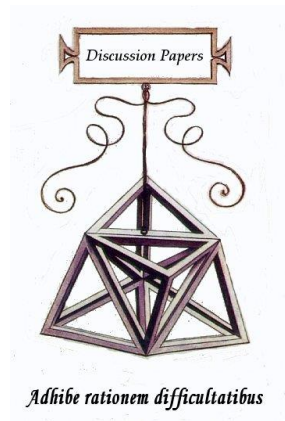




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Caterina GIANNETTI Pietro GUARNIERI Tommaso LUZZATI

Pro-environmental attitude and behaviours: an investigation on the role of pro-sociality

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Indirizzo dell'Autore:

Caterina Giannetti
Dipartimento di Economia e Management, Università di Pisa,
via Ridolfi 10, 56100 PISA – Italy, Email: caterina.giannetti@unipi.it

Pietro Guarnieri
Dipartimento di Economia e Management, Università di Pisa,
via Ridolfi 10, 56100 PISA – Italy, Email: pietro.guarnieri@ec.unipi.it

Tommaso Luzzati
Dipartimento di Economia e Management, Università di Pisa,
via Ridolfi 10, 56100 PISA – Italy, Email: tommaso.luzzati@unipi.it

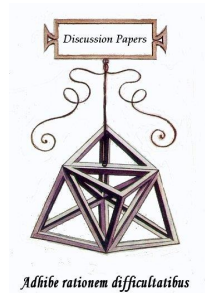
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Discussion Paper
n. 269



Caterina Giannetti Pietro Guarnieri Tommaso Luzzati

Pro-environmental attitude and behaviours: an investigation on the role of pro-sociality

Abstract

The multifaceted nature of contemporary environmental degradation requires an all-round policy approach, that cannot disregard the role of people's behaviour. To study how to promote environmentally friendly actions, this paper investigates whether pro-sociality triggers pro-environmental behaviours (PEBs). To this aim, we consider not only the direct effect that pro-sociality might have on PEBs but also the indirect effect transmitted through environmental concerns. After outlining a theoretical framework based on the literature on PEBs, we use a Eurobarometer survey to conduct a causal mediation analysis. Our results show that pro social attitudes are actually important, having also a strong indirect effect on PEBs. Furthermore, they suggest that policies promoting pro-social attitudes may be more effective than those simply promoting pro environmental attitudes.

Keywords: IV-mediation analysis, environmental citizenship, PEBs, EU citizens

JEL: C36, Q57, Q58

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Caterina GIANNETTI¹ Pietro GUARNIERI Tommaso LUZZATI

2021-02-09

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Keywords: IV-mediation analysis, environmental citizenship, PEBs, EU citizens

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²*Corresponding author.* Department of Economics and Management, University of Pisa, Italy. Email: caterina.giannetti@unipi.it

³Department of Economics and Management, University of Pisa, Italy.

1 Introduction

About half a century ago Georgescu Roegen repeatedly affirmed (e.g. Georgescu-Roegen 1975, p. 377) that policies oriented only to the supply side, such as those promoting technological development and “green investments”, will not be enough to reduce the environmental impact of human activities. His analysis shows that policies influencing the demand, in particular life-styles, are also needed. This has been confirmed by the trends in material use that have been observed starting from post-World War II. For instance, the doubling in energy efficiency that has occurred between 1971 and 2015 has not reduced energy consumption, which instead has increased by 2.5 times (see, e.g.,Luzzati et al. 2018). This increase in energy has gone hand in hand with a strong increase in material consumption, which in turn has strongly impacted the human environment (McNeill and Engelke 2016). Indeed, the wide and consolidated literature on the rebound effect and Jevons’ paradox (e.g., Polimeni et al. 2015, Freire-González 2017,Bruns et al. 2019) contributes to explain why policies centered on efficiency and supply side are deemed to fail, because they do not necessarily involve reductions of material consumption in absolute terms.

Hence, to reduce human impacts a relevant behavioural change is needed and proenvironmental behaviours (PEBs henceforth) have to become widespread. While, sometimes individuals have a direct self-interest in doing PEBs, very often the opposite is true. Hence PEBs that are not immediately aligned with individual interests are particularly relevant. A useful theoretical underpinning to explain why this kind of PEBs can be put in place is the notion of “environmental citizenship”¹ which Dobson [2010] defines as:

“pro-environmental behaviour, in public and private, driven by a belief in fairness of the distribution of environmental goods, participation, and co-creation of sustainability policy. It is about the active participation of citizens in moving towards sustainability.”

Under the lens of this approach, the normative and value-based orientations grounding the individual sense of citizenship drive PEBs. In particular, intrinsic considerations (such as self-transcendent principles of justice or a desire to contribute to society), by acting on social-environmental relations and overall lifestyles, can produce stable PEBs more than external incentives or pressures (see, e.g., Dobson 2010, Jagers and Matti 2010, Hobson 2013). As underlined by Jagers et al. [2014] (p. 436) *“The justice-driven duties, and indeed the motivations, of the ecological citizens are thereby primarily other-regarding and accepted without any expected reciprocity (some right or benefit in return)”*.

Similarly to research that investigated the links between environmental citizenship and PEBs (in particular Carter and Huby [2005], Horton [2006], Seyfang 2006, Wolf et al. [2009], Jagers et al. [2014], Jagers and Matti 2010), the present paper builds on the idea that PEBs can

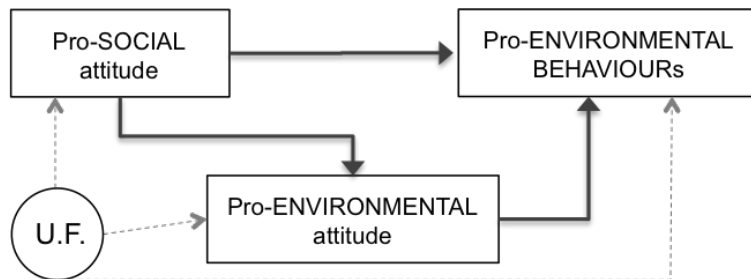
¹In the literature both “environmental citizenship” (e.g. Hobson 2013) and “ecological citizenship” (e.g. Jagers 2009) are used.

be value-driven and aims to provide an empirical check to it. However, differently from previous research, we consider that pro-social attitude can trigger PEBs both directly, out of a sense of community, and indirectly, by making citizens more concerned about the environment. Both channels are visualised in Figure (1), which also show the possible influence of other unobservable factors. From an econometric perspective, it implies to conduct a mediation analysis, which allows us to identify the direct effect of being prosocial on PEBs, as well as its indirect effect, that is the one that goes through being environmentally concerned. More precisely, we consider the individual trait of being pro-social (the “treatment” variable) either as an exogenous (as in Imai et al. 2010c) or an endogenous variable (Dippel et al. 2017, Dippel et al. 2020). In the latter case, pro-sociality and pro-environmental attitude still determines PEBs, but both can be affected by individual or country unobservable factors (e.g., law compliance). In particular, we follow the instrumental variable approach to mediation analysis recently proposed by Dippel et al. 2017, which allows us to estimate the casual effect of a mediator variable in observational studies (i.e., in absence of randomness of treatment assignment) relying on a single instrumental variable. To perform our analysis, we rely on detailed individual data available from the EUROBAROMETER survey in year 2017.²

The dataset we can retrieve from this survey is highly valuable because it contains rich information not only on pro-environmental behaviours, but also on individual concerns (including environmental ones) and individual pro-sociality traits.

Overall, our estimates suggest that the total effect of pro-sociality on PEBs is actually relevant in the EU countries. In particular, when the instrumental variable approach is used, the indirect effect of being prosocial that goes through pro-environmental attitude is larger than its direct effect. These results are robust across different model specifications and variable selections, and give also policy indications about the relative effectiveness of targeting pro-sociality as compared to pro-environmental attitudes.

Figure 1: POSSIBLE LINKS BETWEEN PRO-SOCIAL ATTITUDE, PRO-ENVIRONMENTAL ATTITUDE AND PEBs



²Specifically, we use the survey Eurobarometer 88.1 September-October 2017 ZA No. 6925, Special Eurobarometers 459 and 468 (European Commission 2017a,b,c). The Eurobarometer published three reports which are connected to the present research: the Standard Eurobarometer 88 entitled “Public opinion in the European Union”; the Special Eurobarometer 468 entitled “Attitudes of Europeans towards the Environment”; the Special Eurobarometer 466 entitled “Cultural Heritage”.

The structure of the paper is as follows. Section 2 sets some theoretical insights that are used to mould our empirical analysis. We first explain to which extent our analysis is based on one of the main theoretical frameworks used in the pro-environmental decisions literature, namely, the Value-Belief-Norm Theory (VBN) (Stern and Dietz 1994, Stern 2000), then we briefly discuss the specific meaning of pro-sociality adopted in this paper. Section 3 describes the variables that we built from the dataset. Section 4 illustrates the econometric methods, Section 5 summarises the main results, Section 6 concludes, while the appendix contains full results.

2 A theoretical framework

This section briefly illustrates the theoretical framework we use to explore the EUROBAROMETER survey and to select and build the variables for the empirical analysis. The role of pro-sociality in pro-environmental decisions and behaviours has been widely studied in the empirical and experimental literature.³ Two major research paths have been followed, investigating how pro-sociality is linked, on the one hand, to environmental attitudes (e.g. Schultz and Zelezny 1999, Cheung et al. 2014), and on the other hand, to PEBs (e.g. Schultz and Zelezny 1998, Cameron et al. 1998, Karapetyan and d’Adda 2014, Dietz et al. 2018), including the role of social norms (Farrow et al. 2017) and the positive effect on subjective well being from PEBs (e.g. Binder and Blankenberg [2016] Binder and Blankenberg [2017]). The findings show the relevance of pro-sociality both with respect to environmental attitude and PEBs.

In this paper, we focus on both links at the same time and connect pro-sociality, environmental attitudes and PEBs within a unified picture. To this purpose, the theory of Value-Beliefs-Norms (VBN) (Stern and Dietz 1994, Stern 2000) proves useful because it is consistent with the idea that an overall sense of environmental citizenship motivates PEBs. As is well-known, according to VBN, PEBs are performed out of a sense of normative obligation that is activated by contextual circumstances eliciting the person’s value orientation and attitudes. Values act as fundamental antecedents of PEBs and are classified as egoistic, prosocial or biospheric, meaning that the propensity to engage in PEBs can arise because they increase one’s own welfare, the welfare of others, or from an intrinsic value attributed to nature.⁴ These antecedents affect behavior through the mediation of three types of beliefs: the individual environmental attitude – i.e. the concern for environmental issues – the ascription of personal responsibility and the awareness of consequences.⁵

³For a detailed review on economics studies on PEBS see Blankenberg and Alhusen [2018]

⁴Individuals’ biospheric values will not be considered in this paper because both they cannot be inferred from questions of the Eurobarometer survey that we consider, and are not relevant to the aim of this paper, which is centred on pro-sociality.

⁵In the VBN framework, norm activation occurs only when a person feels herself responsible to undertake the relevant action and knows that the action he is going to perform will have beneficial consequence or will avoid detrimental consequences.

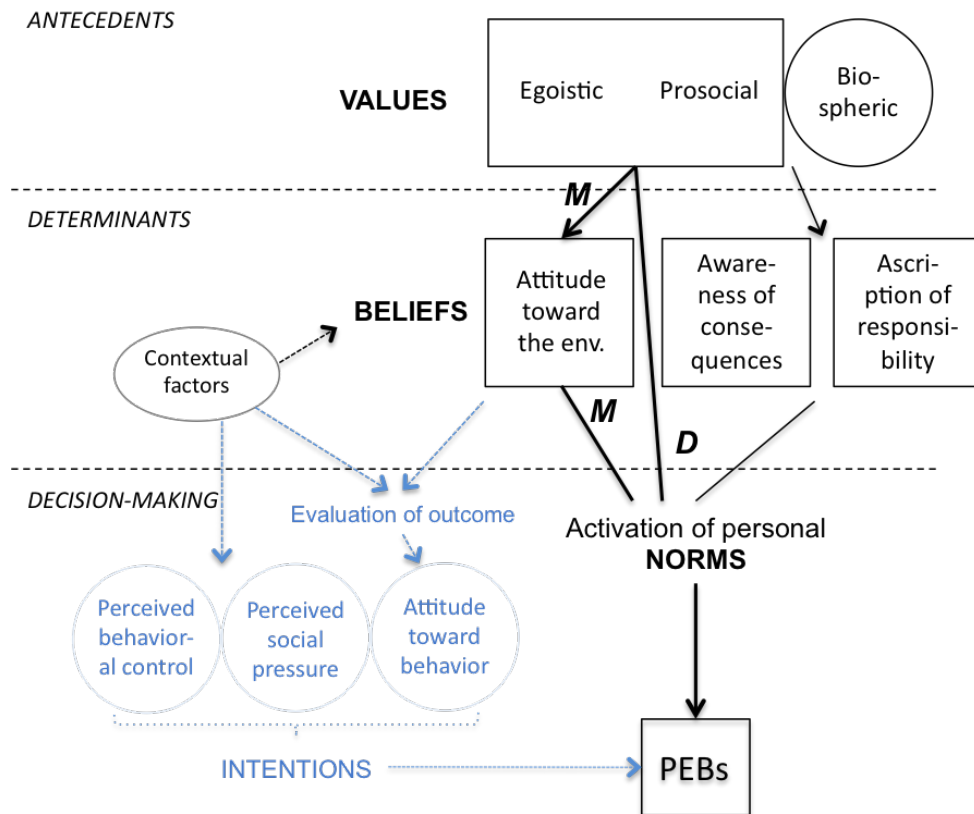
Figure (2) summarises the causal relationships between the theoretical elements of the VBN. It also shows the analytical categories of the Theory of Planned Behavior Ajzen 2002, the other mainstream approach used to account for pro-environmental decisions.⁶ The elements of the VBN are on the right and drawn in black, while the TPB is in light blue on the bottom left side. The main reason for showing the two theories together in the same picture is to highlight the key role that environmental attitude plays. Indeed, the beliefs that identifies personal environmental concern, is not only a trigger of norm activation, but accounts for the outcome evaluation involved in the deliberation motivating decision in the TPB. Furthermore, in both theories contextual factors like behaviours of significant others, social norms and trust, environmental regulation, policies, the presence of green infrastructures, incentives, the availability of information, have a relevant role in affecting PEBs (Drews and Van den Bergh 2016) through the channels shown in the Figure (2).

The Figure also illustrates the key elements of our empirical estimation strategy. Variables in boxes are those for which we have proxies and continuous lines indicate relations that we empirically investigate as possible channels from pro-sociality to PEBs. Path *M* is the one that is studied within the VBN approach, for which values affect PEBs through the mediation of the individual “attitude towards the environment” after controlling for ascription of responsibility and awareness. In this case, pro-sociality of the good citizen makes him environmentally concerned, and hence inclined to perform PEBs. Differently from the VBN approach, however, we want also to explore the direct impact of pro-sociality on PEBs (which is illustrated by the causal link *D*), namely, the direct activation of personal norms that induces the “good citizen” to engage in PEBs even if (s)he is not specifically concerned about the environment.

Before moving to our empirical exercise, a short reflection about the term “pro-sociality” is helpful to clarify the specific meaning that we refer to in our analysis. Pro-sociality is defined in various ways depending on the different disciplines that have a say in it (for an overview see Schroeder and Graziano, 2015). However, a common paradigmatic feature is that pro-social acts are those that serve to benefit another or others. By applying such a definition, based on this “self vs. others” juxtaposition, any generic help given to relatives, friends, specific groups, or the society as a whole is considered indiscriminately as a prosocial act. The advantage of such a perspective is that the proximal reasons why the benefactor generates the benefits are considered as irrelevant, thereby cutting out unsolvable speculation about the “true” reason of the action. At the same time, unfortunately, to leave receivers as a residual and unspecified category, makes it impossible to distinguish between *parochial altruism* – i.e. a “discriminatory”

⁶As is well-known, the VBN and TPB expresses two alternative theoretical claims about what does determine choice. In particular, while VBN deals with decisions in terms of value orientations, TPB refers to intentions that is, on conscious and self-regulatory processes, as the ultimate driver of choice. At the same time, many categories identifying antecedents/drivers of PEBs are similar and overlap across the two theories. For instance, awareness of consequences is crucial both for reasoning (TPB) and for the activation of the norm (VBN). Several possible ways to integrate the two theories have been discussed in the literature (Harland et al. 1999; Kaiser 2006). For a comprehensive discussion see Turaga et al. 2010, Nolan and Schultz 2015, and Lanzini 2017.

Figure 2: ANTECEDENTS AND DETERMINANTS OF PRO-ENVIRONMENTAL BEHAVIOURS



Variables for which we have proxies are in boxes and continuous lines are for relations that we empirically investigated. *D* is the direct effect from pro-sociality to PEBs, while *M* is the one mediated by environmental attitude.

kind of pro-sociality toward a specific group or group members that ends up excluding from the benefit of pro-sociality or damaging others or other groups Rusch [2014], Everett et al. [2015] – from a universalistic and purely self-transcendent kind of pro-sociality directed toward the society as a whole or to any of its member. This, however, would result, for instance, in classifying pro-social also misconducts such as favouring friends in a tendering procedure, or helping fellows of a criminal organization to which one belongs. Consequently, in accordance with common sense, we intend pro-sociality as an attitude towards self-transcendent actions that serve to benefit unidentified others or the society as a whole. This is in line with the social psychological definition of *principism*, i.e., a prosocial behaviour that responds to a universal principle of fairness and justice in compliance with the Kantian categorical imperative (Batson et al. 2011, p. 220; for an overview see Schroeder and Graziano 2015).

3 Data Description

In this section we describe the dataset we use in the empirical analysis. The main source we rely on is the Eurobarometer Survey as of 2017, which contains a special section on “Attitudes of European citizens towards the environment”.⁷ More than 28,000 face-to-face interviews were conducted in 28 EU countries using the multi-stage random (probability) sampling method used in all Eurobarometer surveys, with most countries having almost identical sample sizes (n=1000). We will use the population size weighting factors to ensure that each country/regions are represented in proportion to its population size.

This survey only provides a cross-sectional dataset. At the same time, it is extremely rich and detailed about the questions concerning the environmental concerns and behaviour. In particular, from this survey we build indicators of both pro-environmental behaviours (*PEBs*) and environmental attitude (*EnvAtt*) as well as proxies for pro-sociality (*Prosocial*). The survey contains also useful information about other individual characteristics (e.g. age and education).

⁷In particular, we rely on Standard Eurobarometer 88.1, Special Eurobarometers 459 and 468 (EC 2017a, 2017 b, 2017c).

3.1 Measuring concerns: environmental attitudes (EnvAtt) and other concerns

To derive indicators of concerns and environmental attitude we rely on several questions available in the survey. First of all, we generate a dummy variable *Climate Change* equal to 1 if the individual named climate change among the threats that EU is facing (and zero otherwise). We also generate another dummy variable *Climate Change First* equal to 1 if the individual named climate change as the first concern.⁸

We also generate a variable *Global challenge* equal to 1 (and zero otherwise) if the individual named protecting the environment among the world global challenges that our society should address.⁹ Another generated variable is *Env Importance*, equal to 1 (and zero otherwise) if the individual stated that is extremely important to protect the environment. We also create an ordinal variable ranging from 0 to 3 according to whether the individual stated that protecting the environment is “not all important” to “extremely important”.¹⁰ Finally, we aggregate all the indicators into one single index by using principal component analysis (similar to Dippel et al. 2017). To check the robustness of our results to a different type of societal concern, we additionally generate a dummy variable *Terrorism* equal to 1 (and zero otherwise) if the individual named terrorism among those threats, and *Terrorism First* if the individual named terrorism as the first concern.

3.2 Measuring pro-environmental behaviours (PEBs).

To derive indicators of pro-environmental behaviour (PEBs) we similarly rely on several questions capturing a variety of environmentally friendly actions. In particular, we derive indicators distinguishing between two types of PEBs: possibly *self-transcendent* PEBs, i.e. behaviours not showing an immediate and direct gain for the individual (e.g. avoiding over-packaged products), and other actions centered on *emission reductions*, most of which requires a relevant investment but can also imply personal gains for the individual.

Concerning the first type of PEBs, we rely on the following question:

“Have you done any of the following in the past six-months? Choosing a more environmentally friendly way of traveling | Avoid buying over-packaged products | Avoided single-use plastic goods | Separated most of your waste for recycling | Cut down water consumption | Cut down energy consumption |

⁸The exact question is the following: “The EU and its citizens are facing a number of threats. From which of the following should the EU protect its citizens? Firstly? ”

⁹“From the following items, which two should our society emphasise in order to face major global challenge?”

¹⁰The exact question is the following: in the following question:

“How important is protecting the environment to you personally ” Not all important | Not very important | Very Important | Extremely important.

Bought product with environmental label | Bought local products | Used car less".

and generate a variable *Self-Transcendent PEBs* ranging from 0 to 4 by counting up the total number of pro-environmental actions undertaken by the individual among the first four listed actions (i.e. from "choosing a more environmentally friendly way of travel" to "separated most of your waste for recycling"), while excluding the remaining actions since they might also involve a personal return (i.e. cut-down of water and energy consumption, cut-down of car use, and buying local and environmental labeled products). We also generate an indicator for *Plastic bags reduction*, namely a dummy variable equal to 1 if the individual declared a recent reduction in the use of plastic bags (and zero otherwise).¹¹ We also get additional indicators to be used in the robustness analysis considering actions with a potential personal return (i.e. cut-down water, energy consumption etc.).

In relation to the second type of PEBs, we generate an integer variable *Emission PEBs* **ranging from 0 to 6** relying on the following question:

"In order to reduce harmful emissions into the air have you done any of the following in the last two years? Changed your home heating system with lower emissions | Replaced older energy-intensive equipment | Used more public transport, cycling, walk | Bought an electric vehicle | Bought a low emission car | Bought low emissions product"

3.3 Measuring pro-sociality and other individual traits.

To derive indicators of pro-sociality we rely on specific questions inserted in the "Cultural Heritage" session of the same Eurobarometer survey. Even though this type of activities might appear very peculiar, it is useful for our purpose as we need a variable capturing the individual prosocial trait. Nevertheless, our empirical strategy allows us to create an instrumental variable and test for unobservable relevant individual characteristics.

In particular, individuals were asked:

"Are you involved, in any way, in the field of cultural heritage? Please tell me all that apply: ... | You do voluntary work for an organisation (a museum, an association, a foundation, etc..) that is active in the field of cultural heritage | You donate money or other resources to an organisation (a museum, an association, a foundation, etc..) that is active in the field of cultural heritage.

We generate a dummy variable *Donation* equal to 1 if the individual donated money to an organisation (and zero otherwise) and a dummy variable *Voluntary work* equal to 1 if the individual volunteered for an organisation (and zero otherwise).

¹¹The exact question is *"Have you cut down on your use of single use plastic carrier bags? Yes, in the last 12 months | Yes before the last 12 months | No"*

Finally, the survey contains information about other individual characteristics such as age, education, family and working status. There are also questions that allow us to derive indicators about individual awareness and ascription of responsibility.¹²

3.4 Main descriptive statistics

Table (A.1) in the Appendix reports the main descriptive statistics for each variable in our dataset. In particular, we observe that - on average - individuals undertake about 1.5 actions out of 4 possible *Self-Transcendent PEBs* (such as reducing traveling, over-packaging, plastic reduction, waste-separation, water consumption) and about 1 action out of the 6 *Emission PEBs* (changing heating system, use more public transport, buying an electric/low-emission car or product). On average, 69% individuals reduced their plastic-bags usage, while about 7% donated to a charity (and about 6% volunteered for it).

4 Econometric methods: mediation analysis

The goal of our mediation analysis is to determine possible causal mechanisms by examining the roles of intermediate variables that lie in the causal path between pro-sociality and *PEBs* (Imai et al. 2010a, Dippel et al. 2017, Huber 2019). More specifically, we aim at estimating how much of the individual pro-sociality trait (proxied, for example, by *donation*) is transmitted to *PEBs* directly and how much indirectly, by changing the individual's environmental attitude (in the following *EnvAtt*).

Traditionally, mediation analysis has been implemented within the framework of Linear Simultaneous Equation Model (LSEM). Imai et al. [2010a,c] extended this framework by developing general algorithms to estimate causal mediation effects for linear and non-linear relationship, with parametric and non-parametric models. This general approach can be used to both observational and experimental studies, and has specifically been used in economics (Heckman and Pinto 2015, Klein and Goldberger 1955, Dippel et al. 2017). Outside the experimental framework, additional care needs to be used as the treatment variable is not randomly assigned. Thus, we follow the approach of instrumental variable in mediation analysis as proposed in Dippel et al. 2017.

In the following, we describe the mediation analysis Dippel et al. [2017] and explain how we adapt it to our case. In particular, we first briefly describe the standard setting of the mediation analysis (normally used within an experimental setting) as developed by Imai et al. [2010a,c]

¹²More precisely, we rely on the following questions:

1. "As an individual, you can play a role in protecting the environment in your country": 1|2|3|4|5 (*ascription of responsibility*);
2. "Environmental issues have a direct effect on your daily life and health": 1|2|3|4|5 (*awareness of consequence*);

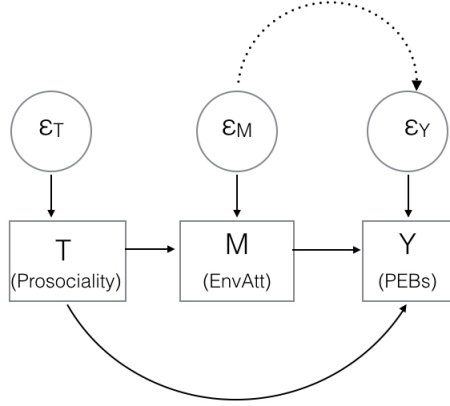


Figure 3: MEDIATION ANALYSIS: TREATMENT RANDOMLY ASSIGNED
 $\varepsilon_T \perp \varepsilon_Y, \varepsilon_T \perp \varepsilon_M$. See Imai et al. [2010c]

and then describe an instrumental variable setting (as in Dippel et al. 2017) that better fits our research design because it considers that our main variable of interest is not randomly assigned, and therefore likely to be affected by unobservable factors.

4.1 Mediation analysis when treatment assignment is random

Given a random sample of size n from the population, for each individual i we observe the vector (T_i, M_i, X_i, Y_i) . Our treatment variable T_i is captured by the dummy variable $Prosocial_i$, where $Prosocial_i = 1$ means that the unit i exhibits prosocial traits (e.g., the individual has made a donation), while $Prosocial_i = 0$ stands for no prosocial traits. The mediator variable M_i is the individual’s environmental attitude (e.g. the concern for the environment the individual expressed), and is denoted by $EnvAtt_i$. X_i indicates the set of control variables. The outcome variable Y_i is about the individual (self-declared) pro-environmental behaviours, PEBs; we proxied it with several variables (e.g. the number of individual’s pro-environmental behaviours). See Figure (4.1) for a representation of this mediation framework and section 3 and Table (A.1) for the descriptions of the variables.

To define the causal mediation effects, let $M_i(t)$ denote the potential value of the mediator when the treatment status is equal to $T_i = t$ and $Y_i(t, m)$ the potential outcome associated to $T_i = t$ and $M_i = m$. The observed variables are indicated with $M_i = M_i(T_i)$ and $Y_i = Y_i(T_i, M_i(T_i))$. Relying on the counterfactual framework of causal inference, we can define the causal mediation effect - or the *indirect effect* - under treatment status t as the quantity

$$\delta_i(t) \equiv Y_i \{t, M_i(1)\} - Y_i \{t, M_i(0)\}$$

for each treatment status $t = 0, 1$ (in our case $t = 1$ for *Prosocial*, and $t = 0$ if not). Therefore, $\delta_i(\text{Prosociality})$ represents the change in *PEBs* caused by a change in *EnvAtt_i* (i.e. the mediator) from the value that would be realized under the control condition - $M(\text{Pro-sociality}=0)$ - to the value that is observed under the treatment condition - $M(\text{Pro-sociality}=1)$ - while holding the treatment status constant. In other words, the difference δ_i tells the change in *PEBs* we would observe if the individual had the same level of *EnvAtt_i* associated to whom is classified as prosocial. Therefore, if the treatment has no effect on the mediator, i.e. $\delta=0$, the indirect effect is zero. By averaging over the individuals, we obtain the average mediation effect (*ACME*):

$$\bar{\delta}(t) = E \{Y(t, M(1)) - Y(t, M(0))\}$$

Similarly, one can define the individual direct effect of the treatment and then calculating the average direct effect (*ADE*) as

$$\bar{\zeta}(t) \equiv E \{Y(1, M(t)) - Y(0, M(t))\}$$

This represents the average causal effect of the treatment on the outcome variable when the mediator is set to the potential value that would occur under the treatment status t . Thus, $\zeta(t)$ represents all other mechanisms linking pro-sociality to *PEBs* when the mediator (i.e. *EnvAtt*) is held constant. Then, the overall effects of the treatment is given by the sum of these two effects, that we can indicate with $\bar{\tau}$, where $\bar{\tau} = \bar{\delta} + \bar{\zeta}$.

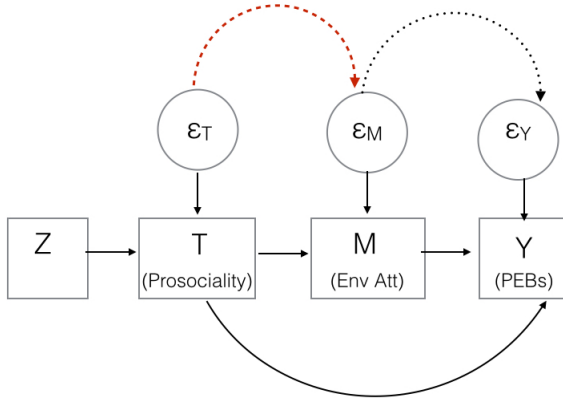
Imai et al. [2010a,c,b] develop general estimation procedures for causal mediation effects that can accommodate linear and non-linear relationships, parametric and non-parametric models. They also show that their framework encompasses the standard mediation analysis based on the single mediator linear SEM as a special case. In our case, that would correspond to:

$$\begin{cases} \text{EnvAtt} & = \beta_1 \text{Prosociality} + \eta_1 \text{other controls} + \varepsilon_1 & (1.1) \\ \text{PEBs} & = \gamma_2 \text{EnvAtt} + \beta_2 \text{Prosociality} + \eta_2 \text{other controls} + \varepsilon_2 & (1.2) \end{cases} \quad (1)$$

where *EnvAtt* is the variables capturing environmental attitude (e.g. how much individuals are concerned with the climate change), *PEBs* is the number of actions done by the same individuals (e.g., waste separation, energy savings), and *other controls* are individual characteristics - such age, sex, education, marital status, awareness, and ascription of responsibility - as well as country controls.

After fitting each linear equation via least squares, the product-of-coefficients method (i.e. “Barron-Kenny procedure”) yields an estimate of the mediation effects by multiplying the relevant coefficients of each equation (Imai et al. [2010c]). For example, the estimate of the direct effect of *Pro-sociality* on choosing *PEBs* is $\hat{\beta}_2$, while $\hat{\gamma}_2 \hat{\beta}_1$ can be interpreted as the estimate of

Figure 4: MEDIATION ANALYSIS: TREATMENT NOT RANDOMLY ASSIGNED



$\varepsilon_T \not\perp \varepsilon_M, \varepsilon_Y \not\perp \varepsilon_M, \varepsilon_Y \perp \varepsilon_T$. See Dippel et al. [2017].

the causal mediation effects that unfold through *EnvAtt* (i.e., δ). Similarly, η_2 captures the direct effect of other controls (such as age), while their mediation effect is captured by $\hat{\eta}_1\hat{\gamma}_2$. The parameter γ_2 represents instead the net effects of being environmentally concerned, once the effect of being prosocial has been netted out.

In order to identify the indirect effects, however, two assumptions need to be satisfied, also known as *sequential ignorability* (Imai et al. 2010a), namely, (1) the treatment assignment is assumed to be statistically independent of potential outcomes and potential mediators; (2) given the actual treatment status and pretreatment confounders, the observed mediator is independent of all potential outcomes and pre-treatment covariates. The assumptions of the mutual independence among error terms ($\varepsilon_T \perp \varepsilon_M, \varepsilon_T \perp \varepsilon_Y$) are quite strong and unlikely to hold in observational studies. To cope with this problem, we also followed a different approach, as illustrated in the next subsection.

4.2 IV-Mediation Analysis

Although a number of studies show that pro-sociality is partially a heritable trait (e.g. Cesarini et al. 2009, Rushton 2004), the same studies highlight that a significant part of this trait variation can be traced back to other contextual factors (such as education, family background or other unobservable individual characteristics). In other words, it is hard to believe that in our setting there are not unobservable factors simultaneously affecting environmental concerns, PEBs, and pro-sociality. Thus, our treatment variable T_i (i.e. *Prosocial*) cannot be considered as randomly assigned, as assumed in the previous subsection.

In particular, we consider a situation in which $\varepsilon_T \not\perp \varepsilon_M$ because of individual (or country) unobserved factors, such as moral intrinsic motivations or law compliance, that can make the individual both more concerned for the environment, and more pro-social. Simultaneously, we want to allow $\varepsilon_Y \not\perp \varepsilon_M$: the same individual unobserved factors may affect both individual propensity to be both more environmentally concerned and more active in terms of PEBs. In other words, unobserved confounders in ε_T tend to affect PEBs through individual pro-social attitudes but not through other channels. That is, $\varepsilon_Y \perp \varepsilon_T$ but $\varepsilon_T \not\perp \varepsilon_Y | \varepsilon_M$: the unobservable variables $\varepsilon_T, \varepsilon_Y$ are not statistically independent conditional on environmental attitudes.

Within this setting, Dippel et al. [2017] show that is possible to achieve point-identification of the total, direct and indirect effects. In particular, they show that it is possible to rely on a single instrument (Z) to perform a mediation analysis which decomposes the total effect of T (i.e. *Pro-sociality*) on Y (i.e. PEBs) into the mediate indirect effect of T on Y that operates through M (i.e. *EnvAtt*) and the direct effect that does not goes trough M . Specifically, they show that is possible to run three separate 2SLS regressions: 1) the first one to estimate the effect of T on M , i.e. β_1^{IV} ;¹³ 2) the second one to estimate the effect of M on Y conditional on T , i.e. γ_2^{IV} and β_2^{IV} ;¹⁴ 3) the third one to estimate the total effect of T on Y (i.e. PEBs), i.e. τ^{IV} .¹⁵ The identifying assumption is that T is endogenous in a regression of Y on T , but the endogeneity cannot arise from confounders that jointly affect T and Y but only from confounders that *jointly* affect T and M (i.e. the standard IV exclusion restriction is that instrument Z affects M and Y only through its impact on T). In other words, the main endogeneity concern in a regression of environmental attitude (M) on pro-sociality is that unobservable country or individual characteristics affect pro-sociality (T) and environmental attitude, and it is plausible that such factors affect pro-environmental behaviour primarily to the extent that they affect environmental attitude. Thus, for Z to be an instrument, it must be the case that Z is statistically independent of unobserved error terms $\varepsilon_T, \varepsilon_M, \varepsilon_Y$. In their work, Dippel et al. [2017] further show that it possible to also relax the hypothesis $\varepsilon_Y \perp \varepsilon_T$, thus allowing to bound the decomposition of the total effect into indirect and direct effect. In our case, it means that we might allow for the presence of additional confounders directly affecting the way in which pro-sociality acts on PEBs.

¹³This first step implies the following two-equation system:

1. $T = \beta_M^z Z + \varepsilon_T$
2. $M = \beta_1 \hat{T} + \varepsilon_M$

¹⁴This second step implies the following two equation system:

1. $M = \gamma_M^z Z + \gamma_M^T T + \varepsilon_T$
2. $Y = \gamma_2 M + \beta_2 T + \varepsilon_y$

¹⁵This third step allows to identify the total effect $Y = \gamma_2 M + \beta_2 T + \varepsilon_y$, with the first step being again $M = \gamma_M^z Z + \gamma_M^T T + \varepsilon_T$. This third step shows how it is possible to obtain the total effect as the product of the estimations achieved in the previous two steps. Indeed, if we substitute M as obtained in step 1 in $Y = \gamma_2(\beta_1 T + \varepsilon_M) + \beta_2 T + \varepsilon_y$, we obtain $Y = (\gamma_2 \beta_1 + \beta_2) T + \gamma_2 \varepsilon_M + \varepsilon_y$, from which we notice that the total effect is equal to $\hat{\gamma}_2 \hat{\beta}_1 + \hat{\beta}_2$.

As an instrument for pro-sociality, in the spirit of Dippel et al. [2020], we created for each individual a variable measuring the average share of donators in countries with a similar level of victims due to car accidents, i.e. we consider two countries as similar if they are within the same average of car-accident victims plus its standard deviation in the sample. In particular, we compute

$$Z_i = \sum_{j \neq i} Donation_{jc} / N_c$$

where *Donation* is the dummy variable defined in Section 3.3, *c* are countries with similar level of car accidents as the one in which individual *i* lives, and N_c is the total population in these countries. In other words, our instrument is the average level of pro-sociality in countries very similar for civic attitude to the one the individual is currently living. The main idea of using the average level probability of being a donator in similar countries, conditional on being a donator in one's own country, will reflect the source of possible bias, i.e. unobservable characteristics driving individual concerns for the environment.

5 Findings

5.1 Main estimates and results

To begin with, we present estimates of model (1.1 ; 1.2) relying on different types of PEBs, namely *Self-Transcendent-PEBs*, *Emission-PEBs* and *Plastic bags reduction*. In this section, the variable *Pro-sociality* is always proxied by the variable *Donation*, while environmental attitude (*EnvAtt*) is measured by the variable *Climate change* (see again section 3 for a full description of these variables). In the next subsection we perform a series of robustness checks to control for other type of measurements both for pro-sociality and environmental attitude.

Table (5.1) summarizes the main results under the two different mediation approaches, reporting only the estimated coefficients for the variables of our interest. Specifically, column *a* summarizes the estimates based upon the product-of-coefficients method, while Table (A.3), Table (A.4), and Table (A.5) in the Appendix report the full set of estimation results. As stated above, the product of coefficient method implies estimating both equations (1.1) and (1.2) with two separate linear regressions to then obtain the indirect effect by multiplying the estimated coefficients for *EnvAtt* and *Pro-sociality* (i.e. $\hat{\gamma}_2 \hat{\beta}_1$) from the two regressions.¹⁶ The first thing to notice is that pro-sociality plays an important role in driving PEBs. The average direct effect of pro-sociality (*ADE*), $\hat{\beta}_2$, is significantly different from zero in all three cases. Indeed, being prosocial directly increases the number of *Self-Transcendent-PEBS* by 0.363, *Emission-PEBS* by 0.450, and *Plastic bags reduction* by 0.065. Their economic relevance is quite high, corresponding

¹⁶Estimations from the non-parametric bootstrap algorithm proposed by Imai et al. [2010a] returns point estimates almost identical the product of coefficients and different confidence intervals (estimates upon request).

to 25%, 45%, 9.5% of the average number of PEBs in the sample. The average indirect effect (i.e. $\hat{\gamma}_2\hat{\beta}_1$) is also positive and statistically significant in all cases, being equal to 0.010 for *Self-Transcendent-PEBS*, 0.007 for *Emission-PEBS*, and 0.065 for *Plastic bags reduction*, although it is not economically relevant.

The second set of results (see column *b*, Table 5.1) relies on the instrumental variable approach as proposed by Dippel et al. [2017]. Once again, we report only results of our main interest, while Table (A.6) reports the full set of estimates for the first-step, which allows identifying β_1^{IV} in eq (1.1), while Table (A.7) reports the full set of estimates for the second step, which allows identifying β_2^{IV} and γ_2^{IV} in eq (2.2) for different types of PEBs sharing the same type of *EnvAtt* (and thus first-stage). In particular, in line with previous studies, Table (A.6) highlights that being prosocial is actually positive related with being environmentally concerned, i.e. β_1^{IV} is positive and statistically significant, while Table (A.7) also highlights that being environmental concerned and prosocial is positive related to a larger numbers of PEBs, i.e. both γ_2^{IV} and β_2^{IV} are positive and statistically significant. The instrument (see section 4.2 for a description) performs well having an F-test well above 10 in all cases. For our purpose, it is important to notice that by instrumenting our pro-sociality variable (see column *b*, Table 5.1) we obtain a very different result compared to column *a*, Table (5.1). In all cases, while the direct effect remains quite similar, the indirect effect of being prosocial becomes much larger than the direct effect, thus reversing the results obtained in the standard setting (although not significant for self-transcendent PEBs). More precisely, while the direct effect remains similar in magnitude and statistically significant in all cases (0.359 for *Self-transcendent PEBs*, 0.501 for *Emission-PEBs*, and 0.061 for *Plastic bags reduction*), the indirect effect becomes larger: 0.410 (although not significant) for *Self-transcendent PEBs*, 3.731 for *Emission PEBs*, and 0.678 for *Plastic-bag reduction*. Thus, these results suggest that unobservable factors, such intrinsic motivation and law-obedience are strong drivers of PEBs, thus highlighting a larger indirect effect of pro-sociality.

Taken all together, these results provide important insights about the role of pro-sociality, allowing us to disentangle the direct effect of being prosocial from the indirect effect of being at the same time concerned for the environment. First of all, we need to notice that that pro-sociality has a positive and significant effect in almost all cases, although not always statistically significant, i.e. $\hat{\beta}_2 > 0$. Moreover, considering the total effect of pro-sociality (ADE+ACME), i.e., $\hat{\tau} = \hat{\beta}_2 + \hat{\gamma}_2\hat{\beta}_1$, we further notice that pro-sociality interacts strongly with the environmental attitude, with the indirect effect being positive and statistically significant, and in most cases even larger than the direct effect (i.e. $\hat{\gamma}_2\hat{\beta}_1 > \beta_2$).

5.2 Robustness

This section discusses the robustness of our results with respect to alternative set of variables. Table 2 shows the main results of the robustness check for the IV approach, which is the core of

Table 1: ESTIMATED CAUSAL MEDIATION EFFECTS: DONATION

OUTCOME VARIABLE		PRODUCT OF COEFFICIENTS	IV
		(a)	(b)
Self-Transcendent PEBs	ACME ($\hat{\gamma}_2\hat{\beta}_1$)	0.010 [0.000]	0.404 [0.661]
	ADE ($\hat{\beta}_2$)	0.360 [0.000]	0.363 [0.000]
	Total ($\tau = \hat{\beta}_2 + \hat{\gamma}_2\hat{\beta}_1$)	0.370 [0.000]	0.767 [0.396]
	$\hat{\gamma}_2$	0.228 [0.000]	0.158 [0.658]
Emission PEBs	ACME ($\hat{\gamma}_2\hat{\beta}_1$)	0.007 [0.000]	3.731 [0.000]
	ADE ($\hat{\beta}_2$)	0.560 [0.000]	0.450 [0.000]
	Total ($\tau = \hat{\beta}_2 + \hat{\gamma}_2\hat{\beta}_1$)	0.567 [0.000]	4.231 [0.002]
	$\hat{\gamma}_2$	0.152 [0.000]	1.464 [0.000]
Plastic bags reduction	ACME ($\hat{\gamma}_2\hat{\beta}_1$)	0.001 [0.008]	0.678 [0.087]
	ADE ($\hat{\beta}_2$)	0.065 [0.000]	0.053 [0.000]
	Total ($\tau = \hat{\beta}_2 + \hat{\gamma}_2\hat{\beta}_1$)	0.066 [0.000]	0.731 [0.061]
	$\hat{\gamma}_2$	0.027 [0.000]	0.266 [0.067]
Observations		23639	23639
Individual controls		Yes	Yes
Country controls		Yes	Yes
F-test I stage		Yes	Yes
F-test II stage		Yes	Yes

p-values are reported in squared brackets [].

our analysis. Column (a) shows the results of a different specification of the IV analysis in Table (5.1), where we use a different measure for the outcome variables *PEBs*, i.e., we replace *Emissions PEBs* with the variable *Other Emissions*. Instead, the remaining columns refer to estimates in which the outcome variable is always *Self-transcendent PEBs* as in Table (5.1) but we use different measures for environmental attitude, i.e. *EnvAtt*. More precisely, Columns (b), (c), (d), show the results where the indicator *Climate Change* is replaced by other variables representing either a stronger concern for the environment (i.e. *Climate change first*, *Global challenge*) or a completely different type of concern (i.e. *Terrorism* and *Terrorism first*). Finally, column (e) shows the results when a different indicator for pro-sociality is used, *voluntary work* rather than *donation*, while keeping *Climate Change* as the indicator for environmental attitude. See again section 3 for a definition of the abovementioned variables as well as Tab. (A.1).

To begin with, column (a) shows similar to the ones presented in Table 5.1, column b; even if we use a different measure of PEBs, i.e. *Other Emissions*, our results are consistent. Once again the indirect effect is positive and significantly larger than the direct one. Results in column (b) and (c) also suggest there are no significant differences on the number of *Self Transcendent PEBs* when we use *Climate change first* or *Global challenge* instead of *Climate Change*. Similar results (not reported but available upon request) are also obtained if we use *Emissions PEBs* instead of *Self-transcendent PEBs* as a measure of PEBs, and we similarly replace *Climate Change* with *Climate change first* or *Global challenge*. That is, once we control for unobservable factors, we observe once again that pro-sociality has a smaller and positive direct effect on PEBs, and a larger and positive indirect effect that unfolds through climate change concern.

Interesting to notice, in column (d) there are no significant differences if we replace *Climate change* concern with *Terrorism* (and *Terrorism first*). That is, we replace a concern for environmental attitude with a different type of concern. The indirect effect of *Prosocial* remains positive and significantly larger than the direct effect. However, the reasons in this case are quite different: as the full set of results highlights (see Table A.8 in the Appendix), the direct effect of pro-sociality is still positive and significant. Being prosocial positively affects the number of PEBs. At the same time, being prosocial significantly decreases the probability of being worried of *Terrorism* of about -1.498, while being worried about terrorism decreases the probability of undertaking many actions of about -0.283. As a result, the indirect effect of being prosocial once again increases the probability of undertaking PEBs by 0.423 (i.e. -1.498×-0.283). The results are similar when using *Terrorism first* instead of *Terrorism* (available upon request) and when relying on country dummies instead of country variables as controls.

Finally, column (e) shows that our results are also robust by using a different measure of pro-sociality based on voluntary work rather than donation (see section 3.3).

Table 2: IV ROBUSTNESS CHECKS

Different indicators for:	<i>PEBs</i>	<i>Env Attitudes</i>			<i>Pro-sociality</i>
	(a)	(b)	(c)	(d)	(e)
	Other emissions	Climate change first	Global challenge	Terrorism	Voluntary work
ACME ($\hat{\gamma}_2\hat{\beta}_1$)	2.629 [0.029]	0.138 [0.597]	0.395 [0.661]	0.424 [0.656]	0.603 [0.551]
ADE ($\hat{\beta}_2$)	0.462 [0.000]	0.359 [0.000]	0.372 [0.000]	0.345 [0.000]	0.236 [0.000]
Total ($\tau = \hat{\beta}_2 + \hat{\gamma}_2\hat{\beta}_1$)	3.091 [0.009]	0.497 [0.592]	0.767 [0.396]	0.769 [0.396]	0.838 [0.334]
$\hat{\gamma}_2$	1.030 [0.015]	0.124 [0.886]	0.241 [0.697]	-0.278 [0.662]	0.216 [0.547]
Observations	23639	23639	23639	23639	23639

Column *a* reports the results from using *Other Emissions* instead of *Emissions PEBs* of Table 5.1-. Column *b*, *c*, *d* reports the results from replacing *Climate Change* in e.q (1.1) and eq.(2.2) of Table 5.1- with *Climate Change First*, *Global Challenge*, and *Terrorism*, while keeping *Self-transcendent PEBs* as the outcome indicator. Finally, column *e* reports the results from using “*voluntary work*” as an alternative indicator of pro-sociality, while keeping *Self-transcendent PEBs* as our measure of *PEBs* and *Climate Change* as an indicator of environmental attitude.

6 Conclusions

The aim of this paper was assessing the role of pro-sociality in pro-environmental behaviours (PEBs). To do this, we considered that pro-sociality can act not only directly, out of a desire of being a good citizen, but also indirectly, by inducing environmental concerns that in turn triggers PEBs. Measuring both effects and quantifying the total effect can give a flavour of the relevance of the notion of environmental citizenship. Moreover, it allows assessing the relative importance of pro-sociality as compared to environmental attitudes in driving PEBs, which is a policy relevant issue.

We firstly sketched a framework based on the Value Belief Norm Theory, which is a rather popular approach to study PEBs. Then, by using data from a Eurobarometer survey, we performed our empirical assessment based on causal mediation analysis. We found that pro-sociality plays an important role for PEBs. After controlling for unobservable factors, such as intrinsic motivations and law-obedience, most of our estimates show that the influence is both direct and indirect, via individual environmental attitude, and that the indirect effect is significantly higher than the direct one. To conclude, the results of our estimates have policy implications for promoting PEBs among the EU citizens. Fostering environmental attitudes through programmes aimed at disseminating environmental knowledge and concern for the environment might be less effective than those targeting also pro-sociality. Policies promoting prosocial values not only build good citizens, but also enhance environmental concern and can

be effective to stimulate more sustainable behaviours. In a community where many people adhere to a comprehensive sense of environmental citizenship, PEBs can become widespread because of a self-transcendent motivation of benefitting the society and the environment as a whole.

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A Tables

Table A.1: DESCRIPTIVE STATISTICS

Variable	Description	Mean	Std. Dev.	Min.	Max.	N
<i>PEBs</i>						
Self- transcendent	An integer variable reporting the total number of actions of an individual among reducing traveling, overpackaging, plastic reduction, waste-separation.	1.456	1.111	0	4	26958
Plastic bags reduction	A dummy variable equal to 1 if the individual reduced plastic bags usage in recent time, as well as in the past.	0.691	0.462	0	1	26958
Emission	An integer variable reporting the total number of actions of an individual undertake to reduce harmful emissions, such as changing heating system, replacing energy-intensive equipment, buying an electric vehicle, using public transportation/walking/cycling, buying low-emissions product.	1.008	0.992	0	6	26958
<i>Concerns</i>						
Climate change	A dummy variable equal to 1 if the individual declared to be concerned about climate change.	0.223	0.416	0	1	26958
Climate change (first)	A dummy variable equal to 1 if the individual declared climate change to be the first concern.	0.05	0.217	0	1	26570
Terrorism	A dummy variable equal to 1 if the individual declared terrorism to be the first concern.	0.543	0.498	0	1	26958
<i>Prosocial attitudes</i>						
Donation	A dummy variable equal to 1 if the individual declared to have made a donation to cultural heritage foundation (check).	0.078	0.268	0	1	26958
Voluntary work	A dummy variable equal to 1 if the individual declared to have made a voluntary work for a cultural heritage foundation (check).	0.062	0.241	0	1	26958
<i>Individual controls</i>						
Single	Dummy variable equal to 1 if the individual is single.	0.161	0.368	0	1	26958
Children	Dummy variable equal to 1 if the individual has children.	0.626	0.484	0	1	26958
Low education	Dummy variable equal to 1 if the individual stopped studying at 18 year.	0.475	0.499	0	1	26958
Female	Dummy variable equal to 1 if the individual is a female	0.552	0.497	0	1	26958
Age	Integer variable measuring the age of the individual.	51.725	18.233	15	99	26958
Difficulties payment	Categorical variable measuring whether the individual has difficulties in payment: 0 no difficulties, 1 some times, 2 most of times.	0.444	0.662	0	2	26958

Table A.3: PRODUCT OF COEFFICIENTS: SELF-TRANSCENDENT ACTIONS

System (1)	<i>Self-Transcendent</i> Eq(1.2)	<i>Climate Change</i> Eq(1.1)
Climate change	0.2285*** (0.019)	
Donation	0.3600*** (0.030)	0.0459*** (0.012)
Single	0.0008 (0.025)	0.0155 (0.010)
Children	-0.0002 (0.017)	0.0051 (0.007)
Low education	-0.2204*** (0.015)	-0.0350*** (0.006)
Female	0.1709*** (0.015)	0.0039 (0.006)
Age	0.0007 (0.000)	-0.0005*** (0.000)
Difficulties	-0.1624*** (0.011)	-0.0322*** (0.004)
Unemployed	-0.0284 (0.031)	-0.0047 (0.013)
Awareness	0.1008*** (0.010)	0.0079** (0.004)
Individual responsibility	0.2358*** (0.010)	0.0393*** (0.004)
Hope individualism	-0.1306*** (0.021)	-0.0397*** (0.008)
Env Tax ₂₀₁₂	-0.0542*** (0.005)	-0.0051** (0.002)
Victim ₂₀₁₂	-0.0004 (0.000)	-0.0009*** (0.000)
Log POP	-0.0491*** (0.009)	-0.0246*** (0.004)
Log GDP	0.2546*** (0.015)	0.0790*** (0.006)
Constant	-1.0327*** (0.230)	-0.2076** (0.094)
N	23639	23639

*p<0.10, ** p<0.05, ***p<0.01

Table A.4: PRODUCT OF COEFFICIENTS: EMISSION PEBS

System (1)	Emission PEBS Eq(1.2)	<i>Climate change</i> Eq(1.1)
Climate change	0.1517*** (0.017)	
Donation	0.5599*** (0.029)	0.0459*** (0.012)
Single	-0.1091*** (0.022)	0.0155 (0.010)
Children	0.1583*** (0.015)	0.0051 (0.007)
Low education	-0.1775*** (0.014)	-0.0350*** (0.006)
Female	-0.0099 (0.013)	0.0039 (0.006)
Age	-0.0030*** (0.000)	-0.0005*** (0.000)
Difficulties	-0.1034*** (0.010)	-0.0322*** (0.004)
Unemployed	-0.0356 (0.027)	-0.0047 (0.013)
Awareness	0.0937*** (0.009)	0.0079** (0.004)
Individual responsibility	0.1246*** (0.009)	0.0393*** (0.004)
Hope individualism	-0.0044 (0.019)	-0.0397*** (0.008)
Env Tax ₂₀₁₂	-0.0077 (0.005)	-0.0051** (0.002)
Victim ₂₀₁₂	-0.0017*** (0.000)	-0.0009*** (0.000)
Log POP	-0.0212** (0.009)	-0.0246*** (0.004)
Log GDP	0.1177*** (0.013)	0.0790*** (0.006)
Constant	-0.2571 (0.214)	-0.2076** (0.094)
N	23639	23639

Table A.5: PRODUCT OF COEFFICIENTS: PLASTIC BAGS REDUCTION

System (1)	<i>Plastic-bag reduction</i> Eq(1.2)	<i>Climate change</i> Eq(1.1)
Climate change	0.0266*** (0.007)	
Donation	0.0638*** (0.011)	0.0459*** (0.012)
Single	0.0067 (0.011)	0.0155 (0.010)
Children	0.0217*** (0.008)	0.0051 (0.007)
Low education	-0.0577*** (0.007)	-0.0350*** (0.006)
Female	0.0720*** (0.006)	0.0039 (0.006)
Age	0.0007*** (0.000)	-0.0005*** (0.000)
Difficulties	-0.0533*** (0.005)	-0.0322*** (0.004)
Unemployed	-0.0264* (0.015)	-0.0047 (0.013)
Awareness	0.0374*** (0.004)	0.0079** (0.004)
Individual responsibility	0.0892*** (0.005)	0.0393*** (0.004)
Hope individualism	-0.0349*** (0.009)	-0.0397*** (0.008)
Env Tax ₂₀₁₂	-0.0116*** (0.002)	-0.0051** (0.002)
Victim ₂₀₁₂	-0.0009*** (0.000)	-0.0009*** (0.000)
Log POP	0.0085** (0.004)	-0.0246*** (0.004)
Log GDP	0.0758*** (0.006)	0.0790*** (0.006)
Constant	-0.5000*** (0.100)	-0.2076** (0.094)
N	23639	23639

Table A.6: IV FIRST-STEP: CLIMATE CHANGE

	Eq(1.1)	
	First-stage	Second-stage
	Donation	Climate Change
Donation		2.5481*** (0.699)
Z	1.6189*** (0.382)	
Single	-0.0086 (0.006)	0.0359* (0.020)
Children	-0.0059 (0.004)	0.0183 (0.013)
Low education	-0.0320*** (0.004)	0.0460* (0.026)
Female	0.0026 (0.004)	-0.0019 (0.011)
Age	0.0007*** (0.000)	-0.0021*** (0.001)
Difficulties	-0.0132*** (0.003)	0.0020 (0.013)
Unemployed	-0.0074 (0.007)	0.0153 (0.022)
Awareness	0.0183*** (0.006)	-0.0854*** (0.022)
Individual responsibility	0.0098*** (0.002)	-0.0158 (0.010)
Hope individualism	0.0101*** (0.003)	0.0127 (0.011)
Env Tax ₂₀₁₂	0.0046*** (0.001)	-0.0172*** (0.005)
Victim ₂₀₁₂	0.0004* (0.000)	0.0007 (0.000)
Log POP	-0.0061** (0.002)	-0.0063 (0.009)
Log GDP	0.0112*** (0.004)	0.0438*** (0.015)
Constant	-0.1997*** (0.070)	-0.1387 (0.181)
F-test	17.92	
N	23639	23639

This 2SLS regression allows us to identify β_1^{IV} in eq (1.1). This first stage implies $T = \beta_M^z Z + \epsilon_T$, while the second stage $M = \beta_1 \hat{T} + \epsilon_M$. *p<0.10, ** p<0.05, ***p<0.01

Table A.7: IV SECOND STEP: EMISSION PEBs

	First-stage		Second-stage Eq (1.2)		Second stage - Eq (1.2)	
	Climate Change	Self-Transcendent PEBs	Emission PEBs	Plastic bags		
Climate change		0.1586 (0.358)	1.4644*** (0.381)	0.2659* (0.145)		
Donation	0.0434*** (0.012)	0.3632*** (0.034)	0.4997*** (0.038)	0.0528*** (0.013)		
Z	4.0549*** (0.592)					
Single	0.0144 (0.010)	0.0019 (0.026)	-0.1295*** (0.026)	0.0030 (0.011)		
Children	0.0034 (0.007)	0.0002 (0.017)	0.1515*** (0.018)	0.0204*** (0.008)		
Low education	-0.0343*** (0.006)	-0.2229*** (0.020)	-0.1315*** (0.021)	-0.0493*** (0.009)		
Female	0.0045 (0.006)	0.1712*** (0.015)	-0.0151 (0.016)	0.0710*** (0.006)		
Age	-0.0005*** (0.000)	0.0007 (0.000)	-0.0024*** (0.000)	0.0008*** (0.000)		
Difficulties	-0.0311*** (0.004)	-0.1647*** (0.016)	-0.0611*** (0.017)	-0.0456*** (0.007)		
Unemployed	-0.0032 (0.013)	-0.0287 (0.031)	-0.0294 (0.031)	-0.0253* (0.015)		
Awareness	-0.0396*** (0.008)	-0.1334*** (0.025)	0.0478* (0.027)	-0.0254** (0.011)		
Individual responsibility	0.0087** (0.004)	0.1013*** (0.010)	0.0834*** (0.011)	0.0355*** (0.004)		
Hope individualism	0.0381*** (0.004)	0.2385*** (0.018)	0.0729*** (0.019)	0.0798*** (0.007)		
Env Tax ₂₀₁₂	-0.0057*** (0.002)	-0.0545*** (0.005)	-0.0010 (0.006)	-0.0104*** (0.002)		
Victim ₂₀₁₂	0.0017*** (0.000)	-0.0004 (0.000)	-0.0005 (0.000)	-0.0007*** (0.000)		
Log POP	-0.0216*** (0.004)	-0.0508*** (0.013)	0.0111 (0.013)	0.0144*** (0.005)		
Log GDP	0.0718*** (0.006)	0.2601*** (0.032)	0.0140 (0.034)	0.0569*** (0.013)		
Constant	-0.6387*** (0.109)	-1.0472*** (0.244)	0.0154 (0.266)	-0.4504*** (0.107)		
F-test	46.84	23639	23639	23639		
N	23639	23639	23639	23639		

These 2SLS regressions allow us to identify γ_2^{IV} and β_2^{IV} in eq(1.2). The first stage is $M = \gamma_M^Z Z + \gamma_M^T T + \epsilon_T$ always identical for the different types of PEBs in the second stage, which is $Y = \gamma_2 M + \beta_2 T + \epsilon_y$.

*p<0.10, ** p<0.05, ***p<0.01

Table A.8: IV ROBUSTNESS CHECK: TERRORISM

	First step		Second step	
	First-stage <i>Donation</i>	Second-stage <i>Terrorism</i>	First-stage <i>Terrorism</i>	Second-stage <i>Self-Transcendent PEBs</i>
Donation		-1.4984*** (0.540)	-0.0721*** (0.013)	0.3500*** (0.055)
Terrorism				-0.2786 (0.637)
Z	1.6189*** (0.382)		-2.3089*** (0.688)	
Single	-0.0086 (0.006)	-0.0112 (0.016)	0.0010 (0.012)	0.0044 (0.025)
Children	-0.0059 (0.004)	0.0043 (0.011)	0.0128 (0.008)	0.0043 (0.019)
Low education	-0.0320*** (0.004)	-0.0124 (0.020)	0.0333*** (0.008)	-0.2191*** (0.026)
Female	0.0026 (0.004)	0.0436*** (0.009)	0.0399*** (0.007)	0.1831*** (0.029)
Age	0.0007*** (0.000)	0.0008* (0.000)	-0.0002 (0.000)	0.0006 (0.000)
Difficulties	-0.0132*** (0.003)	-0.0456*** (0.010)	-0.0268*** (0.006)	-0.1771*** (0.020)
Unemployed	-0.0074 (0.007)	-0.0014 (0.019)	0.0091 (0.016)	-0.0267 (0.032)
Awareness	0.0183*** (0.006)	-0.0035 (0.016)	-0.0295*** (0.010)	-0.1479*** (0.029)
Individual responsibility	0.0098*** (0.002)	0.0061 (0.008)	-0.0079* (0.005)	0.1005*** (0.011)
Hope individualism	0.0101*** (0.003)	0.0291*** (0.009)	0.0146*** (0.005)	0.2486*** (0.014)
Env Tax ₂₀₁₂	0.0046*** (0.001)	0.0135*** (0.004)	0.0069*** (0.002)	-0.0535*** (0.007)
Victim ₂₀₁₂	0.0004* (0.000)	-0.0022*** (0.000)	-0.0027*** (0.000)	-0.0009 (0.001)
Log POP	-0.0061** (0.002)	0.0040 (0.007)	0.0127*** (0.004)	-0.0507*** (0.013)
Log GDP	0.0112*** (0.004)	0.0094 (0.012)	-0.0066 (0.007)	0.2696*** (0.016)
Constant	-0.1997*** (0.070)	0.3928*** (0.143)	0.6775*** (0.133)	-0.9597*** (0.367)
F-test	17.92		11.21	
N	23639	23639	23639	23639

The first 2SLS regression (i.e. first-step) allow us to identify β_1^{IV} in eq (1.1). In this case, the first stage implies $T = \beta_M^z Z + \epsilon_T$, with *Prosocial* being the treatment T , while the second stage is $M = \beta_1 \hat{T} + \epsilon_M$ with M being the mediator. The second 2SLS regression (i.e. second-step) allow us to identify γ_2^{IV} and β_2^{IV} in eq(1.2). In this case, the first stage is $M = \gamma_M^z Z + \gamma_M^T T + \epsilon_T$ with *Terrorism* being the mediator M , while the second stage is $Y = \gamma_2 M + \beta_2 T + \epsilon_y$, with *Self-Transcendent PEBs* as outcome Y . * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Discussion Papers

Collana del Dipartimento di Economia e Management, Università di Pisa

Comitato scientifico:

Luciano Fanti - *Coordinatore responsabile*

Area Economica

Giuseppe Conti
Luciano Fanti
Davide Fiaschi
Paolo Scapparone

Area Aziendale

Mariacristina Bonti
Giuseppe D'Onza
Alessandro Gandolfo
Elisa Giuliani
Enrico Gonnella

Area Matematica e Statistica

Sara Biagini
Laura Carosi
Nicola Salvati

Email della redazione: lfanti@ec.unipi.it