"Green behavioral (in)consistencies: are pro-environmental behaviors in different domains substitutes or complements?"

| AUTHORS | Sandra Schusser https://orcid.org/0000-0002-6204-6384
Goran Bostedt https://orcid.org/0000-0002-6540-743X |

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
49	4	12

BUSINESS PERSPECTIVES

businessperspectives.org

Sandra Schusser, Ph.D. candidate, Centre for Environmental and Resource Economics (CERE), Department of Forest Economics, Swedish University of Agricultural Sciences, Sweden.

Göran Bostedt, Associate Professor, Centre for Environmental and Resource Economics (CERE), Department of Forest Economics, SLU/Swedish University of Agricultural Sciences; Umeå School of Business and Economics, Umeå University, Sweden.

Sandra Schusser (Sweden), Göran Bostedt (Sweden)

GREEN BEHAVIORAL (IN)CONSISTENCIES: ARE PRO-ENVIRONMENTAL BEHAVIORS IN DIFFERENT DOMAINS SUBSTITUTES OR COMPLEMENTS?

Abstract

Households' consumption patterns and behaviors have profound influence on natural resources and environmental quality. This paper explores whether environmental behaviors and willingness to pay (WTP) in the household domains transport, energy consumption and water consumption are substitutes or complements. Using a cross-country data set from the Organization for Economic Cooperation and Development Survey on Environmental Attitudes and Behavior from 2008, a random-effects (ordered) probit model is used to answer this question for the following countries: Australia, Canada, France, Mexico, Italy, and South Korea. It is found that in most countries, actual environmental behaviors are substitutes, while WTP for environmental public goods in different domains is mostly complementary. Grounding in these results, policies aiming to encourage overall environmentally friendly lifestyles should therefore be all-encompassing of several public domains, instead of individual ones, to avoid the risk of negative spillovers.

INTRODUCTION

Households' consumption patterns and behaviors have profound influence on our natural resources and environmental quality. To reach certain environment-related Sustainable Development Goals (e.g. good health and well-being, clean water and sanitation, affordable and clean energy, responsible consumption and production (United Nations, 2015b), the general public needs to contribute to them. Moreover, private households' contribution to the provision of public goods in the form of environmental amenities is desirable for governments' public policy goals (Lanzini & Thøgersen, 2014). Consumption of private environmental goods contributes to private provision of an public environmental goods. For example, choosing electricity based on renewable energy sources (RES) over conventionally generated electricity reduces greenhouse gas emissions (a public bad[1]).

To encourage the activities of private households to increase their contributing efforts, governments in numerous countries have taken various policy measures (such as taxes, subsidies or public campaigns) to

---

1   For ease of use we will denote the reduction of a public bad as contributing to the provision of a public good.

incentivize the public to take environmental aspects into consideration in their consumption decisions. Yet, before incentivizing people to follow a certain behavior, getting to know their behavior in the status quo is the foundation for inducing any behavior changes through policy. Depending on environmental attitudes, households respond differently to policies aimed at promoting energy conservation, water conservation and waste prevention (Brown, 2014; Millock & Nauges, 2010). Therefore, examining the relation of pro-environmental behavior and willingness to pay (WTP) in different areas is an important step in devising policies effective across domains.

The relation of environmental behaviors, i.e. whether they are treated as substitutes or complements, is often analyzed in the context of spillover effects. Spillover effects are changes in a non-targeted behavior as a response to a behavior targeted by a program. Positive spillover effects occur if a pro-environmental behavior in one context leads to more pro-environmental behavior in another domain. Such interventions that lead subsequently to positive spillover effects will occur under complementary pro-environmental behavior. If interventions on environmental behavior lead to less pro-environmental behavior in another domain, then this constitutes a negative spillover effect – behaviors are substitutes. According to the classification by Nilsson et al. (2017), spillover effects can be behavioral (engaging in a specific behavior affects the probability of another specific behavior), temporal (a behavior affects the probability of engaging in the same behavior at another point in time) or contextual (a behavior in one context affects the likelihood of conducing the same behavior in another context). While we also draw on the literature related to the latter two, the focus of this paper is on behavioral spillovers. Recent literature points to altruism and warm glow effects in environmental behavior and the wish for consistency in behavior and attitudes shapes consumers' behavior (see also Festinger, 1957; Thögersen, 2004).

This paper seeks to answer questions on the interrelation between pro-environmental behaviors and WTP for environmental goods in different household domains. In particular, the question of whether different environmental behaviors or consumption of environmental goods can be regarded as substitutes or as complements will be investigated.

While the concept of spillover usually has been applied to studies of interrelated behavior changes induced by incentives, this paper focuses on a series of self-reported behaviors and responses to price changes of environmental goods. The overarching perspective over several household domains that we apply allows us to draw conclusions about the relationship of several seemingly unrelated goods while taking into account their environmental characteristics. This is also one of the major contributions of this paper. The large body of research in the literature focuses on the interrelation of environmental goods within the same domain. But there is little documentation on the occurrence of behavioral spillovers across domains and the type of interrelation (Dolan & Galizzi, 2015). Complementary to that, this paper turns to the subjects of the behavior, the consumers, and asks them how they would react, without treating them with experiments. Additionally, the scope of the survey, covering Organization for Economic Cooperation and Development (OECD) countries on four continents, greatly exceeds the traditionally smaller scope of studies in this research area.

In particular, we focus on consumer preferences, choices and WTP for renewable electricity, clean transport and water quality, and address these issues empirically using a unique data set generated by the OECD Households Survey on Environmental Attitudes and Behavior in 2008. This survey asked about 1,000 households each in eleven countries a total of 90 questions on attitudes and behavior in five environmental key areas. This gives us unique possibilities to compare environmental behavior across several OECD member states[2]. Specifically, we concentrate in this paper on the provision of the public goods "lower carbon emissions", as provided by households' behavior and consumption choices of renewable electricity and of transport, and on the provision of "clean water for all", as provided by

---

2   We focus on six countries out of this study: Canada, France, Mexico, Italy, Australia, and South Korea.

households' water saving actions and investments in improved water quality. We find that WTP for environmental public goods in different domains tend to be complementary, whereas reported behaviors are revealed to be substitutes in most countries under consideration. WTP for public goods in different domains are more likely to be complements for respondents that reported above-average pro-environmental behaviors.

The paper is organized as follows. In the next section, we will provide a background on previous research on the incentives for pro-environmental behavior and theoretical discussion on pro-environmental behavior. Section 2 will present a theoretical approach to complements and substitutes, followed by the empirical approach and a description of the data set in section 3. Section 4 presents and compares results for a set of OECD countries. Finally, we will conclude the paper with a discussion of policy implications, comparison with previous research, and directions for future research.

1. PREVIOUS RESEARCH

The goods that we are considering (fuel consumption for transport, electricity from RES, tap water quality) can be characterized as impure public goods, as they have characteristics of both private and public goods. The markets for environmental goods tend to be markets for impure public goods, since consumers buy a good that is both private and public in nature. This is because consumers derive utility from the private good that they consume, but they also buy the good's public good characteristics (e.g. carbon emission reduction, clean water), which are basically non-rivalrous and non-excludable. With impure public goods consumers may additionally derive utility from their own contribution to the public good (e.g. Kotchen, 2006; Andreoni, 1990; Wichman, 2016). Yet, the evident behavior for a profit maximizing individual would be to free-ride on other people's contributions. Supporting this, among others, Carbone and Gazzale (2017) found in experiments that effort contributions to a public good decreased when the share of peers who contributed with money to the public good increased. The following subsection will set the possible reasons for consumers to behave pro-environmentally and to consume environmental goods, followed by a presentation of literature on interrelations of environmental behaviors.

1.1. Private investments in environmental goods

Other than being subject to government regulations, nudges and influential framing (Croson & Treich, 2014), motives for consumers to invest in public goods are influenced by environmental knowledge, attitudes or values, and range from social expectations to altruism and status (see e.g. Truelove et al., 2014; Kollmuss & Agyeman, 2002). Impure altruists derive a warm glow from contributing to a public good (Andreoni, 1990). Welsch and Kühling (2009) investigate the modes of choice for pro-environmental consumption, in particular, the role of reference groups and routine behavior. They find that highly visible pro-environmental elements serve as status symbols among peer groups. Repeated pro-environmental behavior, irrespective of the reason, seems to enhance this kind of behavior. Also, Whitmarsh and O'Neill (2010) show that self-identity is an important predictor (though not the only one) for pro-environmental behaviors, whereas Kashima et al. (2014) argue that "environmental striving" might be a better predictor of environmental behavior, particularly more costly behavior, than environmental identity. Gneezy et al. (2011) find, in a field experiment, that costless pro-social behavior[3] does not indicate that subsequent actions will also be pro-social. However, costly pro-social behavior consistently leads to positive spillovers. They argue that this kind of behavior can be seen as part of a self-identity. The importance of low-cost vs. high-cost (or effort) behavior for subsequent behavior has also been recognized by, for example, Lanzini and Thögersen (2014), Gneezy et al. (2011), Diekmann and Preisendörfer (2003). Diekmann and Preisendörfer (2003) show that environmental behavior is determined by the law of demand and that the effect of environmental attitudes on

---

[3] Pro-social behavior in this context can be identified as a parent category for pro-environmental behavior.

pro-environmental behavior decreases with costs and inconvenience involved in the actual environmental behavior.

Economic attempts at explaining pro-environmental behavior trace their roots back to the characteristics demand theory suggested by Lancaster (1966) in the "New Approach to Consumer Theory", which states that when consumers buy goods, they do not actually derive utility from the goods themselves, but from the goods' characteristics. This concept can be applied to consumers buying a bundle of goods, some of which are certain environmental goods. An environmentally friendly behavior like commuting by bike instead of by car can have different (perceived) levels of attributes like monetary costs (acquisition costs of bike vs. car, fuel costs), cost of time (biking is more time-consuming), environmental friendliness (no emissions vs. high emissions), convenience (getting sweaty vs. sitting comfortably) or health benefits (outdoor exercise vs. sitting still). Individual sets of environmental behavior contain a specific sum of attributes for which individuals hold a certain willingness to pay, given their budget[4].

1.2. Literature on interrelations of environmental behaviors

Most research on interrelations of environmental goods and behaviors is restricted to one specific domain, for example, the electricity consumption of private households. Yet, the missing knowledge about both, interrelations as well as spillovers of pro-environmental behaviors between different domains has been acknowledged by many authors (e.g. Thögersen & Ölander, 2003; Stern, 2011; Dolan & Galizzi, 2015).

From the existing literature, interrelation of pro-environmental behaviors are mainly inconclusive. Thögersen and Ölander (2003), having asked whether pro-environmental behavior spreads through other areas in a "virtuous cycle", find evidence for both negative and positive spillover effects of pro-environmental behavior in one domain to other domains, all of them very small though. The effect is stronger though

among individuals with strong values on environmentally friendly behavior. Specifically, recycling was found to spill over into buying organic products and using a bike/public transport comparatively more, and buying organic food was negatively correlated with recycling during subsequent years. Thögersen (1999) focuses on two specific pro-environmental behaviors (recycling and packaging waste prevention) and finds that they are not independent from each other. Environmentally friendly behavior from recycling results in a negative spillover effect to attitudes towards related activities, according to Thögersen (1999), most likely because recycling is used as an excuse to not make any bigger, more radical or costly changes to lifestyle. Thögersen (1999) argues that the behavior spills over into another domain without apparent cognitive process. Mazar and Zhong (2010) conducted experiments that showed that exposing people to green products (in an online store) makes them more likely to behave pro-social (in a moral or ethical sense), while purchasing green products has negative effects on their altruism, thus suggesting "that consumption is connected to social and ethical behaviors more broadly across domains than previously thought". In fact, they show that buying green products seems to buy them the "right to violate social norms". Similar results have also been found, for example, by Clot et al. (2014) and Tiefenbeck et al. (2013).

Besides these inconclusive study results, a number of other results indicate positive or complementary interrelations between several environmental goods. According to Margetts and Kashima (2017), positive interrelations between pro-environmental behaviors occur when they require similar resources to perform them. Lanzini and Thögersen (2014) analyzed spillovers from green purchasing behavior encouraged by praise or monetary incentives to other, self-reported pro-environmental behavior. A positive spillover was revealed, affecting mostly low-cost behavior. Martínez-Espiñeira et al. (2014) use a multivariate probit model on cross-sectional data on Spanish households to find the determinants for the likelihood of engaging in any of three binary behavior variables (conserva-

---

4   Empirical attention has been paid to willingness to pay for certain environmental attributes or behaviors and incentives for participation in green markets (i.e. markets for environmentally friendly goods and services, see e.g. Kotchen and Moore (2007), Kotchen (2006), Cummings et al. (1994)).

tion habits) and three binary investment variables (investment into efficient appliances), taking into consideration possible correlations between these variables. They find positive and significant correlations between almost all the decision variables, suggesting the existence of unobservable characteristics that drives all pro-environmental behaviors. The hypothesis is supported by Lange et al. (2017) who find rather complementary interrelation between emission off-setting behavior and a number of pro-environmental behaviors.

Thus, socio-demographic, economic characteristics, internal motivation and knowledge, as well as characteristics of the behavior, influence the relation between pro-environmental behaviors. Evidence for the interrelation of such behaviors is mixed, with large support for complementary in behavior, yet numerous effects working towards the contrary direction.

2. MODEL

2.1. Theoretical background

To illustrate the issue of positive vs. negative spillover effects of environmental behavior and willingness to pay for environmental goods, we next describe two extreme cases. One, where two public goods are perfect substitutes and one where two public goods are perfect complements. Since the objective here is to isolate the effects of substitutability and complementarity, we assume that consumers do not regard two public goods as completely independent from each other. The models are here intentionally kept simple to illustrate a few points. We argue that more complex utility functions only add complexity without adding intuition about how environmental behavior might be discerned from the data.

First, let us assume that an individual has a utility function for two perfectly substitutable public goods (Z_1 and Z_2) that are implicitly bought when buying two private goods (x_1 and x_2). For demonstrative purposes, let us assume that consumption of all other goods is kept constant and that the relationship between good xi and the public good zi is multiplicative so that $z_i = 0$ when $x_i = 0$. This is intended to demonstrate a situation where the

public good does not enter the utility function unless the associated private good is bought. It also turns the public good into an impure one, since consumers care about their own provision of the public good. The utility maximization problem for a representative consumer can then be formulated as follows:

$$\max_{x} \quad U\left(Z_1, Z_2, x\right) = Z_1 x_1 + Z_2 x_2$$

subject to $\quad m = p_{x1} x_1 + p_{x2} x_2,$

where m is income net of consumption of all other goods. The indirect utility function can then be written as

$$V\left(Z_1, Z_2, p_x, m\right) = \max\left\{\frac{Z_1 m}{p_{x1}}, \frac{Z_2 m}{p_{x2}}\right\}.$$

This implies that since goods $Z1$ and $Z2$ are perfect substitutes, consumers will choose whichever of the two public goods together with its normal good gives them most utility. When the two public goods are perceived as equal, this depends on the price of the private good. In the case of equal prices, i.e. when $p_{x1} = p_{x2} = p$, any combination of the two public goods is optimal, $\left(\alpha Z_1 + \left(1 - \alpha\right) Z_2\right) \cdot m / p,$ where $\alpha \in \left(0, 1\right),$ since any combination of the two gives the same utility.

Moving from the representative consumer to a sample of consumers, the relationship between the two public goods that are substitutes is therefore negative. If more is spent on the good associated with the public good Z_1, less needs to be bought of the private good associated with the public good Z_2 to achieve the same level of utility. The implication of this is that the valuation for one public good should decrease with the valuation of another substitute public good. This is graphically demonstrated in Figure 1a with a hypothetical data set.

If a representative individual's utility function instead contains two perfectly complementary public goods and two private goods of the form $U\left(Z_1, Z_2, x\right) = \min\left\{Z_1 x_1, Z_2 x_2\right\},$ where the relationship with the public good z_i and private good x_i is again multiplicative, and the individual is facing the same budget constraint as above, the indirect utility function takes the form

$$V\left(Z_1, Z_2, p_x, m\right) =$$

$$= \min\left\{ Z_1 \frac{Z_2 m}{Z_2 p_{x1} + Z_1 p_{x2}}, Z_2 \frac{Z_1 m}{Z_2 p_{x1} + Z_1 p_{x2}} \right\} =$$

$$= \frac{Z_1 Z_2 m}{Z_2 p_{x1} + Z_1 p_{x2}}.$$

Consumers will then choose their consumption bundle such that $Z_1 x_1 = Z_2 x_2$, so that their consumption of one good is matched equally by consumption of the other good. A complementary public good is then valued higher with improved provision of another public good. Moving from the representative consumer to a sample of consumers, the relationship between the valuation of two complementary public goods is therefore positive, as illustrated schematically in Figure 1b, where the dots represent individual observations in a sample of hypothetical consumers.

We relate a positive relationship between the demand of the two public goods as in complements to a positive relation between WTP for them or to a positive relation between the quantity of pro-environmental behaviors connected to the two public goods. In other words, in this case, the two public goods are likely consumed together their probability of being consumed is equal. A negative relationship between the demand for the public goods represents a negative relation between

WTP for the goods or a negative relation between pro-environmental behaviors. Two goods that are substitutes will then differ in their likelihood of being consumed at the same time.

In economic terms, sensitivity of consumers' WTP to the order of goods purchased is also related to the order of income changes (cf. Johansson, 1987, p. 22). For example, if a respondent pays first for good i, then his income is reduced by $WTPi$, he is less wealthy. If he is then asked to value a second good j, his base line income is $m - WTPi$ and he will value.

This second good assumes lower income, which will result in a reduced WTP for good j. The situation is turned around if the first good to be valued is good j and the second one is good i. But under some conditions WTP will not be affected by the sequence of valuations. These conditions are known as path independence conditions. Total WTP does not depend on the order of questions if cross-price effects on demand are equal, such that $\partial Z_i / \partial p_j = \partial Z_j / \partial p_i$ with $i \neq j$. This is the case when marginal utilities are constant. Thus, a sufficient condition of path independence is linearity in the utility function with respect to the parameters of interest, since then marginal utilities will be constant. However, a sequencing effect is not very likely to arise in our data set, since valuation questions were asked interspersed with non-valu-
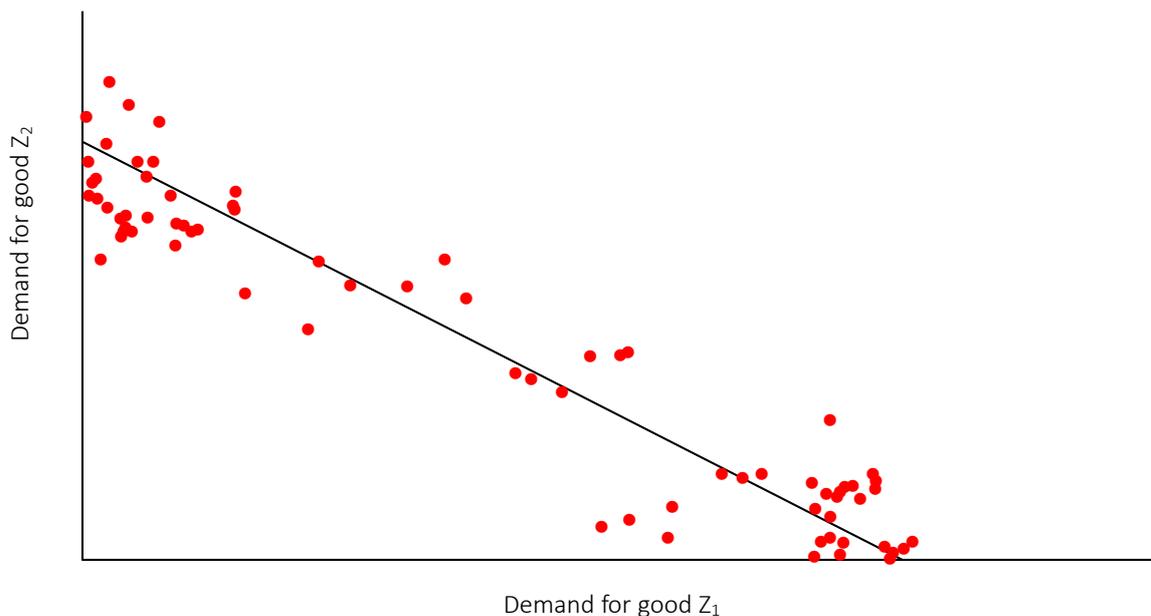
Figure 1a. Schematic illustrations of demand for two public goods, if they are substitutes
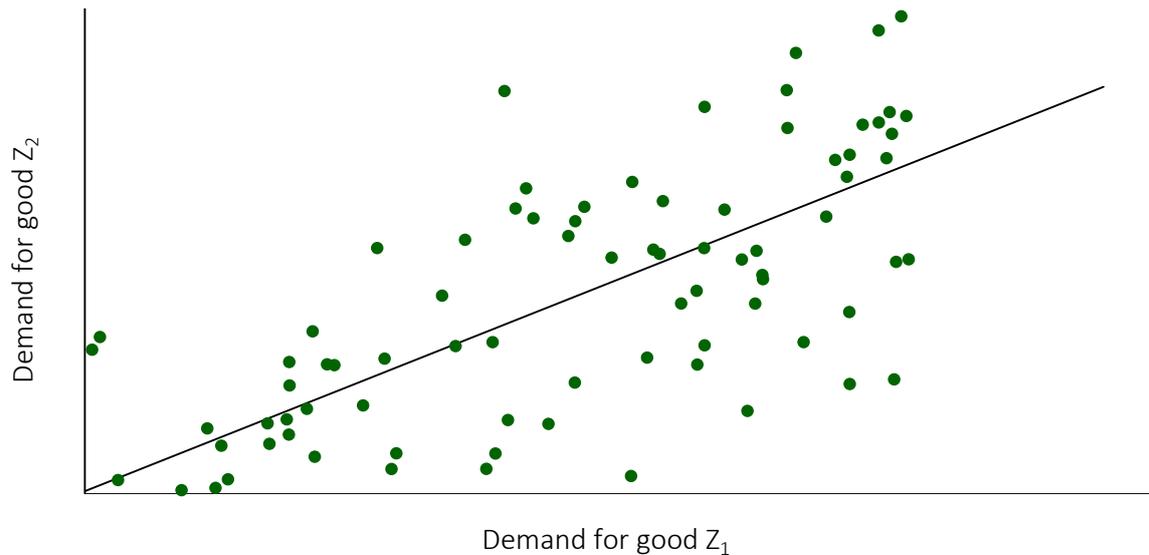
Figure 1b. Schematic illustrations of demand for two public goods, if they are complements.

ation questions. Additionally, the money spent on the three domains represents a small share of consumption. We can therefore assume that respondents considered their original income as base line for answering the valuation questions.

2.2. Econometric method

Given the nature of the available data set, we approach the question of consistency of pro-environmental behavior by means of probabilities of engaging in them in different household domains. For this we adapt the approach used by Lange et al. (2017, p. 80).

In a first step, we estimate a binary probit model due to the binary setup of our pro-environmental behavior variables in the three domains. Thus, we can estimate whether probabilities of engaging in above-median pro-environmental behavior in the domains transport and water differ from those in the energy domain, which we use as base line:

$$Y_i^* = \alpha_T \cdot T_i + \alpha_W \cdot W_i + \beta_0 x_{ij} + u_i + v_{ij}, \qquad (1)$$

where the dummy variable Y_i takes value 1 if for a particular domain the respondent engages in a number of pro-environmental behaviors above the median, and zero otherwise. We take this to be the observable representation of unobservable overall pro-environmental behavior of Y_i^*. Each domain is then identified by a dummy variable it-

self, T for transport and W for water, where E (energy) serves as the base and is not included as a regressor. We include x_{ij} as the vector of explanatory variables described in Table 1, including the dummies for the respondents' country with Australia as base line, and β_{ij} is their parameter vector. Since we assume that pro-environmental behaviors might be correlated across domains, we apply random effects model where u_i represents unobserved heterogeneity. This is appropriate since the null hypothesis of no unobserved heterogeneity was rejected by likelihood ratio test. The error term v_{ij} for variation within households and domains is normally distributed. Results are reported as average discrete effects in Table B1, column 1.

Second, we estimate the same model for each country, since the results from the first step suggest variations among countries in the relation between environmental behaviors in the domains (reported as average discrete effects in Table B1, columns 2-7).

Building on the previous, if the public goods involved in transport and energy and water consumption have a positive interrelation (and thus are considered as behavioral complements), we would expect the discrete probability effects of the domain dummies W_i and T_i to be zero. Then, any given outcome is equally likely to occur for each of the domains. If they are significantly different

from zero, we interpret them to have a negative interrelation, i.e. as behavioral substitutes:

$$Y_i^* = \alpha_T \cdot T_i + \alpha_W \cdot W_i + \sum_{d=T,W,E} \gamma_{T_d} B_d^+ + \quad (2)$$
$$+ \sum_{d=T,W,E} \gamma_{W_d} B_d^+ + \beta_0' x_{ij} + u_i + v_{ij},$$

In a third step, we basically start from the same model structure as in the first step above, where Y_i^* is now unobservable WTP for an environmental good. Taking note of the ordinal structure of the observable dependent variable Y_i, the problem turns into the estimation of an ordered probit model with random effects. Here the dependent variable $Y_i = k \left(k = 1, ..., 5 \right)$ if the unobservable WTP lies between the lower and upper bounds of k, c_{k-1} and c_k, $\left(c_{k-1} < Y_i^* \le c_k \right)$. Estimation results are presented in Table B3. We proceed in a fourth step to specify this ordered probit model with random effects for each of the six countries individually. To take into account respondents previous level of environmental behavior, the third and fourth steps add to the explanatory variables interaction terms of the domain dummies with the dummies for above-median environmental behavior (B_d^+ with $d = T,W,E$). Six parameters γ_{T_d} and γ_{W_d} with $d = T,W,E$ show the effect of above-average pro-environmental behavior in domain d on the relation between WTP in transport and energy domain γ_{T_d} and on the relation between WTP in water and energy domain γ_{W_d}. We expect respondents who have shown an above-median level of pro-environmental behavior to be more likely to respond with higher WTP in all domains, as an expression of more pro-environmental attitude. The interaction coefficients are therefore expected to counteract the domain coefficients.

Limitations in our model choice can arise due to unobserved underlying characteristics and due to the order in which the questions were asked[5]. As mentioned above, distorting effects, in the form of income effects or substitution effects, can appear when several WTP are elicited in a sequence.

3. DATA

For the empirical analysis, we use existing data from the Web Survey on Environmental Attitudes and Behavior conducted by OECD in 2008. This unique data set contains approximately 1,000 responses from each of ten OECD countries. The survey contained in total about 90 questions on household characteristics, attitudinal characteristics and the five key areas such as Waste, Transport, Energy, Organic Food, and Water[6]. We focus on such domains as transport, energy and water, since they have a clear connection to environmental behavior and questions were posed in a comparable way. Item non-response was in many cases large. Responses that were not answered or answered with "I don't know" are treated as missing. From this data set, we selected six countries, which had more than 100 complete and usable responses: Canada, France, Mexico, Italy, Australia and South Korea.

As related above, we use two sets of dependent variables: one variable indicating pro-environmental behavior and second one indicating WTP for pro-environmental goods. For each domain, we consider these two variables of interest. For the first, respondents were asked if or how often they perform certain pro-environmental activities; these are the behavioral variables (see Q1.2, Q2.2 and Q3.2 in Appendix A). We recoded them into binary variables where 1 signifies that respondents are engaged in an above-median number of environmental behaviors, and 0 otherwise[7].

For the second, respondents are asked to state their fuel consumption change in response to change in price (transport), and to value the maximum price change they would accept to change the quality of their consumption (renewable-energy-only and improved water quality in the respective domains). These are the WTP variables (see Q1.1, Q2.1 and Q3.1 in Appendix A), which are interval-valued and they are attributed ordinal values. When respondents consider

---

5   When there is a possibility of correlations of errors in between the three models, modelling the data in an equation system seems to be the straightforward method of choice. Greene (2008, chapt. 10) presents the formal model of multivariate choice estimations for the bivariate case, but point out that the bivariate model involves a substantial amount of computation, not to speak of equation systems of order three.

6   For a full description of the survey and the data see OECD (2008a).

7   Note that whereas the answer options in the energy and water domain contain only behaviours, the transport domain includes the investment option that respondents "changed a car for another one, which uses less polluting fuel". This option is obviously related to income.

the questions, they are actually asked to consider the consumption good and the underlying public good, i.e. the environmental qualities of the good. While the underlying public goods might be the same or similar, the associated private goods are not. The effect of an increase in fuel price on motorized vehicle transport includes not only the choice of lower emission levels due to lower fuel consumption, but also the choice for preferred vehicle and its convenience. Similarly, the choice between conventional electricity generation and renewable-based electricity generation implies a choice of the amount of pollutant emissions. The choice to pay for cleaner water asks implicitly to value the reduction of pollutants in the water cycle. Whitmarsh et al. (2011) have shown for the public bad carbon emissions that carbon is not a normal part of everyday decision-making. Knowledge, skills, and judgement are misaligned with behaviors. It is conceivable that households engaging in pro-environmental behavior differentiate between these behaviors even if the behaviors are, in fact, related to the same public good. Therefore, although pollutant emission as the underlying environmental attribute of transport and energy is the same, we theorize that respondents still perceive the public goods as different from each other in that they are transmitted through different private goods. The survey primes respondents to consider their environmental behavior, therefore, it is valid to assume that they actually value the public good in their private consumption decision.

As explanatory variables we consider environment related attitudinal variables: an indicator for membership of or contribution to an environmental organization, an indicator for environmental concern relative to other global concerns ranked from one to six, and two indicators if the household has invested into an above-median amount of energy- or water-efficient appliances, respectively. As socio-demographic control variables we consider gender, age, household size, an indicator for a university education, self-reported household income and an indicator for urban residency, since these factors are to be expected and partly have been shown to influence environmental behavior and WTP (see e.g. Kriström & Krishnamurthy, 2014; Beaumais et al., 2014; Ehreke et al., 2014; Brown, 2014). All variables are described in Table 1.

Table 1. Description of variables

Variables	Description
E	Dummy for the energy domain, 1 if observation refers to this domain, 0 otherwise. Used as reference domain in the estimations
T	Dummy for the transport domain, 1 if observation refers to this domain, 0 otherwise
W	Dummy for the water domain, 1 if observation refers to this domain, 0 otherwise
B_T^+	1 if number of reported pro-environmental behaviors in the transport domain in the previous year is above the median, 0 otherwise
B_W^+	1 if number of reported pro-environmental behaviors in the water domain that are done regularly (often or always) in the previous year is above the median, 0 otherwise
B_E^+	1 if number of reported pro-environmental behaviors in the energy domain that are done regularly (often or always) in the previous year is above the median, 0 otherwise
W_invest	1 if the household has invested in more than the median number of energy-efficient devices in the past ten years, 0 otherwise
E_invest	1 if the household has invested in more than the median number of energy-efficient devices in the past ten years, 0 otherwise
Env_concern	Values from 1 to 6, indicates environmental concern relative to other global concerns. Respondents were asked to rank six issues in the order of their importance to them
Member	1 if the respondent is a member of, or a contributor to an environmental organization, 0 otherwise
E_renewable	1 if the household takes special measures to buy renewable energy from their electricity provider, 0 otherwise
Distance	Kilometres driven by car per week categorized in intervals (0: 0, 1: < 30, 2: 31-100, 3: 101-250, 4: 251-500, 5: 501-700, 6: 701-900, 7: 901-1000, 8: > 1001)
W_satisfaction	1 if the respondent is satisfied with tap water quality, 0 otherwise
Age	Age in years of the person who answered the survey on behalf of the household
HH_size	Number of people living in the surveyed household
Income	Annual household income after tax, categorized in intervals of dollars (1: 1-22, 200; 2: 22, 201-29, 100; 3: 29, 101-35, 200; 4: 35, 201-41,300; 5: 41, 301-47, 500; 6: 47, 501-54, 700; 7: 54, 701-62, 900; 8: 62, 901-73, 500; 9: 73, 501-91,700; 10: more than 91, 700)
Female	1 if the respondent is female, 0 if male
Uni	1 if the respondent has Bachelor's or postgraduate degree, 0 otherwise
Urban	1 if the respondent's primary residence is in an urban or suburban area, 0 otherwise
Australia (Canada, France, Mexico, Italy, South Korea)	Dummies for the countries, 1 if the respondent lives in the respective country, 0 otherwise

Table 2. Descriptive statistics per country (means)

Variables	Australia		Canada		France		Mexico		Italy		South Korea		Total	
	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)	(a)	(b)
T	1.661	–	1.822	–	2.148	–	2.287	–	2.217	–	2.674	–	2.248	–
W	1.669	–	1.877	–	1.651	–	2.633	–	2.173	–	2.046	–	2.144	–
E	1.787	–	1.897	–	1.757	–	2.448	–	1.966	–	2.000	–	2.058	–
Env_concern	3.850	–	3.815	–	3.544	–	4.062	–	3.725	–	3.263	–	3.712	–
Member	0.189	–	0.096	–	0.130	–	0.166	–	0.141	–	0.240	–	0.168	–
E_renewable	0.243	–	0.133	–	0.050	–	0.139	–	0.098	–	0.435	–	0.183	–
Distance	61	–	49	–	66	–	35	–	63	–	24	–	49	–
W_satisfaction	0.715	0.87	0.672	0.87	0.698	0.80	0.205	0.73	0.497	0.76	0.303	0.75	0.527	0.77
Age[1]	36.9	40.9	42.4	39.7	46.9	40.0	38.0	25.8	43.4	43.8	37.5	38.0	42.0	38.0
HH_size[4]	3.7	2.6	3.8	2.5	3.7	2.3	4.8	3.9	4.1	2.3	4.7	2.7	4.3	2.7
Income[5]	55,364	30,495	62,648	27,282	57,553	28,115	66,135	12,441	62,182	27,332	64,132	17,885	61,336	23,926
Female[1]	0.504	0.500	0.521	0.504	0.473	0.513	0.391	0.503	0.534	0.514	0.374	0.503	0.451	0.506
Uni[2]	0.268	0.330	0.377	0.470	0.219	0.260	0.682	0.150	0.319	0.130	0.574	0.330	0.462	0.278
Urban[3]	0.795	0.801	0.733	0.724	0.604	0.831	0.955	0.634	0.809	0.909	0.886	0.828	0.835	0.787
N	127	–	146	–	169	–	422	–	382	–	350	–	1596	–

Notes: (a) sample means, (b) OECD/UN data, sources specified below. [1] in (b): data for 2010 (United Nations, 2015b), [2] in (b): percentage of adults with teriary education as the highest level attained. From Educational attainment of 25-64 year-old, data for 2006 (OECD, 2008b), [3] in (b): percentage of population living in urban and intermediate areas, data from 2014 (OECD, 2018b), [4] in (b): average size of households, data from 2010 (South Korea, Mexico), 2011 (Canada, Australia) and 2015 (France, Italy) (OECD, 2015), [5] in (b): household net adjusted disposable income in USD, data for 2008 (OECD, 2018a). in (a): income in USD calculated as average of the interval scaled income categories.

Table 2 gives number of observations, means for dependent variables and control variables and compares relevant sample means with national population means from various UN and OECD sources[8].

Compared to the sample, the national populations are structurally different in certain aspects. Since household income is self-reported net of taxes and the population mean is household net adjusted disposable income, values might be expected to somewhat differ. More survey respondents than average have a university degree. The OECD's data corroboration admits certain differences in the sample versus the population for some countries. This difference is particularly large and raises concerns about bias only in Mexico. The difference between sample mean age and population mean age is also the largest in Mexico. The deviation of the Mexican sample from the population is due to low internet access compared with other countries (OECD, 2008a).

Table 3 shows the frequency distribution of WTP responses and shares of respondents who reported above-median environmentally friendly behav-

iors and investments. A majority of respondents would not change their fuel consumption if fuel prices increased and about 20% of respondents reported that they would reduce their fuel consumption by less than 10%, between 10% and 20%, and more than 20%, respectively. Seventeen percent of respondents did not answer this question and an equal share responded with "I don't know".

Thirty percent of respondents each would either not pay anything additional or less than 5% additional on their energy bill to only use electricity from RES, while fewer respondents reported willingness to pay higher percentages of their energy bill towards this objective. Fifteen percent of respondents answered this question with either "I don't know" or "I prefer not to answer". For improved water quality, each of the answer possibilities "would not pay anything", "would pay less than 5%" and "would pay between 5% and 15%" received 30% of responses. The remaining responses are split between respondents who are willing to pay more than 16% and more than 30% above their current water bill. More than 50% of responses are missing for this question. Respondent fatigue might account for this. All domains have

---

8   Note that while the sample is from 2008, national population means are from 2006 to 2015. Data were reported from the year closest to 2008 that was found.

Table 3. Frequencies and medians for variables related to pro-environmental goods and behaviors in each of the domains, namely energy, transport and water

Outcomes/Choices	Energy		Transport		Water	
	Choice	N	Choice	N	Choice	N
WTP						
Outcome 1	0	2,196	0	1,789	0	998
Outcome 2	< 5%	1,781	< 10%	856	< 5%	933
Outcome 3	5-15%	11,84	10-20%	820	5-15%	707
Outcome 4	16-30%	245	> 20%	781	16-30%	145
Outcome 5	> 30%	81	–	–	> 30%	52
Don't want to answer	–	1,023	–	1119	–	248
Missing	–	/	–	1145	–	3427
Behaviors						
Choices	–	5	–	8	–	5
Median	–	4	–	1	–	3
Investments						
Investments	–	5	–	/	–	5
Median	–	2	–	/	–	2

in common that responses seem to accumulate along the lower range of the WTP scale. In the analysis below, respondents who reported "don't know" or "prefer not to answer" were treated as missing information.

From the pro-environmental behaviors to choose from, between 44% and 47% of the sample reported engagement in more than the median number of pro-environmental behaviors in each particular domain. A slightly lower share has made investments into energy and water efficient devices during the past ten years. Note that surveyed behaviors in the different domains vary in their environmental impact (turning off the lights has low impact, whereas not using the car for commuting has more likely high impact on emission reductions).

4. RESULTS

In order to determine whether the relationships between pro-environmental activities and between WTP for goods different domains vary among the countries, we estimated the probit model for each country. Table 4 provides the excerpt of the regression results showing marginal probability differences of engaging in pro-environmental behavior in the specified domains (1), and parameter estimates of differences in WTP for pro-environmental goods (2). The full table of results can be found in Appendix B in Table B1 and Table B2 for (1) and in Table B5 and Table B6 for (2), where the respec-

tive first table has energy as base domain and the second table has transport as base domain.

Note in Table 4 that effects that are significantly different from zero indicate substitutes, while those that are non-significant indicate complements. We see that there are differences in the probability levels of most domains in all countries. High engagement in pro-environmental activities in the transport domain is less likely compared to the energy domain in Canada, France, and Italy, whereas they are more likely in Mexico and South Korea. Above-average engagement in water-efficient activities, on the other hand, is more likely in Australia and less likely in Mexico, Italy and South Korea. Past investments into energy- and water-efficient appliances positively significantly affect the probability to engage in above-average pro-environmental activities (Table B1). Contrary to the prevalently substitutional relations of behaviors in the studied countries, WTP seem to be more likely to be complements. Some substitutionary relations exist in Italy and South Korea, higher WTP are significantly more likely in the transport than in energy domain. In Italy and Mexico, respondents are more likely to report higher WTP for water quality than for electricity from RES, whereas in France, this relation is the opposite. Additionally, interaction terms with domain dummies T and W in Table B5 and E and W in Table B6 show relations between WTP for pro-environmental goods and the effects that above-average pro-environmental behavior has on these relations. Notably,

Table 4. Average discrete effects of binary probit, dependent variable: engagement in pro-environmental behavior above the median (1), parameter estimates of ordered probit with random effects, dependent variable: WTP for pro-environmental goods (2)

Effects	Australia	Canada	France	Mexico	Italy	South Korea
(1) Behaviors						
T< >E	0.049	−0.080**	−0.080**	0.239***	−0.083***	0.125***
W< >E	0.318***	0.014	0.046	−0.092***	−0.143***	−0.223***
W< >T	0.270***	0.094**	0.126***	−0.334***	−0.060**	−0.329***
(2) WTP for goods						
T< >E	−0.636	0.021	0.328	−0.174	0.326*	0.745**
W< >E	−0.211	0.194	−0.540**	0.422**	0.535***	0.321
W< >T	0.425	0.173	−0.868***	0.595**	0.209	−0.423*

*Note:* * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

almost all significant interactions have the opposite sign to the pure domain effect, thus attenuating differences in probability between WTP for different domains when above-average pro-environmental behavior is taken into account. In other words, looking for example at France, respondents with above-average pro-environmental behavior in the energy domain show rather complementary WTP for water and energy domains.

In Italy, respondents with above-average pro-environmental behavior in the transport and water domain are more likely to display complementary WTP for water and energy. All interrelations found above for every individual country are summarized in Table 5 and shown graphically in Figures 2 and 3. There are no consistent country differences in the interrelation between environmental goods and behaviors. In

Table 5. Summary of interrelations

Countries	Energy and transport		Energy and water		Water and transport	
	Behaviors	WTP	Behaviors	WTP	Behaviors	WTP
Australia	C	C	S	C	S	C
Canada	S	C	C	C	S	C
France	S	C	C	(C)	S	(S)
Mexico	S	C	S	S	S	S
Italy	S	C	S	(C)	S	C
South Korea	S	S	S	C	S	(S)

Note: S – substitutionary interrelation, C – complementary interrelation, (C) – complementary interrelation if above-average pro-environmental activities.
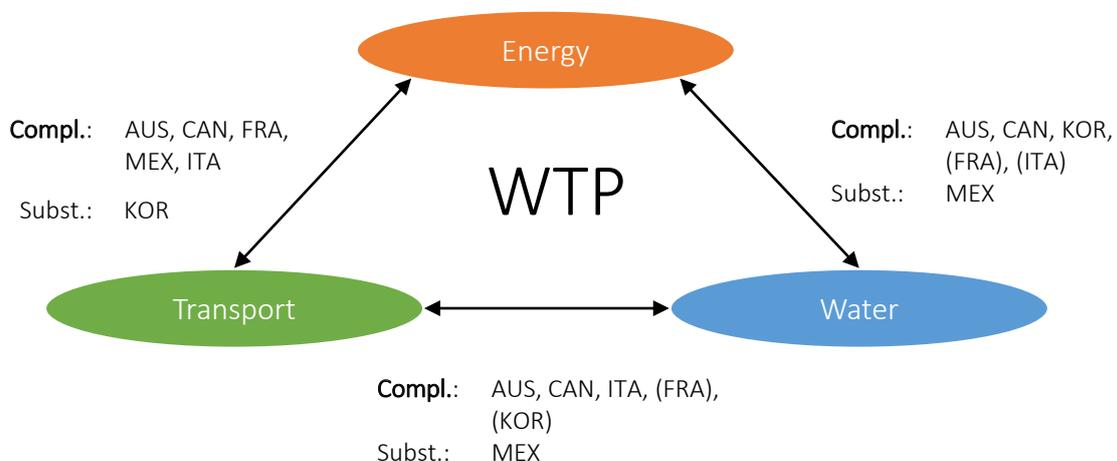
Figure 2. Summary of the relation of WTP in the domains energy, transport and water in six countries. In bold is the dominating relation
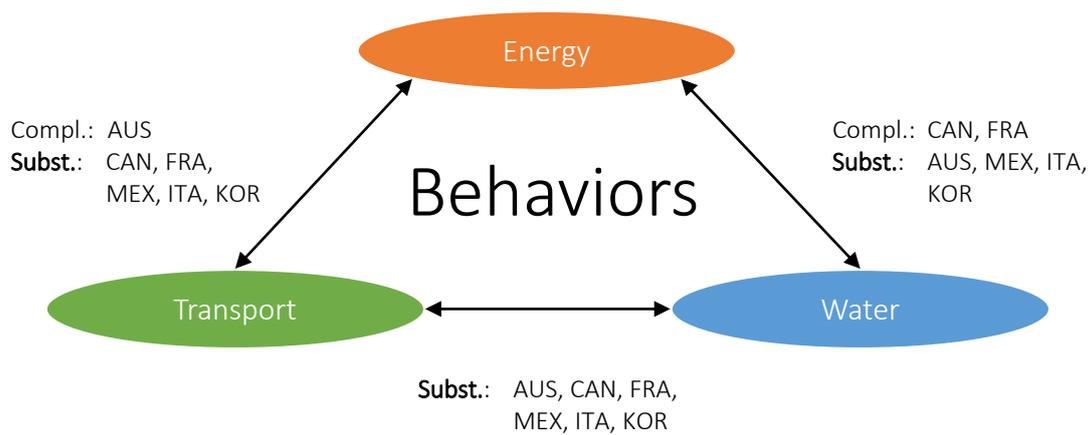
Figure 3. Summary of the relation of behaviors in the domains energy, transport and water in six countries. In bold is the dominating relation

other words, the relation of pro-environmental behaviors and the relation of WTP in different domains is similar in all countries in the study. The covariates' significance and signs are similar across countries. Household size, gender, education, living in an urban environment, satisfaction with water quality and distance travelled by car are insignificant in all countries. Age is only significant and positive in Italy and South Korea; income is only significant and negative in Australia and France. Environmental concern is positively significant in Australia, Mexico and Italy and membership in an environmental organisation and having taking special measures to buy electricity from renewable sources from the electricity provider positively affect engagement in pro-environmental activities in almost all countries. See Tables B1-B4 for full results of average discrete effects.

Considering the aggregate level of all countries combined, discrete probability effects for each country are given by the country dummies at the end of Tables B1 and B2 (column 1) and Tables B3 and B4, with Australia, as the reference country[9].

Relative to Australia, respondents in Mexico are more likely to report above-average pro-environmental activities and in South Korea they are less likely to report high engagement in pro-environmental activities. In Tables B3 and B4, given that Australia has the lowest average

WTP outcomes, respondents in all other countries have a significantly higher propensity to report higher order positive WTP. Also from the first column in Table B1, we find that relative to energy-efficient behavior, respondents are neither more nor less likely to engage in above-median pro-environmental behavior in the transport or water domain. Having invested in water-efficient or in energy-efficient devices in the last ten years has a positive effect on reporting above-average pro-environmental behavior.

The first two lines of results from the ordered probit model including all countries (with random effects fixed at its mean) in Table B3 show that the discrete probability effect of transport and water on reporting zero WTP (outcome 1) is negative, but that there are significantly higher propensities to report higher order WTP (outcomes 3 to 5). At the same time, there is no significant discrete probability effect of transport and water on outcome 2. Two things are interesting to note here: first, the significant difference in probability levels for the outcomes as compared to WTP for renewable-energy-only suggest a substitutionary relationship between the WTP for the three domains. Second, these differences are more pronounced in the extremes, i.e. at zero WTP and at WTP higher than the minimum positive choice (up to 5 or 10%). Thus, when looking at very low positive WTP, environmental goods are treated as com-

---

9 Average WTP outcomes were the lowest in Australia compared to the other countries in the sample (see Table 2).

plements. On the other hand, larger discrete probability difference between higher order WTP in the different domains might indicate stronger preferences of one domain over another, thus leading to treating them as substitutes. Both can be interpreted as an expression of a fixed budget for environmental consumption.

As for socio-economic characteristics, we find that basically all such characteristics have, in general, an insignificant or a very small effect on engaging in pro-environmental behaviors, on reporting positive WTP (Table B1), as well as on the individual outcomes (Table B3). Being female has a small negative effect on higher order outcomes in the ordinal case. As expected, environmental concern, being a member of an environmental organization and having taken measures to buy electricity from renewable sources has positive probability effects on the binary outcomes, as well as on higher order WTP outcomes. Outcomes are not affected by weekly distance travelled by car or by reported satisfaction with tap water.

These results are in line with other (single domain) studies that use the 2008 (or the 2011 follow-up) OECD surveys on environmental behavior. For example, Shi et al. (2013) find that income and environmental concern determine the entry decision into renewable-energy-only market, but not the level decision for WTP for energy. Instead, membership in environmental organizations as an indicator of environmental attitudes and behavior drives the choice how much to pay (Krishnamurthy & Kriström, 2016; Shi et al., 2013). That being said, WTP for energy is low (only a few percentage points) in all of the countries (Shi et al., 2013). Krishnamurthy and Kriström (2016) identify income to be irrelevant for the level of reported WTP but relevant to reporting a positive WTP at all, i.e. relevant for the decision to enter the renewable-energy-only market. In the transport domain, Ehreke et al. (2014) indicate in their results that attitudinal characteristics are only minor determinants of household choices for transport decisions, rather distance to travel destination is correlated to these choices. Still, they find that a posi-

tive predisposition towards emission abatement returns positive WTP for more environmentally friendly vehicles.

5. DISCUSSION

Our choice of goods with an environmental attribute originates from the clear environmental quality inherent in the choice of these goods such that respondents might be able to make the connection between their stated choice and a certain corresponding environmental quality. Given this premise, of the goods with an environmental public good nature asked about in the OECD survey, the relevant ones were: electricity from renewable sources (instead of conventional sources), fuel for personal car transport, and clean water. The former two relate to the public good reduction of GHG emissions, while the latter refers to the public good clean water access. Usually GHG emissions are referred to as public bad with negative externalities on people. Since our study asks about the opposite, i.e. a reduction of the public bad, we talk about a public good.

The six countries in our sample were chosen particularly, because they represent very diverse countries (within the scope of member states of OECD and those that participated in the survey) in terms of geographic location, natural resource endowment and socio-economic background. When comparing WTP in different countries in this type of analysis, it must be borne in mind that the base line levels and prices of the environmental goods in question vary considerably across the included OECD countries. This influences the empirical effects of complementarity in pro-environmental behavior, since if for instance tap water is already seen as excellent in a country this will effectively truncate the WTP to improve it further, and thus "hide" the true preferences for high quality tap water. To take this into account in this survey, only people reporting that they were not satisfied with tap water quality were asked about their WTP for better tap water quality[10]. Beaumais et al. (2014) find in a cross-country

---

10 Therefore we did not include it in the ordered probit analyses of WTP.

analysis that WTP for better tap water quality is higher in countries in which respondents are to a larger share unsatisfied with tap water quality. Also other water attributes, like an appalling odor or taste, which are perceived as health risk contribute to an increased WTP for improved water quality (Dupont, 2005). In our sample, household satisfaction with tap water quality has only insignificant probability effects on engaging in above-average pro-environmental behavior in all countries. In all countries, irrespective of satisfaction with tap water, the behavior domains water and transport are substitutes. This might be because behavior changes in the water domain, e.g. turning off water when brushing teeth or plugging the sink when washing the dishes, are more effortlessly implemented than changes in the transport domain, e.g. use car-sharing or change a car for another one that uses less fuel. Thus, easy pro-environmental behaviors in the water domain may substitutes for higher effort behaviors in the transport domain.

Only in Canada and France, two countries in which a relatively larger share of respondents has given a positive answer to satisfaction with tap water quality (see Table 2 for shares), behaviors in the domains water and energy are complements whereas they are substitutes in the other domains. For WTP, we cannot identify a regularity among the different countries corresponding to their tap water satisfaction. But for energy and water WTP interrelations are complements apart from Mexico, which also happens to show lowest satisfaction with tap water. There, water quality might be a driving factor behind the substitute relation we find.

Similarly, if a country already produces a high share of its electricity from renewable sources, and this is common knowledge, the WTP to increase this share could be low. To choose this option, a country also needs to have the option including the technology available to produce larger shares of electricity from renewable sources. Large countries with a less developed public transport system might naturally be more reliant on personal car transport which hides true WTP for the public good associated with lower fuel consumption. To reduce fuel consumption

or change behavior, alternatives, like transportation network or low-fuel cars, need to be available and affordable for households.

Table 6. Shares of renewable energy sources in total primary energy supply and electricity supply, by country, 2016

Country	Renewable energy shares in total primary energy supply (OECD, 2018a)	Share of electricity from renewable energy sources (OECD, 2018a)
Australia	0.06	0.15
Canada	0.17	0.65
France	0.07	0.20
Mexico	0.09	0.25
Italy	0.11	0.34
South Korea	0.01	0.07

In Canada, more than half of the electricity comes from renewable sources, which is high by international comparison (see Table 6 for renewable energy shares by country). The provincial policies and renewable energy goals vary considerably, so do the shares of electricity from renewable energies over all of Canada's provinces. Australia has an electricity production from renewable sources of 15%, with a high potential for a larger share resulting from more extensive use of solar and wind power plants. Support mechanisms include carbon pricing, a variation of small-scale renewable support schemes, as well as feed-in tariffs in several regions. A government program allows households to pay extra to get electricity from renewable energy sources only. Both Canada and Australia are vast countries in which personal car transport plays a major role. Even in urban areas only a small share of people use public transport for commuting (Statistics Canada, 2017). Fuel reduction by switching to public transport may therefore seem like an unviable option. Public transport networks in Italy, France and South Korea are generally expansive and electricity from RES shares are 34%, 20% and 7%, respectively. In Italy, renewable energy installations are promoted by a guaranteed minimum price and certain plants are eligible for reduced VAT. France has as support mechanisms, among others, feed-in-tariffs and premium tariffs in place. South Korea relies mainly on thermal electricity production from imported fuels, with renewable reaching at most 7%. Increasing the renewables share is thus not only a way to fight

climate change, but also a way to reach energy independence. Mexico has a share of about 25% electricity from renewable sources and at the time of the survey had just passed a law for the development of renewable energy and energy transition. A complication with this survey data from Mexico is that internet penetration in Mexico is quite low, therefore the sample is skewed towards urban, rather wealthy households and not representative of the Mexican population. Wealthier households are more likely to have a car instead of relying on local public transport (Guerra, 2015).

We are controlling for electricity from renewable sources and personal car relevance on a household level by including whether a household has already taken measures to invest into electricity from renewable sources and the weekly distances covered by car. Only the former does significantly and positively affect pro-environmental behaviors and WTP in some countries. This falls in line with other activities that can be interpreted as the

manifestations of pro-environmental attitudes, i.e. investments into water- or energy-efficient appliances and being member of an environmental organization, or contributing to one, remain as determinants of pro-environmental behaviors and WTP for environmental goods in most countries.

In general, we can see that pro-environmental behaviors are more likely substitutes, whereas pro-environmental WTP are more likely to be complements in all countries. We can interpret WTP, which is a hypothetical willingness, as the theoretically desired lifestyle, which seems to be to pay consistently for all pro-environmental domain – either consistently little or consistently high. However, actual behavioral patterns as reported for the previous show a different lifestyle where pro-environmental behavior in one domain substitutes for non-environmentally friendly behavior in other domains. The exact behaviors referred to can be found in Appendix A.

CONCLUSION

Do consumers in different countries consistently make "green" lifestyle choices and are equally likely to pay more for pro-environmental goods in several domains of their life? Possible spillover effects of environmental behavior have received some attention from behavioral research. However, economic studies of the linkages between environmental behavior and goods across different household domains, and comparisons of the linkages across different countries are still relatively few. This study contributes to filling this gap through a multi-country approach, based on a unique data set assembled by the OECD.

The study uses the random effects probit and ordered probit models on pro-environmental behaviors and WTP for pro-environmental goods in three domains: transport, energy and water. We chose to focus on six of the countries surveyed in the 2008 OECD Survey on Environmental Attitudes and Behavior: Australia, Canada, France, Mexico, Italy and South Korea.

The first main finding is that while past pro-environmental behaviors in different domains are revealed to be substitutes, WTP for pro-environmental goods tend to have a rather complementary interrelation in the countries under analysis. This finding of complementary WTP for pro-environmental goods echoes the positive correlations between pro-environmental investments found by Martínez-Espiñeira et al. (2014) and the partly positive spillover effects found by Thögersen and Ölander (2003) and Lange et al. (2017). A desire to consistently invest in green choices can account for complementarity of WTP for environmental goods, since this is a hypothetical decision, whereas behaviors are reported actual behaviors, which unveil that reality cannot keep up with desires.

Second, and adding to the above, a key finding is that complementary WTP in different domains is more likely for respondents with above-average pro-environmental behavior. Past pro-environmental behavior can therefore be interpreted as an indicator for a more widespread environmentally friendly attitude throughout several domains of life. This is a point of discussion when comparing our mostly

low-cost pro-environmental behaviors with conclusions by Gneezy et al. (2011). They find that costless pro-social behaviors do not indicate that subsequent actions will also be pro-social, whereas costly pro-social behavior consistently leads to positive spillovers. While Gneezy et al. (2011) and Thögersen and Ölander (2003) refer to temporal spillover effects, we give support to their findings within the field of behavioral spillover effects.

Since stated WTP could suffer from hypothetical bias, reported behaviors should be a stronger indication of interrelations between domains than stated WTP. Behaviors for most studied countries are revealed to be substitutes. This suggests that policies that focus narrowly on encouraging pro-environmental behavior in one domain risk negative spillovers into other domains. Therefore, policies aiming at kick-starting an overall green lifestyle should be all-encompassing of several public domains. Carbon pricing is a good example of such a policy, since it covers emissions irrespective of domain. Given that membership in an environmental organizations is a significant predictor, environmental education could potentially aid in such a kick-starting process.

Lastly, the interpretations of the results must be taken with some caution given the sample bias in the dataset. Survey respondents had a higher household income, higher education levels and larger household sizes than the population average. This difference was most substantial for Mexico. In our results, there are no major country differences in the interrelation between environmental goods and behaviors; the relation of pro-environmental behaviors and the relation of WTP in different domains is relatively similar in all countries in the study. A more representative study could improve the tentative interpretations in this paper and point towards particularities of individual countries. Our results are contingent on the three domains under study. Other domains of morally or ethically desirable behavior might affect the interrelation[11].

With a focus on behavioral spillovers, this study does not take into account any time effects. The OECD study used in this paper was followed up with another survey in 2011. Prospective research should consider combining these data sets in a panel-like setup and look into temporal issues of the consistency of pro-environmental behaviors. With the given data, we cannot completely disentangle the public and private aspects of the goods, but since the survey is labelled as an environmental study, subjects are primed to think about the public good aspect in their choices. These issues certainly warrant a more detailed analysis with data sets specifically aimed at eliciting the relationship between pro-environmental behavior in different domains and underlying attitudes.

ACKNOWLEDGEMENTS

---

11   For example, animal rights can be a more relevant concern for some households, which might affect how much they are willing to pay for environmental protection.

REFERENCES

1. Andreoni, J. (1990). Impure altruism and donations to public goods: A theory of warm-glow giving. *The Economic Journal, 100*(401), 464-477. Retrieved from http://www.jstor.org/stable/2234133

2. Beaumais, O., Briand, A., & Millock, K. (2014). What are Households willing to pay for Better Tap Water Quality? A Cross-Country Valuation Study. *Climate Change and Sustainable Development Series, 24*(3), 1689-1699. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2407873

3. Brown, Z. (2014). *Greening household Behavior: Cross-domain Comparisons in Environmental Attitudes and Behaviors Using Spatial Effects* (OECD Environment Working Papers) (68 p.). Retrieved from https://ideas.repec.org/p/oec/envaaa/68-en.html

4. Carbone, J. C., & Gazzale, R. S. (2017). A shared sense of responsibility: Money versus effort contributions in the voluntary provision of public goods. *Journal of Economic Behavior & Organization, 139,* 74-87. https://doi.org/10.1016/j.jebo.2017.03.011

5. Clot, S., Grolleau, G., & Ibanez, L. (2014). Smug Alert! Exploring self-licensing behavior in a cheating game. *Economics Letters, 123*(2), 191-194. https://doi.org/10.1016/j.econlet.2014.01.039

6. Croson, R., & Treich, N. (2014). Behavioral Environmental Economics: Promises and Challenges. *Environmental and Resource Economics, 58*(3), 335-351. https://doi.org/10.1007/s10640-014-9783-y

7. Cummings, R. G., Ganderton, P. T., & McGuckin, T. (1994). Substitution Effects in CVM Values. *American Journal of Agricultural Economics, 76*(2), 205-214. https://doi.org/10.2307/1243622

8. Diekmann, A., & Preisendörfer, P. (2003). Green and Greenback: The Behavioral Effects of Environmental Attitudes in low-cost and high-cost situations. *Rationality and Society, 15*(4), 441-472. https://doi.org/10.1177/1043463103154002

9. Dolan, P., & Galizzi, M. M. (2015). Like ripples on a pond: Behavioral spillovers and their implications for research and policy. *Journal of Economic Psychology, 47,* 1-16. https://doi.org/10.1016/j.joep.2014.12.003

10. Dupont, D. (2005). Tapping into Consumers' Perceptions of Drinking Water Quality in Canada: Capturing Customer Demand to Assist in Better Management of Water Resources. *Canadian Water Resources Journal, 30*(1), 11-20. Retrieved from https://www.tandfonline.com/doi/pdf/10.4296/cwrj300111

11. Ehreke, B. Jaeggi, & Axhausen, K. W. (2014). *Greening Household Behavior and Transport* (OECD Environment Working Papers, 77). http://dx.doi.org/10.1787/5jxrclm3qhr0-en

12. Festinger, L. (1957). *A Theory of cognitive dissonance.* Stanford: CA: Stanford University Press. Retrieved from https://psycnet.apa.org/record/1993-97948-000

13. Gneezy, A., Imas, A., Brown, A., Nelson, L. D., & Norton, M. I. (2011). Paying to Be Nice: Consistency and Costly Prosocial Behavior. Management Science. *Management Science, 58*(1), 179-187. https://doi.org/10.1287/mnsc.1110.1437

14. Greene, W. H. (2008). *Modeling Ordered Choices.* Stern School of Business.

15. Guerra, E. (2015). The geography of car ownership in Mexico City: a joint model of households' residential location and car ownership decisions. *Journal of Transport Geography, 43,* 171-180. https://doi.org/10.1016/j.jtrangeo.2015.01.014

16. Johansson, P.-O. (1987). *The Economic Theory and Measurement of Environmental Benefits.* Cambridge University Press. Retrieved from http://EconPapers.repec.org/RePEc:cup:cbooks:9780521348102

17. Kashima, Y., Paladino, A., & Margetts, E. A. (2014). Environmental identity and environmental striving. *Journal of Environmental Psychology, 38,* 64-75. https://doi.org/10.1016/J.JENVP.2013.12.014

18. Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*(3), 239-260. https://doi.org/10.1080/13504620220145401

19. Kotchen, M. (2006). Green Markets and Private Provision of Public Goods. *Journal of Political Economy, 114*(4), 816-834. https://doi.org/10.1086/506337

20. Kotchen, M., & Moore, M. R. (2007). Private provision of environmental public goods: Household participation in green-electricity programs. *Journal of Environmental Economics and Management, 53*(1), 1-16. https://doi.org/10.1016/j.jeem.2006.06.003

21. Krishnamurthy, C. K. B., & Kriström, B. (2016). Determinants of the Price-Premium for Green Energy: Evidence from an OECD Cross-Section. *Environmental and Resource Economics, 64*(2), 173-204. https://doi.org/10.1007/s10640-014-9864-y

22. Kriström, B., & Krishnamurthy, C. K. B. (2014). *Greening Household Behavior and Energy* (OECD Environment Working Papers, 68). http://dx.doi.org/10.1787/5jxrclm3qhr0-en

23. Lancaster, J. (1966). A New Approach to Consumer Theory. *Journal of Political Economy, 74*(2), 132-157. Retrieved from https://www.jstor.org/stable/1828835?seq=1#page_scan_tab_contents

24. Lange, A., Schwirplies, C., & Ziegler, A. (2017). On the interrelation between the consumption of impure public goods and the provision of direct donations: *Theory and empirical evidence. Resource and Energy Economics, 47,* 72-88. http://dx.doi.org/10.1016/j.reseneco.2016.11.002

25. Lanzini, P., & Thøgersen, J. (2014). Behavioral spillover in the environmental domain: An intervention study. *Journal of Environmental Psychology, 40,* 381-390. https://doi.org/10.1016/j.jenvp.2014.09.006

26. Margetts, E. A., & Kashima, Y. (2017). Spillover between pro-environmental behaviors: The role of resources and perceived similarity. *Journal of Environmental Psychology, 49,* 30-42. https://doi.org/10.1016/J.JENVP.2016.07.005

27. Martínez-Espiñeira, R., Garcia-Valiñas, M. A., & Nauges, C. (2014). Households' pro-environmental habits and investments in water and energy consumption: determinants and relationships. *Journal of Environmental Management, 133,* 174-183. https://doi.org/10.1016/j.jenvman.2013.12.002

28. Mazar, N., & Zhong, C.-B. (2010). Do green products make us better people? *Psychological Science, 21*(4), 494-498. https://doi.org/10.1177/0956797610363538

29. Millock, K., & Nauges, C. (2010). Household adoption of water-efficient equipment: the role of socio-economic factors, environmental attitudes and policy. *Environmental and Resource Economics, 46*(4), 539-565. Retrieved from https://link.springer.com/article/10.1007/s10640-010-9360-y

30. Nilsson, A., Bergquist, M., & Schultz, W. P. (2017). Spillover effects in environmental behaviors, across time and context: a review and research agenda. *Environmental Education Research, 23*(4), 573-589. https://doi.org/10.1080/13504622.2016.1250148

31. OECD (2008a). *2008 OECD Study Household Survey on Environmental Attitudes and Behavior: Data Corroboration.* Retrieved from https://www.oecd.org/env/consumption-innovation/44101274.pdf

32. OECD (2008b). *Education at a Glance 2008: OECD Indicators.* https://doi.org/10.1787/401482730488 (accessed on July 18, 2018).

33. OECD (2018a). *Air and GHG emissions: Indicator.* https://doi.org/10.1787/93d10cf7-en (accessed on July 18, 2018).

34. OECD (2018b). *National population distribution (indicator).* https://doi.org/10.1787/7314f74f-en (accessed on July 18, 2018).

35. OECD (n.d.). *OECD Family Database.* Retrieved from www.oecd.org/els/family/database.htm (accessed on July 18, 2018).

36. Shi, L., Zhou, W., & Kriström, B. (2013). Residential demand for green electricity. *Environmental Economics, 4*(1), 51-62. Retrieved from https://businessperspectives.org/pdfproxy.php?item_id=5028

37. Statistics Canada (2017). Journey to work: Key results from the 2016 Census.

38. Stern, P. C. (2011). Contributions of psychology to limiting climate change. *American Psychologist, 66*(4), 303-314.

39. Thøgersen, J. (1999). Spillover processes in the development of a sustainable consumption pattern. *Journal of Economic Psychology, 20*(1), 53-81. https://doi.org/10.1016/S0167-4870(98)00043-9

40. Thøgersen, J. (2004). A cognitive dissonance interpretation of consistencies and inconsistencies in environmentally responsible behavior. *Journal of Environmental Psychology, 24*(1), 93-103. https://doi.org/10.1016/S0272-4944(03)00039-2

41. Thøgersen, J., & Ölander, F. (2003). Spillover of environment-friendly consumer behavior. *Journal of Environmental Psychology, 23*(3), 225-236. https://doi.org/10.1016/S0272-4944(03)00018-5

42. Tiefenbeck, V., Staake, T., Roth, K., & Sachs, O. (2013). For better or for worse? Empirical evidence of moral licensing in a behavioral energy conservation campaign. *Energy Policy, 57,* 160-171. https://doi.org/10.1016/j.enpol.2013.01.021

43. Truelove, H. B., Carrico, A. R., Weber, E. U., Raimi, K. T., & Vandenbergh, M. P. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. *Global Environmental Change, 29,* 127-138. https://doi.org/10.1016/j.gloenvcha.2014.09.004

44. United Nations (2015a). *World Population Prospects: The 2015 Revision. United Nations, Department of Economic and Social Affairs, Population Division* (Custom data acquired via website). Retrieved from https://www.unfpa.org/ (accessed on July 18, 2018).

45. United Nations (2015b). *Transforming our world: the 2030 Agenda for Sustainable Development.* Retrieved from https://www.unfpa.org/resources/transforming-our-world-2030-agenda-sustainable-development

46. Welsch, H., & Kühling, J. (2009). Determinants of pro-environmental consumption: The role of reference groups and routine behavior. *Ecological Economics, 69*(1), 166-176. https://doi.org/10.1016/j.ecolecon.2009.08.009

47. Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviors. *Journal of Environmental Psychology, 30*(3), 305-314. https://doi.org/10.1016/j.jenvp.2010.01.003

48. Whitmarsh, L., Seyfang, G., & O'Neill, S. (2011). Public engagement with carbon and climate change: To what extent is the public 'carbon capable'? *Global Environmental Change, 21*(1), 56-65. https://doi.org/10.1016/j.gloenvcha.2010.07.011

49. Wichman, C. J. (2016). Incentives, green preferences, and private provision of impure public goods. *Journal of Environmental Economics and Management, 79,* 208-220. http://dx.doi.org/10.1016/j.jeem.2016.06.003

APPENDIX A. OECD SURVEY QUESTIONS

Transport

Q1.1 WTP: What would be the likely effect of a permanent increase in fuel prices of 20% on your fuel consumption for your personal car/motorcycle use?

- Would not change
- Would reduce by less than 10%
- Would reduce between 10% and 20%
- Would reduce by more than 20%

Q1.2 Behavior: During the past year, have you done any of the following?

- Used car sharing/pooling
- Used recycled tires/low rolling resistance tires
- O set your carbon emissions
- Changed a car for another one which uses less fuel
- Used public transport more than the previous year
- Walked or cycled more than the previous year
- Adapted your driving style to use less fuel (e.g. reduce speed, reduce air conditioning use)
- Changed a car for another one which uses less polluting fuel
- None of the above

Energy

Q2.1 WTP: What is the maximum percentage increase in your annual bill you are willing to pay to use only renewable energy?

- I would not pay anything additional
- Less than 5%
- 5% to 15%
- 16% to 30%
- More than 30%

Q2.2 Behavior: How often do you perform the following in your daily life? (selection options per item: never – occasionally – often – always)

- Turn off lights when leaving a room
- Cut down on heating/air conditioning to limit your energy consumption
- Wait until you have full loads when using washing machines or dishwashers
- Turn off appliances when not in use
- Switch off standby mode of appliances/electronic devices

Q2.3 Investment: Has your household installed any of the following items over the past ten years in your primary residence? (Selection options per item: Yes – No – Already equipped – Not possible)

- Energy-efficiency-rated appliances (e.g. top rated washing machines, refrigerators)
- Low-energy light bulbs (compact fluorescent)
- Thermal insulation (e.g. walls/roof insulation, double-glazing)
- Efficient heating boiler (e.g. condensing boiler)
- Renewable energy (e.g. to install solar panels, wind power)

Water

Q3.1 WTP: What is the maximum percentage increase you would be willing to pay above your actual water bill to improve the quality of your tap water, holding water consumption constant?

- Nothing
- Less than 5%
- Between 5% and 15%
- Between 16% and 30%
- More than 30%

Q3.2 Behavior: How often do you do the following in your daily life? (selection options per item: never – occasionally – often – always – not applicable)

- Turn off the water while brushing teeth
- Take showers instead of bath specifically to save water
- Plug the sink when washing the dishes
- Water your garden in the coolest part of the day to reduce evaporation and save water
- Collect rainwater (e.g. in water tanks) or recycle waste water

Q3.3 Investment: Has your household invested in the following appliances/devises in the past ten years in your current primary residence? (selection options per item: yes – no – already equipped – not possible)

- Water efficient washing machines
- Low volume or dual flush toilets
- Water flow restrictor taps/low-flow shower head
- Water tank to collect rainwater
- Water purifier for drinking water

APPENDIX B. COMPLETE REGRESSION RESULTS

Table Bl. Average discrete effects of binary probit, dependent variable in model: engagement in pro-environmental acitivities above the median, base domain: energy

Variable	All countries[1]	Australia	Canada	France	Mexico	Italy	South Korea
T	0.014	0.049	−0.080**	−0.080**	0.239***	−0.083***	0.125***
W	−0.015	0.318***	0.014	0.046	−0.092***	−0.143***	−0.223***
W_invest	0.125***	0.094***	0.123***	0.165***	0.152***	0.104***	0.140***
E_invest	0.058***	0.028	0.068*	0.058*	0.015	0.079***	0.095***
Env_concern	0.017***	0.021**	0.016	0.012	0.024**	0.017**	0.015
Member	0.107***	0.121***	0.093*	0.148***	0.071*	0.142***	0.055
E_renewable	0.060***	0.070*	0.130**	−0.032	0.089*	0.069*	0.014
Distance	−0.007*	−0.011	−0.013	0.010	−0.015	−0.012	−0.000
W_satisfaction	0.016	0.040	−0.008	0.017	0.057	0.004	0.025
Age	0.001**	−0.001	−0.001	0.001	0.002	0.002***	0.003**
HH_size	0.009*	0.007	0.022	0.010	0.003	0.007	0.007
Income	−0.004**	−0.013**	−0.003	−0.010*	−0.001	−0.005	0.000
Female	0.007	0.016	−0.008	0.016	−0.003	0.013	−0.040
Uni	−0.010	0.006	−0.043	−0.019	−0.025	0.004	−0.003
Urban	0.008	−0.003	0.032	0.025	0.003	−0.034	0.047
Canada	−0.010	–	–	–	–	–	–
France	0.033	–	–	–	–	–	–
Mexico	0.160***	–	–	–	–	–	–
Italy	−0.025	–	–	–	–	–	–
South Korea	−0.083***	–	–	–	–	–	–
Wald Chi-squared	600.407	192.671	75.181	106.272	200.254	162.073	162.532
df	20	15	15	15	15	15	15

Note: * p < 0.05, ** p < 0.01, *** p < 0.001, 1 base country: Australia.

Table B2. Average discrete effects of binary probit, dependent variable in model: engagement in pro-environmental acitivities above the median, base domain: transport

Variable	All countries[1]	Australia	Canada	France	Mexico	Italy	South Korea
T	−0.014	−0.050	0.080**	0.080**	−0.235***	0.086***	−0.116***
W	−0.028*	0.270***	0.094**	0.126***	−0.334***	−0.060**	−0.329***
W_invest	0.125***	0.094***	0.123***	0.165***	0.152***	0.104***	0.140***
E_invest	0.058***	0.028	0.068*	0.058*	0.015	0.079***	0.095***
Env_concern	0.017***	0.021**	0.016	0.012	0.024**	0.017**	0.015
Member	0.107***	0.121***	0.093*	0.148***	0.071*	0.142***	0.055
E_renewable	0.060***	0.070*	0.130**	−0.032	0.089*	0.069*	0.014
Distance	−0.007*	−0.011	−0.013	0.010	−0.015	−0.012	−0.000
W_satisfaction	0.016	0.040	−0.008	0.017	0.057	0.004	0.025
Age	0.001**	−0.001	−0.001	0.001	0.002	0.002***	0.003**
HH_size	0.009*	0.007	0.022	0.010	0.003	0.007	0.007
Income	−0.004**	−0.013**	−0.003	−0.010*	−0.001	−0.005	0.000
Female	0.007	0.016	−0.008	0.016	−0.003	0.013	−0.040
Uni	−0.010	0.006	−0.043	−0.019	−0.025	0.004	−0.003
Urban	0.008	−0.003	0.032	0.025	0.003	−0.034	0.047
Canada	−0.010	–	–	–	–	–	–
France	0.033	–	–	–	–	–	–
Mexico	0.160***	–	–	–	–	–	–
Italy	−0.025	–	–	–	–	–	–
South Korea	−0.083***	–	–	–	–	–	–
Wald Chi-squared	600.407	192.671	75.181	106.272	200.254	162.073	162.532
df	20	15	15	15	15	15	15

Note: * p < 0.05, ** p < 0.01, *** p < 0.001, 1 base country: Australia.

Table B3. Average discrete effects of ordered probit, dependent variable: ordinal responses for WTP for pro-environmental goods, base good: renewable-energv-only

Variable	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
T	−0.068***	−0.000	0.037***	0.028***	0.004***
W	−0.043***	−0.000	0.023***	0.017***	0.002**
B_T^+	−0.074***	−0.000	0.040***	0.030***	0.004***
B_W^+	−0.024	−0.000	0.013	0.010	0.001
B_E^+	−0.008	−0.000	0.004	0.003	0.000
W_invest	−0.040	−0.000	0.022*	0.016*	0.002*
E_invest	0.001	0.000	−0.000	−0.000	−0.000
Env_concern	−0.015**	−0.000	0.008**	0.006*	0.001*
Member	−0.104***	−0.010*	0.057***	0.049***	0.008***
E_renewable	−0.076***	−0.000	0.041***	0.031***	0.004**
Distance	0.004	0.000	−0.002	−0.002	−0.000
Age	0.001*	0.000	−0.001*	−0.001*	−0.000*
HH_size	−0.007	−0.000	0.004	0.003	0.000
Income	0.000	0.000	−0.000	−0.000	−0.000
Female	0.046**	−0.000	−0.025**	−0.018**	−0.003*
Uni	−0.033	−0.000	0.018	0.014	0.002
Urban	−0.016	0.000	0.008	0.006	0.001
Canada	−0.132**	0.041**	0.065**	0.024**	0.002*
France	−0.174***	0.048***	0.087***	0.035**	0.003*
Mexico	−0.323***	0.044**	0.172***	0.097***	0.011***
Italy	−0.270***	0.052***	0.142***	0.070***	0.007***
South Korea	−0.251***	0.053***	0.130***	0.062***	0.006***
Wald Chi²	290.160				
df	22				

Note: Base country: Australia, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table B4. Average discrete effects of ordered probit, dependent variable: ordinal responses for WTP for pro-environmental goods, base good: transport

Variable	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
E	0.068***	0.000	−0.037***	−0.028***	−0.004***
W	0.025	0.000	−0.014	−0.010	−0.001
B_T^+	−0.074***	−0.000	0.040***	0.030***	0.004***
B_W^+	−0.024	−0.000	0.013	0.010	0.001
B_E^+	−0.008	−0.000	0.004	0.003	0.000
W_invest	−0.040	−0.000	0.022*	0.016*	0.002*
E_invest	0.001	0.000	−0.000	−0.000	−0.000
Env_concern	−0.015**	−0.000	0.008**	0.006*	0.001*
Member	−0.104***	−0.010*	0.057***	0.049***	0.008***
E_renewable	−0.076***	−0.000	0.041***	0.031***	0.004**
Distance	0.004	0.000	−0.002	−0.002	−0.000
Age	0.001*	0.000	−0.001*	−0.001*	−0.000*
HH_size	−0.007	−0.000	0.004	0.003	0.000
Income	0.000	0.000	−0.000	−0.000	−0.000
Female	0.046**	−0.000	−0.025**	−0.018**	−0.003*
Uni	−0.033	−0.000	0.018	0.014	0.002
Urban	−0.016	0.000	0.008	0.006	0.001
Canada	−0.132**	0.041**	0.065**	0.024**	0.002*
France	0.174***	0.048***	0.087***	0.035**	0.003*
Mexico	−0.323***	0.044**	0.172***	0.097***	0.011***
Italy	−0.270***	0.052***	0.142***	0.070***	0.007***
South Korea	−0.251***	0.053***	0.130***	0.062***	0.006***
Wald Chi²	290.160				
df	22				

Note: Base country: Australia, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table B5. Countrywise parameter estimates of ordered probit with random effects

Variable	Australia	Canada	France	Mexico	Italy	South Korea
T	−0.636	0.021	0.328	−0.174	0.326*	0.745**
$T \times B_T^+$	0.729*	−0.244	0.324	0.198	0.003	0.073
$T \times B_W^+$	−0.146	0.146	0.293	−0.162	−0.165	0.129
$T \times B_E^+$	0.160	0.215	−0.144	−0.044	0.106	0.108
W	−0.211	0.194	−0.540**	0.422**	0.535***	0.321
$W \times B_T^+$	−0.008	0.080	0.324	−0.164	−0.267*	−0.502*
$W \times B_W^+$	0.058	0.109	−0.020	−0.254	−0.285*	0.137
$W \times B_E^+$	−0.126	−0.627*	0.704**	0.095	−0.101	−0.072
T_behave	0.199	0.330	0.440	0.063	0.223	0.490*
W_behave	0.254	−0.254	−0.193	0.142	0.267	0.227
E_behave	−0.108	0.050	−0.196	0.043	0.160	−0.331
W_invest	−0.002	0.361*	0.351	0.174*	−0.044	0.109
E_invest	0.046	−0.026	0.127	−0.007	−0.080	0.054
Env_concern	0.056	0.054	0.038	0.067*	0.035	0.010
Member	0.460*	0.906**	0.817**	0.128	0.521***	0.149
E_renewable	0.122	0.581**	1.111*	0.143	0.292	0.030
Distance	−0.035	−0.047	−0.036	0.002	−0.024	−0.021
Age	−0.007	−0.010	−0.011	−0.005	−0.007*	0.008
HH_size	0.040	0.030	−0.066	0.004	0.027	−0.049
Income	−0.019	−0.021	0.084*	0.003	−0.009	−0.023
Female	−0.175	0.109	−0.104	−0.073	−0.329**	0.017
Uni	0.568**	0.210	−0.065	−0.045	0.047	0.232
Urban	−0.131	−0.367*	0.083	0.377**	0.006	0.171
cut1	0.225	−0.206	0.223	−0.047	−0.240	−0.009
cut2	1.030	0.695	1.261	0.775*	0.597	1.269**
cut3	2.223***	1.767**	2.341**	1.756***	1.578***	2.311***
cut4	2.978***	3.244***	3.808***	2.864***	2.858***	3.878***
Wald Chi²	35.958	61.061	87.547	58.784	82.400	102.174
df	23	23	23	23	23	23

Note: Base domain: energy, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table B6. Countrywise parameter estimates of ordered probit with random effects

Variable	Australia	Canada	France	Mexico	Italy	South Korea
E	0.636	−0.021	−0.328	0.174	−0.326*	−0.745**
$E \times B_T^+$	−0.729*	0.244	−0.324	−0.198	−0.003	−0.073
$E \times B_W^+$	0.146	−0.146	−0.293	0.162	0.165	−0.129
$E \times B_E^+$	−0.160	−0.215	0.144	0.044	−0.106	−0.108
W	0.425	0.173	−0.868***	0.595**	0.209	−0.423*
$W \times B_T^+$	−0.738*	0.324	−0.001	−0.361	−0.270	−0.575*
$W \times B_W^+$	0.204	−0.037	−0.313	−0.092	−0.120	0.008
$W \times B_E^+$	−0.286	−0.842*	0.848*	0.139	−0.206	−0.180
T_behave	0.928**	0.086	0.764*	0.261	0.225	0.563**
W_behave	0.108	−0.108	0.100	−0.019	0.102	0.355
E_behave	0.051	0.265	−0.340	−0.001	0.265	−0.223
W_invest	−0.002	0.361*	0.351	0.174*	−0.044	0.109
E_invest	0.046	−0.026	0.127	−0.007	−0.080	0.054
Env_concern	0.056	0.054	0.038	0.067*	0.035	0.010
Member	0.460*	0.906**	0.817**	0.128	0.521***	0.149
E_renewable	0.122	0.581**	1.111*	0.143	0.292	0.030
Distance	−0.035	−0.047	−0.036	0.002	−0.024	−0.021
Age	−0.007	−0.010	−0.011	−0.005	−0.007*	0.008
HH_size	0.040	0.030	−0.066	0.004	0.027	−0.049
Income	−0.019	−0.021	0.084*	0.003	−0.009	−0.023
Female	−0.175	0.109	−0.104	−0.073	−0.329**	0.017

Table B6 (cont.). Countrywise parameter estimates of ordered probit with random effects

Variable	Australia	Canada	France	Mexico	Italy	South Korea
Uni	0.568**	0.210	−0.065	−0.045	0.047	0.232
Urban	−0.131	−0.367*	0.083	0.377**	0.006	0.171
cutl	0.861	−0.227	−0.104	0.127	−0.566	−0.754
cut2	1.666*	0.674	0.934	0.949**	0.271	0.524
cut3	2.858***	1.746**	2.013*	1.930***	1.252***	1.566**
cut4	3.614***	3.223***	3.480***	3.037***	2.532***	3.133***
Wald Chi²	35.958	61.061	87.547	58.784	82.400	102.174
df	23	23	23	23	23	23

Note: Base domain: transport, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.