2	4305.12	2300.35	1869.83	1499.51	4019.35	2064.54	1700.65	1415.19
Pseudo R^2	0.07	0.07	0.06	0.07	0.08	0.08	0.08	0.07
Hausman test χ^2	994.21***	530.95***	429.00***	339.19***	962.06***	502.61***	407.91***	338.74***

Variable legend: see table 4. z statistics in square brackets. Country and year dummies are included in the estimates.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6. The determinants of the willingness to pay more taxes or to give part of individual income to prevent pollution – High income OECD countries

HIOECD	Willingness to pay more taxes to prevent pollution				Willingess to give part of individual income to prevent pollution			
	Demographics	Demographics + values	Demographics + values + (part of) country variables	Demographics + values + country variables	Demographics	Demographics + values	Demographics + values + (part of) country variables	Demographics + values + country variables
Equincome	-6.89e-10	-8.94e-09	-9.31e-09	-6.99e-09	-3.72e-09	-1.01e-08	-1.05e-08	8.00e-09
	[-0.07]	[-0.80]	[-0.83]	[-0.55]	[-0.36]	[-0.76]	[-0.79]	[0.57]
$[Equincome]^2$	8.03e-18	1.32e-16	1.37e-16	1.12e-16	3.62e-17	9.52e-17	9.75e-17	-1.24e-16
	[0.07]	[0.92]	[0.96]	[0.70]	[0.26]	[0.54]	[0.56]	[-0.70]
Dincome1	-0.150***	-0.170**	-0.170**	-0.129*	-0.091*	-0.140*	-0.145*	-0.125
	[-3.14]	[-2.54]	[-2.52]	[-1.86]	[-1.73]	[-1.89]	[-1.94]	[-1.63]
Dincome2	-0.088**	-0.108*	-0.096*	-0.080	-0.112**	-0.159***	-0.158**	-0.164***
	[-2.10]	[-1.91]	[-1.69]	[-1.35]	[-2.50]	[-2.58]	[-2.55]	[-2.58]
Dincome4	0.094**	0.120**	0.115*	0.144**	0.117**	0.070	0.059	0.074
	[2.08]	[1.98]	[1.89]	[2.27]	[2.30]	[1.02]	[0.85]	[1.03]
Dincome5	0.091*	0.162**	0.158**	0.155**	0.247***	0.211***	0.217***	0.225***
	[1.67]	[2.29]	[2.20]	[2.11]	[4.01]	[2.62]	[2.66]	[2.70]
Age	0.002*	0.001	0.001	0.001	-0.003***	-0.006***	-0.006***	-0.006***
	[1.76]	[0.41]	[0.35]	[0.37]	[-3.09]	[-3.58]	[3.58]	[-3.42]
Male	-0.069**	0.003	0.000	-0.004	-0.128***	-0.093**	-0.088*	-0.065
	[-2.31]	[0.08]	[0.01]	[-0.09]	[-3.94]	[-2.07]	[-1.93]	[-1.41]
Education	0.341***	0.259***	0.266***	0.277***	0.330***	0.263***	0.264***	0.260***
	[13.94]	[7.82]	[7.99]	[8.08]	[12.48]	[7.30]	[7.27]	[6.98]
Dchildren	-0.016	-0.044	-0.042	-0.049	-0.100**	-0.162***	-0.171***	-0.195***
	[-0.43]	[-0.83]	[-0.80]	[-0.90]	[-2.41]	[-2.74]	[-2.86]	[-3.18]
Unemployed	-0.091	-0.043	-0.048	-0.070	-0.101	-0.124	-0.128	-0.105
	[-1.38]	[-0.43]	[-0.48]	[-0.68]	[-1.47]	[-1.18]	[-1.22]	[-0.98]
Townsize	0.024***	0.015*	0.016*	0.011	0.016**	0.021**	0.023**	0.019*
	[3.57]	[1.66]	[1.71]	[1.19]	[2.21]	[2.13]	[2.26]	[1.84]
Pratrelig		0.031***	0.028**	0.029**		0.053***	0.053***	0.054***
		[2.66]	[2.42]	[2.43]		[4.06]	[4.03]	[4.04]
Ggbelong		0.075***	0.076***	0.078***		0.068***	0.066***	0.074***
		[4.45]	[4.45]	[4.40]		[3.56]	[3.45]	[3.73]
Natproud		0.043	0.045	0.042		0.034	0.033	0.031
		[1.40]	[1.46]	[1.28]		[0.99]	[0.94]	[0.88]
Politideas		-0.069***	-0.069***	-0.079***		-0.065***	-0.064***	-0.066***
		[-6.38]	[-6.36]	[-6.95]		[-5.32]	[-5.22]	[-5.21]
Cheatax		-0.062***	-0.062***	-0.064***		-0.076***	-0.075***	-0.076***
		[-6.13]	[-6.09]	[-5.94]		[-6.96]	[-6.82]	[-6.57]
Irrpay			0.186**	0.307***			-0.145	0.204*
			[2.25]	[3.99]			[-1.57]	[1.90]
Laworder			-0.204***	-0.052			-0.041	0.051
			[-3.73]	[-0.92]			[-0.64]	[0.76]
$[CO_2pc]_{t-5}$				0.030***				0.050***
				[3.34]				[2.86]
$[Taxpress]_{t-5}$				-0.074***				-0.168***
				[-3.88]				[-5.39]
Observations	20,555	11,317	11,134	10,423	18,207	10,157	9,972	9,262
Wald χ^2	1511.88	827.06	815.11	759.14	1654.84	887.99	875.47	759.93
Pseudo R^2	0.06	0.06	0.06	0.06	0.08	0.08	0.08	0.07
Hausman test χ^2	346.18***	190.04***	187.34***	170.95***	372.88***	204.22***	201.02***	176.65***

Variable legend: see table 4. z statistics in square brackets. Country and year dummies are included in the estimates.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. The determinants of the willingness to pay more taxes or to give part of individual income to prevent pollution – World except High income OECD countries

NON HIOECD	Willingness to pay more taxes to prevent pollution				Willingess to give part of individual income to prevent pollution			
	Demographics	Demographics + values	Demographics + values + (part of) country variables	Demographics + values + lagged country variables	Demographics	Demographics + values	Demographics + values + (part of) country variables	Demographics + values + lagged country variables
equincome	5.84e-06***	2.77e-06	3.03e-06	3.08e-06	8.55e-06***	5.23e-06	5.14e-06	5.15e-06*
	[3.16]	[1.14]	[1.23]	[1.23]	[4.64]	[1.93]	[1.87]	[1.88]
$[Equincome]^2$	-7.81e-12	-3.94e-12	-4.24e-12	-4.25e-12	-1.12e-11	-6.01e-12	-5.66e-12	-6.12e-12
	[-2.58]	[-1.01]	[-1.07]	[-1.06]	[-3.70]	[-1.33]	[-1.23]	[-1.36]
Dincome1	-0.195***	-0.145***	-0.139**	-0.152**	-0.240***	-0.079	-0.069	-0.084
	[-5.14]	[-2.83]	[-2.35]	[-2.05]	[-5.62]	[-1.32]	[-1.00]	[-1.05]
Dincome2	-0.094***	-0.044	-0.046	-0.101	-0.175***	-0.096*	-0.067	-0.115*
	[-2.84]	[-1.02]	[-0.91]	[-1.61]	[-4.63]	[-1.89]	[-1.10]	[-1.70]
Dincome4	0.158***	0.146***	0.127*	0.179**	0.017	0.096	0.135*	0.152
	[3.69]	[2.60]	[1.93]	[2.15]	[0.34]	[1.44]	[1.73]	[1.64]
Dincome5	0.211***	0.182**	0.134*	0.144	0.222***	0.316***	0.253**	0.399***
	[3.91]	[2.50]	[1.66]	[1.27]	[3.34]	[3.36]	[2.47]	[2.85]
Age	-0.006***	-0.007***	-0.010***	-0.007***	-0.008***	-0.008***	-0.009***	-0.007***
	[-6.27]	[-6.00]	[-7.03]	[-3.88]	[-8.35]	[-5.39]	[-5.31]	[-3.47]
Male	-0.047*	-0.019	-0.023	0.004	-0.029	0.018	0.048	0.092*
	[-1.93]	[-0.58]	[-0.60]	[0.08]	[-1.05]	[0.47]	[1.05]	[1.75]
Education	0.229***	0.187***	0.168***	0.160***	0.352***	0.325***	0.322***	0.307***
	[11.12]	[7.02]	[5.47]	[4.23]	[14.48]	[9.97]	[8.50]	[7.31]
Dchildren	-0.008	-0.075*	-0.062	-0.061	0.005	-0.108**	-0.139**	-0.183**
	[-0.24]	[-1.71]	[-1.20]	[-0.90]	[0.12]	[-1.97]	[-2.13]	[-2.40]
unemployed	-0.051	-0.080	-0.009	0.049	-0.133***	-0.164***	-0.162**	-0.149*
	[-1.23]	[-1.49]	[-0.14]	[0.58]	[-2.84]	[-2.58]	[-2.08]	[-1.69]
Townsize	0.001	0.001	0.012	0.009	0.018***	0.012	0.017	0.013
	[0.27]	[0.08]	[1.26]	[0.78]	[3.00]	[1.42]	[1.62]	[1.06]
Pratrelig		0.023**	0.026**	0.036**		0.027**	0.023*	0.004
		[2.55]	[2.42]	[2.58]		[2.38]	[1.76]	[0.26]
Ggbelong		0.047***	0.048***	0.071***		0.056***	0.061***	0.060**
		[3.44]	[2.98]	[3.39]		[3.36]	[3.04]	[2.56]
Natproud		0.196***	0.244***	0.267***		0.207***	0.245***	0.227***
		[8.64]	[8.85]	[7.71]		[8.22]	[8.09]	[6.30]
Politideas		0.015**	0.016*	0.010		0.014*	0.018*	-0.001
		[2.17]	[1.94]	[1.01]		[1.65]	[1.83]	[-0.10]
Cheatax		-0.024***	-0.026***	-0.015		-0.032***	-0.023**	-0.011
		[-3.25]	[-3.06]	[-1.33]		[-3.79]	[-2.27]	[-0.90]
irrpay			-0.472***	-0.606***			0.041	0.004
			[-16.16]	[-13.69]			[1.10]	[0.07]
laworder			0.238***	0.335***			-0.015	-0.403***
			[9.79]	[5.93]			[-0.41]	[-8.02]
$[CO_2pc]_{t-5}$				0.048***				0.029*
				[2.85]				[1.72]
$[Taxpress]_{t-5}$				-0.058**				0.014
				[-2.15]				[0.19]
Observations	31,914	18,605	13,587	8,452	27,249	15,157	10,669	8,057
Wald χ^2	2722.85	1433.45	1058.20	755.15	2208.49	1065.03	800.23	593.82
Pseudo R^2	0.08	0.07	0.06	0.08	0.08	0.07	0.07	0.07
Hausman test χ^2	632.58***	335.59***	244.97***	174.24***	543.01***	266.57***	196.66***	144.97***

Variable legend: see table 4.z statistics in square brackets. Country and year dummies are included in the estimates.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8 DFBETA test on the presence of influential outliers in regressors which vary at country level

Countries	Irrpay	Laworder	CO_2pc	Taxpress
AUSTRALIA	0.01	0.0001	0.30	0.08
AUSTRIA	-0.01	-0.25	0.15	-0.14
BELGIUM	-0.09	0.21	-0.10	0.24
BANGLADESH	-0.17	0.21	-0.17	0.29
BULGARIA	0.01	-0.02	0.00	-0.01
CANADA	0.00	0.00	0.03	0.01
CHILE	0.31	0.00	-0.43	0.10
CZECH REPUBLIC	-0.09	0.09	0.10	0.12
GERMANY	0.02	-0.09	-0.10	0.03
DENMARK	0.08	-0.07	-0.02	-0.36
SPAIN	-0.14	0.13	-0.09	-0.09
ESTONIA	-0.38	0.25	-0.39	-0.52
FINLAND	0.05	-0.01	0.01	-0.04
FRANCE	-0.12	0.11	0.13	0.24
BRITAIN	0.08	0.21	-0.02	0.23
GREECE	0.03	-0.06	0.03	-0.02
HUNGARY	-0.20	0.23	0.04	0.10
INDIA	-0.04	-0.04	-0.13	-0.10
IRELAND	0.01	-0.02	0.01	0.02
ICELAND	0.51	0.19	-0.38	0.26
ITALY	0.11	-0.14	0.13	0.15
LITHUANIA	-0.39	-0.23	0.42	-0.60
MEXICO	0.06	-0.15	-0.04	0.01
NETHERLANDS	0.01	0.02	-0.01	-0.04
PHILIPPINES	0.04	-0.10	-0.06	0.00
POLAND	0.14	-0.10	-0.04	-0.02
ROMANIA	0.04	0.02	0.07	0.01
RUSSIA	-0.34	-0.58	0.73	-0.43
SLOVAKIA	-0.15	0.26	0.01	0.16
SLOVENIA	-0.02	0.03	-0.01	0.01
TURKEY	0.00	0.01	0.02	0.01
UKRAINE	0.49	-0.19	-0.19	0.04

Legend: F-test value of a 2-step DFBETA test. Null hypothesis: the significance of the column variable in fully augmented tax model (the one estimated in Table 5, column 4) depends from the (row) country outlier.

APPENDIX A

Table A.1. Countries of the World Value Survey database

1	ALBANIA	41	JORDAN
2	ARGENTINA	42	JAPAN
3	ARMENIA	43	REPUBLIC OF KOREA
4	AUSTRALIA	44	LITHUANIA
5	AUSTRIA	45	LUXEMBOURG
6	AZERBAIJAN	46	LATVIA
7	BELGIUM	47	MOROCCO
8	BANGLADESH	48	MOLDOVA
9	BULGARIA	49	MEXICO
10	BOSNIA-HERZEGOVINA	50	MACEDONIA
11	BELARUS	51	MALTA
12	BRAZIL	52	NIGERIA
13	CANADA	53	NETHERLANDS
14	SWITZERLAND	54	NORWAY
15	CHILE	55	NEW ZEALAND
16	CHINA	56	PAKISTAN
17	COLOMBIA	57	PERU
18	CZECH REPUBLIC	58	PHILIPPINES
19	GERMANY	59	POLAND
20	DENMARK	60	PUERTO RICO
21	DOMINICAN REPUBLIC	61	PORTUGAL
22	ALGERIA	62	ROMANIA
23	EGYPT	63	RUSSIA
24	SPAIN	64	SINGAPORE
25	ESTONIA	65	EL SALVADOR
26	FINLAND	66	SLOVAKIA
27	FRANCE	67	SLOVENIA
28	BRITAIN	68	SWEDEN
29	GEORGIA	69	TURKEY
30	GHANA	70	TANZANIA
31	GREECE	71	UGANDA
32	CROATIA	72	UKRAINE
33	HUNGARY	73	URUGUAY
34	INDONESIA	74	USA
35	INDIA	75	VENEZUELA
36	IRELAND	76	VIETNAM
37	IRAN	77	SERBIA
38	ICELAND	78	SOUTH AFRICA
39	ISRAEL	79	ZIMBABWE
40	ITALY		

Table A.2 Descriptive statistics of variables used in the econometric analysis

	mean	se(mean)	p50	sd	min	max	N	p5	p25	p75	p95
envirtax	2.64574	0.002	3	0.879	1	4	191210	1	2	3	4
envirincome	2.724662	0.0032699	3	0.8671502	1	4	70328	1	2	3	4
dummyenvirtax	0.5966006	0.0011219	1	0.4905809	0	1	191210	0	0	1	1
dummyenvirincome	0.65122	0.0017971	1	0.4765876	0	1	70328	0	0	1	1
equincome	525,451	12517.6200	558.56	3985423	0.00032	84800000	101369	0.29	39.54	3652.01	250275.40
[equincome]^2	1.62E+13	6.4300E+11	311993.40	2.05E+14	0	7.19E+15	101369	0.08	1563.26	13300000	6.E+10
Dincome 1	0.22	0.0009	0	0.42	0	1	221132	0	0	0	1
Dincome 2	0.29	0.0010	0	0.45	0	1	221132	0	0	1	1
Dincome 4	0.16	0.0008	0	0.36	0	1	221132	0	0	0	1
Dincome 5	0.09	0.0006	0	0.29	0	1	221132	0	0	0	1
Age	41.21	0.0323	39	16.29	18	101	254611	20	27	53	71
Male	0.48	0.0010	0	0.50	0	1	261320	0	0	1	1
Education	1.91	0.0017	2	0.72	1	3	189939	1	1	2	3
Pratrelig	4.04	0.0044	4	2.07	1	7	224209	1	2	6	7
Dchildren	0.85	0.0008	1	0.35	0	1	212038	0	1	1	1
Unemployed	0.08	0.0005	0	0.27	0	1	255364	0	0	0	1
townsize	4.50	0.0055	5	2.51	1	8	207754	1	2	7	8
CO2pc	6.38	0.0091	6	4.53	0.07	20.36	246862	0.69	2.70	8.96	15.43
Irrpay	5.81	0.0069	6	2.45	0.60	10	126120	1.90	3.90	8	9.30
laworder	7.08	0.0069	7	2.61	0	10	144088	3.30	5.00	10	10
Taxpress	4.57	0.0056	4	2.67	0	10	225581	0.00	2.00	7	9
ggbelong	2.23	0.0025	2	1.24	1	5	248721	1.00	1.00	3	5
Natproud	3.37	0.0016	4	0.82	1	4	251817	2.00	3.00	4	4
Politideas	5.55	0.0052	5	2.28	1	10	193785	1.00	4.00	7	10
Cheatax	2.42	0.0047	1	2.36	1	10	247390	1.00	1.00	3	8

Table A..3. Pariwise correlation matrix for the WTP income estimate

(dummyenvirincome= the variable takes the value of one if individuals strongly agree or agree (to give part of their income to prevent pollution) and the value of zero if they disagree or strongly disagree.

	dummyenvir~x	equincome	[equincome]^2	Dincome 1	Dincome 2	Dincome 4	Dincome 5	age	male	education	pratrelig
dummyenvirtax	1										
equincome	-0.02	1.00									
[equincome]^2	-0.01	0.90	1.00								
Dincome 1	-0.05	-0.06	-0.05	1.00							
Dincome 2	-0.03	-0.06	-0.06	-0.32	1.00						
Dincome 4	0.04	0.05	0.05	-0.22	-0.29	1.00					
Dincome 5	0.04	0.09	0.10	-0.17	-0.22	-0.15	1.00				
age	-0.10	-0.04	-0.05	0.14	0.03	-0.08	-0.06	1.00			
male	0.00	0.01	0.01	-0.07	0.01	0.00	0.03	-0.01	1.00		
education	0.12	0.03	0.02	-0.24	-0.14	0.18	0.21	-0.24	0.04	1.00	
pratrelig	0.02	0.03	0.02	0.03	0.04	-0.04	-0.05	0.09	-0.03	-0.03	1.00
dchildren	-0.04	-0.13	-0.12	0.02	0.02	-0.01	-0.03	0.42	-0.08	-0.17	0.06
unemployed	0.00	-0.02	-0.01	0.09	0.02	-0.05	-0.06	-0.12	0.05	-0.03	0.00
townsize	0.08	0.01	0.00	-0.05	-0.05	0.05	0.06	-0.07	-0.05	0.21	-0.04
CO2pc	-0.04	0.03	0.02	0.00	-0.10	0.09	0.07	0.18	-0.09	0.08	-0.07
Irrpay	-0.11	0.06	0.05	0.01	-0.13	0.09	0.07	0.23	-0.07	-0.02	-0.13
laworder	-0.09	0.14	0.12	0.02	-0.12	0.08	0.07	0.24	-0.05	-0.03	-0.13
Taxpress	0.08	-0.22	-0.15	-0.01	0.09	-0.06	-0.05	-0.20	0.05	0.04	0.10
ggbelong	0.06	0.01	0.01	-0.04	-0.03	0.03	0.07	-0.08	0.03	0.14	-0.03
Natproud	0.08	-0.04	-0.04	0.01	0.04	-0.02	-0.07	0.03	0.01	-0.06	0.13
Politideas	0.02	-0.04	-0.03	0.00	0.01	-0.01	0.01	-0.01	0.03	-0.04	0.12
Cheattax	-0.05	0.02	0.01	-0.01	-0.03	0.01	0.02	-0.11	0.04	0.04	-0.09

Table A..3. Pariwise correlation matrix for the WTP income estimate (follows)

	dchildren	unemployed	townsize	CO2pc	irrpay	laworder	Taxpress	ggbelong	Natproud	Politideas	cheatax
dummyenvirtax											
equincome											
[equincome]^2											
Dincome 1											
Dincome 2											
Dincome 4											
Dincome 5											
age											
male											
education											
pratrelig											
dchildren	1.00										
unemployed	-0.09	1.00									
townsize	-0.08	0.00	1.00								
CO2pc	-0.02	-0.08	-0.01	1.00							
Irrpay	0.01	-0.09	-0.09	0.69	1.00						
laworder	0.04	-0.09	-0.18	0.66	0.88	1.00					
Taxpress	0.01	0.06	0.04	-0.44	-0.68	-0.63	1.00				
ggbelong	-0.06	-0.01	0.11	0.06	0.02	0.03	0.04	1.00			
Natproud	0.02	-0.02	0.04	-0.06	-0.09	-0.15	0.12	-0.02	1.00		
Politideas	0.02	0.01	-0.01	-0.14	-0.20	-0.17	0.18	-0.03	0.12	1.00	
Cheattax	-0.07	0.04	0.05	0.01	0.01	-0.02	-0.03	-0.01	-0.10	-0.03	1

Table A..4. Pariwise correlation matrix for the WTP taxes estimate

(dummyenvirtax= the variable takes the value of one if individuals strongly agree or agree (to pay more taxes to prevent pollution) and the value of zero if they disagree or strongly disagree.

	dummyenvirincome	equincome	[equincome]^2	Dincome 1	Dincome 2	Dincome 4	Dincome 5	age	male	education
dummyenvirincome	1									
equincome	0.03	1								
[equincome]^2	0.02	0.90	1							
Dincome 1	-0.04	-0.06	-0.06	1						
Dincome 2	-0.05	-0.06	-0.06	-0.30	1					
Dincome 4	0.05	0.06	0.05	-0.22	-0.28	1				
Dincome 5	0.06	0.10	0.11	-0.17	-0.22	-0.16	1			
age	-0.12	-0.05	-0.06	0.14	0.07	-0.09	-0.07	1		
male	0.00	0.01	0.01	-0.07	0.01	0.00	0.03	-0.01	1	
education	0.14	0.04	0.03	-0.22	-0.15	0.18	0.21	-0.23	0.03	1
pratrelig	0.03	0.04	0.03	0.02	0.03	-0.04	-0.04	0.09	-0.03	-0.0348
dchildren	-0.07	-0.15	-0.13	0.01	0.04	-0.02	-0.03	0.43	-0.08	-0.1647
unemployed	-0.02	-0.03	-0.02	0.09	0.01	-0.05	-0.06	-0.13	0.04	-0.013
townsize	0.07	0.03	0.01	-0.04	-0.07	0.06	0.07	-0.04	-0.05	0.2043
CO2pc	-0.03	0.01	0.01	-0.01	-0.06	0.06	0.10	0.15	-0.10	0.1084
Irrpay	-0.10	0.03	0.03	0.00	-0.08	0.06	0.09	0.18	-0.07	0.01
laworder	-0.08	0.14	0.13	0.03	-0.05	0.03	0.08	0.20	-0.05	0.00
Taxpress	0.07	-0.21	-0.15	-0.01	0.06	-0.04	-0.07	-0.17	0.05	0
ggbelong	0.07	0.01	0.01	-0.03	-0.03	0.03	0.07	-0.09	0.04	0.13
Natproud	0.07	-0.04	-0.03	0.01	0.02	-0.01	-0.05	0.05	0.01	-0.07
Politideas	0.01	-0.04	-0.02	-0.01	0.00	0.00	0.01	-0.01	0.03	-0.03
Cheattax	-0.05	0.02	0.01	-0.01	-0.04	0.02	0.04	-0.11	0.03	0.05

Table A..4. Pariwise correlation matrix for the WTP taxes estimate (follows)

	pratrelig	dchildren	unemployed	townsize	CO2pc	irrpay	laworder	Taxpress	ggbelong	Natproud	Politideas	cheatax
dummyenvirincome												
equincome												
[equincome]^2												
Dincome 1												
Dincome 2												
Dincome 4												
Dincome 5												
age												
male												
education												
pratrelig	1											
dchildren	0.0653	1										
unemployed	-0.0084	-0.0886	1									
townsize	-0.0532	-0.0812	-0.0121	1								
CO2pc	-0.0668	-0.0353	-0.0646	0.0609	1							
Irrpay	-0.15	-0.02	-0.08	0.06	0.60	1						
laworder	-0.13	0.01	-0.09	-0.05	0.62	0.84	1					
Taxpress	0.10	0.03	0.06	-0.03	-0.32	-0.65	-0.58	1				
ggbelong	0	-0.06	0.00	0.11	0.06	0.02	0.01	0.05	1			
Natproud	0.13	0	-0.02	0.00	-0.04	-0.02	-0.05	0.08	-0.02	1		
Politideas	0.12	0.02	0	-0.03	-0.10	-0.16	-0.12	0.15	-0.02	0.11	1	
Cheattax	-0.10	-0.07	0.04	0	0.02	0.02	-0.03	-0.04	-0.01	-0.11	-0.03	1