Pro-environmental attitudes, local environmental conditions and recycling behavior

Pro-environmental attitudes, local environmental conditions and recycling behavior *

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Abstract

The paper uses Italian official survey data collected in 2012 from more than 20 thousand households to shed light on the determinants of people's pro- environmental behavior, more specifically the differentiation of domestic waste disposal. A rich interdisciplinary literature has developed to explain why people may make eco-friendly choices, which come at a personal cost and provide benefits accruing largely to other people. The paper contributes to this investigation by jointly considering non-economic (a declared general interest in environmental issues), economic (easy access to recycling bins) and contextual (the perceived condition of the local environment) determinants of recycling. The results show that a higher general interest in environmental issues is associated with an increase in recycling of 7.5 percentage points, while easy access to facilities is associated with an increase in recycling of 5.3 percentage points. More educated households are also more inclined to behave pro-environmentally: a university degree or a Ph.D. is associated with an increase in the probability of recycling of 5.2 percentage points. Finally, the paper provides evidence that locally perceiving environmental degradation is associated with a 5.8 percentage points decrease in the likelihood of recycling. This last result may be explained by bounded rationality and/or conditional social cooperation, which both may lead to an environmental poverty trap. The final message is that the evidence gathered is difficult to reconcile with the "homo oeconomicus" hypothesis still prevailing in standard economic theory and that non-economic determinants have to be properly considered in the formulation of effective environmental policies.

Keywords: Pro-Environmental Behavior, Intrinsic Motivation, Recycling, Environmental Degradation

JEL Codes: Q57, Q53, R11, D91

*We thank Editor Yutao Wang, Associate Editor Sandra Caeiro, and 5 anonymous reviewers for their precious comments. We are grateful to Angelo Antoci, Tommaso Reggiani, Fabio Sabatini, Francesco Scervini, and participants to the SIE Conference 2021 and the Young Economists Seminars Sapienza (YESS) for helpful comments and suggestions.

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1 Introduction

This paper studies one commonly observed form of environment-friendly behavior, i.e. separated domestic waste disposal (recycling). Recycling is individually costly, because messy and time-consuming, while the social gains from it, mainly a reduced use of landfills and incinerators, are hardly noticeable, so investigating the psychological motivations of recyclers has attracted a sizable literature (Ackerman, 2013). This work contributes to this literature by analyzing data from the Multipurpose Household Survey (MHS) collected in 2012 by the Italian National Statistics Office (ISTAT), with more than 60 thousand observations from more than 20 thousand households.

In Italy, Law Decree 22/1997, also known as the "Ronchi Decree" established specific incentives to reduce waste at source and promote separate collection and recycling of the municipal solid waste with respect to five main components (paper, glass, plastic, aluminum, and biodegradable waste). Waste disposal is managed at the municipal level according to national legislation, but methods and results differ widely from area to area. Recycling is legally compulsory for households, but complying with the rules remains largely a choice, as non-compliance is seldom sanctioned. Indeed, the urban separate waste collection was only 38% in 2012 even if it increased to 58% in 2018.[1]

Any agent who reduces the negative impact of the action on the biosphere creates a public good from which all other agents get benefits without bearing the cost. Agents pursuing only their self-interest, as generally assumed by mainstream economics, will then have an incentive to free-ride. Various approaches have been developed by psychologists, economists, and other social scientists to explain why individuals act in ways that are costly to them while their benefits flow to society as a whole. An important explanation hinges on the role of moral beliefs and values which provide pro-environmental behavior with intrinsic motivation (see Aprile and Fiorillo, 2019)[2]. Perceived social norms may also be an important conditioning factor for pro-environmental behavior, as people show a desire to comply with these norms. The behavior is also dependent on external incentives determining its opportunity cost. Indeed the convenience and affordability of recycling have been shown to have a sizable impact in increasing waste separation behavior (Fan et al., 2014; Miafodzyeva and Brandt, 2013; Schwab et al., 2014).

In this paper, the MHS data are used to contribute to the literature on the antecedents of pro-environmental behavior by providing evidence on the answers to the following questions. First, are intrinsic motivations a driver of pro-environmental behavior? Specifically, do respondents who express an interest for the environment recycle more? Second, what is the impact on domestic waste recycling of opportunity costs? Specifically, do respondents declaring easy access to recycling bins recycle more? Third, does education play any role in recycling decisions? Fourth, are the data consistent with the hypothesis that an easy access to containers strengthens the intrinsic motivations for recycling? Fifth, is there a correlation between recycling and perceived bad local

[1] These figures can be found at: https://www.catasto-rifiuti.isprambiente.it/index.php?pg=nazionein Following European directives, Italian legislation started in 1975 and has been subsequently progressively extended and modified. Most recently the law of 4 October 2019, n. 117 has been approved to enact the 2015 E.C. Circular Economy Package adopted by Member states on May 22, 2018.

[2] Aprile and Fiorillo (2019) differentiate environmental concerns into egoistic, altruistic and biospheric.

environmental conditions (polluted air, dirtiness on the streets, or a degraded environment), netting out the effect of recycling bins being difficult to reach? This netting out is implemented because it is plausible that perceived bad environmental conditions are associated with poor recycling facilities making it difficult to isolate the separate effect of the two determinants. Finally, the paper investigates the interaction between education and perceived bad local environmental conditions.

The MHS data provide answers to these questions as follows. First, a declared environmental interest is found to be associated with more recycling. This finding offers evidence in favor of a role for intrinsic motivations in determining recycling behavior. Second, the perceived easiness of access to containers, implying lower perceived opportunity costs, is also associated with a higher probability of recycling. This finding offers evidence in favor of a role for external constraints in determining recycling behavior. Third, a higher educational background correlates with pro-environmental behavior. Fourth, environmental concern is more strongly associated with recycling when recycling is more difficult. Fifth, the worse the conditions of the local environment people perceive the less they respect recycling rules. Last, the correlation between environmental degradation and recycling does not vary with the level of education. The subjective perception of bad environmental conditions is associated with the same results across all educational levels: a lower willingness to recycle.

We may think of two possible explanations for our finding that people perceiving bad environmental conditions recycle less. The first is that if people infer from the state of the environment itself what are the prevailing environmental social attitudes and norms and align their behavior to these norms, the more degraded the environment people experience the less they will feel compelled by social norms to behave pro-environmentally. An environmental poverty trap effect may also arise from "bounded rationality" phenomena. If a loss produces higher disutility than the utility yielded by a gain of the same size (Kahneman et al., 1991) people living in a well-preserved environment will be vividly aware of what they would lose if they do not behave in an eco-friendly way while people living in a degraded environment will not strive towards ecological restoration.

The aim of this assessment of the weight of intrinsic, extrinsic and local environmental factors in producing people's choices as regards the environment is to stimulate a more realistic approach to the formulation of effective environmental policies: well designed public action requires a good understanding of how people behave and make decisions.

The rest of the paper is organized as follows: the next section offers an overview of the related literature and against the background thus provided articulates the conceptual framework used, the third section describes the data used and the econometric model adopted, the fourth section presents and discusses the results, while the fifth section concludes.

2 Conceptual Framework

To clarify the theoretical background of the analysis the paper starts with a short survey of related works.

2.1 Literature Review

Influential psychological frameworks used for the analysis of pro-environmental behavior are the "Norm Activation Model" (NAM) (Schwartz, 1977), the "Theory of Reasoned Action" (TRA) (Fishbein and Ajzen, 1980), the "Theory of Planned Behavior"(TPB) (Ajzen et al., 1991) and the "Values-Beliefs-Norms Theory (VBN)" (Stern et al., 1999). According to NAM, a personal norm (i.e a subjective moral obligation) is activated when one is aware of the negative consequences of a certain behavior and takes responsibility for not behaving pro-socially. TRA suggests that a person's behavior is determined by the belief that the behavior will lead to an intended outcome (intention). This intention is, in turn, a function of attitudes toward the behavior itself and of subjective norms (Fishbein et al., 1975). TPB was proposed by Ajzen et al. (1991) to improve on the predictive power of TRA by including perceived behavioral control. VBN is a generalization of NAM to adapt it to environmentalism: the values behind norms need not be simply altruistic, as they are in NAM, while the awareness of adverse consequences of certain behavior and the related ascription of responsibility may concern any valued objects, not necessarily other people.

The literature on the antecedents of pro-environmental behavior often distinguishes between extrinsic and intrinsic motivations (Deci, 1971). Intrinsically motivated behaviors are self- rewarding, while extrinsically motivated behaviors are enacted to pursue an external reward.

There is evidence that individuals subscribing to values beyond their immediate own interests are more likely to engage in environmentally significant behavior, (see e.g. De Groot and Steg, 2008).[3] Individual motivations have been suggested to go from pure altruism to warm-glow altruism to ecocentrism (see e.g. De Young, 1996; Barr and Gilg, 2007; Thøgersen, 2008; Farrow et al., 2017). So, people may behave pro-environmentally because they care about the well-being of others as in Becker (1974). Andreoni (1990) defines warm-glow as the affect generated by a good action, such as giving to others, while for Brekke et al. (2003) socially responsible behaviour creates a positive self-image. Similarly, Halvorsen (2008) relates warm-glow to the respect for social and moral norms.

Pro-social behavior may depend on the behavior of others within a given group through reciprocity, reputational concerns, and social norms (Rabin, 1993; Fehr and Gächter, 2000; Bénabou and Tirole, 2006; Brekke et al., 2010). The theory of normative conduct (Cialdini et al., 1990) stresses that social norms can be descriptive or injunctive. Descriptive norms are those supposed to be generally respected (what people do) while injunctive norms are those generally approved (what people approve). People may infer their individual responsibility by looking at others' behavior(Nyborg et al., 2006). In fact, two possible channels of influence of social cues on norm compliance can be identified: the "informational" and the "focusing" channels.[4] The first is active when the appropriate behavior is learned by observing others. The second is active when a norm is

[3]For the relation between sociability and subjective well being see Becchetti et al. (2012), as well as the overview in Pelloni (2016). Recent works are Marujo and Neto (2017), Capecchi et al. (2018), Schmiedeberg and Schröder (2017), Pagan (2016), Rasciute et al. (2017) and Lardies-Bosque et al. (2015). Indeed, for the favourable environmental consequences of substituting "relational goods", i.e non-instrumental social relationship to market goods, as well as for the effects of city planning on the choice see Pullinger (2014) and Shao and Rodríguez-Labajos (2016).

[4] See (Cialdini et al., 1990) and (Krupka and Weber, 2009).

brought to the attention of an agent by the behavior of others. The "focusing" channel may have counterintuitive effects. For instance, observing anti-environmental behavior might lead to pro-environmental behavior, if it draws attention to environmental problems.

It is not always easy to say whether behaving according to reciprocity, social norms, and reputational concerns is intrinsically motivated or not. People may respect a social norm because it is in their private interest to do so (e.g. to show others they are good citizens) or because they intimately approve of the norm. And of course, both motivations may hold at the same time. It is worth stressing that social norms may stabilize an already established social equilibrium with good properties but are not enough for social change. This requires innovation in personal norms, which may start among pioneers and then spread across communities through contagion effects, see Reed et al. (2010).

In studying the association of the local environment conditions with recycling we will also use concepts from "prospect theory". This theory was proposed by the psychologists Tversky and Kahneman (Tversky and Kahneman, 1991) to explain the experimentally observed departures from the expected utility framework. Behavioral economics as a field has largely developed around this theory (Kahneman et al., 1991).[5] Prospect theory replaces the standard utility function over quantities of a good (e.g. wealth) with a value function v over gains and losses relative to a reference point. The value function is concave over gains and convex over losses and steeper for losses than gains -a property known as loss aversion. The status quo bias/endowment effect arises when the current state of affairs is perceived as a reference point. People typically require more compensation to give up a possession than they would have been willing to pay to obtain it in the first place (Tversky and Kahneman, 1991). These two effects are relevant for the inquiry on environmental attitudes because they suggest that people living in a well-preserved environment will be more willing to behave in an eco-friendly manner than people living in a degraded environment. In fact, the former will be motivated by fear of a loss, while the latter by the hope of a gain. More generally, the status quo bias may hinder the transition to a sustainable economy as it is painful for people to give up on entrenched habits, even when the objective calculations of costs and benefits of the current behavior would recommend doing so.

Specifically, related to this article are empirical studies on the motivations of domestic differentiated waste disposal. These form a large literature, from which an array of recent contributions from different countries/areas are singled out. The motivations may reflect national culture, legal and political institutions so that investigations conducted for different countries or different areas inside a country may add value. For a comprehensive survey see Knickmeyer (2020). Ferrara and Missios (2005), using data from Canada, show that socially-minded people recycle more. Berglund (2006) using data from Sweden finds that a higher "Green Moral Index" is associated with more willingness to recycle. Using Norwegian data Halvorsen (2008) finds that believing that recycling contributes to a better environment and considering oneself a responsible person are associated with more recycling. Viscusi et al. (2011) investigate the role of personal and social norms in affecting recycling in the US, finding that only personal

[5]For overviews on behavioral economics and environmental policies, see e.g. Venkatachalam (2008), Gsottbauer and Van den Bergh (2011) and Pasche (2016).

norms are effective.[6] Koford et al. (2012) using data from Kentucky find that monetary rewards were effective in inducing recycling while communication appeals (informative, guilt, and feel good inducing) much less so. Abbott et al. (2013), using English data find that social norms are positively associated with individual recycling, but find no evidence of warm-glow motivations. However, D'Amato et al. (2016), again using English data, show that interest in environmental issues are associated with more waste reduction and recycling. Arbues and Villanúa (2016) find that Spanish respondents' concern about the environment is a significant driver for recycling. Czajkowski et al. (2017) find the same for Poland. Tong et al. (2018) report on a recycling experiment in Beijing and stress the importance of social norms. Using data from, respectively, China and Singapore and from rural China Fan et al. (2019) and Shi et al. (2021) find that household waste sorting is simultaneously influenced by moral norms, by social norms and by external and contextual factors.

The empirical literature on the antecedents of domestic recycling in Italy, to which this paper specifically contributes, consists of just a few articles. Fiorillo (2013) using the 1998 wave of the MHS focuses on social capital and individual income as determinants of recycling, but also finds that environmental concern, entered as a control, attracts a significant positive coefficient. Aprile and Fiorillo (2019), using again the 1998 wave of the MHS, examines how respondents' ranking of the relative importance of environmental problems such as climate change, pollution, depletion of natural resources, and biodiversity loss correlates with recycling.[7] A third contribution is Gilli et al. (2018) that uses a proxy for intrinsic motivations built from answers to questions that go from being informed about environmental problems to buying goods with lower packaging or made with recycling materials. This proxy turns out not to be correlated with recycling among the respondents of the survey used. Fiorillo and Senatore (2020) find a positive relationship between pro-social behaviors, waste concern, and recycling behavior that is robust to the inclusion of social capital variables. Crociata et al., 2015 and Agovino et al., 2017 use the 2012 wave of the MHS also used in this paper to answer a different question e.g. what is the relationship between cultural consumption (e.g. buying newspapers and going to cinemas) and recycling behavior as well as purchase of organic food and find that these variables are positively associated. Finally, Massarutto et al. (2019) find a strong warm glow effect from recycling.

Finally Crociata et al. (2016) and Agovino et al. (2016) find evidence of strong spatial dependence between provinces in terms of separate waste collection rates which they interpret as an instance of institutional "behavioral contagion".

[6] In particular, respondents who would be upset if neighbors put recyclables in the garbage or consider self environmentalists recycle more while respondents who think neighbors would be upset if someone put recyclables in garbage do not recycle more.

[7] The idea is that some concerns (e.g. pollution) are more egoistical than other concerns (e.g. loss of biodiversity) and can therefore condition behavior differently. In a related study, Aprile and Fiorillo (2017) study how environmental concerns affect water conservation behavior. They find that different kinds of concerns might have contrasting effects. Specifically, pollution and resource exhaustion concerns are positively related to water conservation behavior while alteration of environmental heritage concerns exhibits a negative relationship with water-saving behavior.

2.2 Hypotheses development

To capture empirically the association between recycling and intrinsic motivations a good index for these motivations is needed. Cecere et al. (2014) use data for EU27 and do not find that the intrinsically motivated recycle more. They consider more intrinsically motivated those respondents that do not prefer to pay taxes to cover waste management based on the quantity generated. They write: "research should consider more explicit ways to closely measure intrinsic and extrinsic motivations, through focused surveys with questions aimed at measuring, for instance, the individuals' involvement in environmental issues (intrinsic motivations)." The MHS questionnaire asks participants about their interest in environmental issues, so offering a good proxy for environmental intrinsic motivations.

In fact, the evidence on the issue using Italian data is not univocal, as the findings in Gilli et al. (2018) contradict those in Fiorillo (2013) and Massarutto et al. (2019), as seen above. Based on these premises the first hypothesis to be tested is as follows:

> **H1.** *Environmental concerns positively correlate with domestic waste sorting behavior.*

Massarutto et al. (2019) stress that the literature on domestic recycling "has rarely led to a combined and systematic consideration of either economic or non-economic motivational perspectives in order to derive insights for policymaking."

The MHS data allow this joint consideration as respondents are asked about their easiness of access to recycling facilities. A good measure for an important component of the (perceived) opportunity cost of recycling is then available for extrinsic incentives. The second hypothesis of this study will therefore be:

> **H2.** *Low perceived opportunity costs are positively correlated with domestic waste sorting behavior.*

Social psychology indicate that agents' choices are deeply influenced by their socio-economic background (see e.g. Ajzen et al., 1991). It has been suggested that people from impoverished social groups will both perceive a more deteriorated environment and be under less societal pressure to behave pro-environmentally out of reciprocity so they will tend to recycle less (Chen and Hung, 2016; De Leeuw et al., 2015). While the MHS data do not contain rich information on respondents' income they do contain information about their educational attainment.[8] According to Ajibade and Boateng (2021) higher education, particularly holding a master's degree, predicts participation in pro-social behaviour in general and other studies have found a positive correlation between high school and recycling behaviour (Czajkowski et al., 2014; Padilla and Trujillo, 2018;Aprile and Fiorillo, 2019). Confirming this result would be interesting, as this could be interpreted as evidence of a positive externality from the investments in human capital accumulation, which is largely publicly funded in Italy as in all advanced countries. Indeed, forming good citizens is an important goal for public spending in the educational sector. A third hypothesis is:

[8]The data also provide information on employment conditions, house ownership and self-evaluation of the household economic condition. To check the robustness of results controls built from this information are included in the regressions reported in Tables A1 and A2.

H3. *Higher levels of education are associated with more recycling.*

Furthermore, how economic antecedents (e.g. opportunity costs) and non-economic antecedents (e.g. intrinsic motivations) interact in determining behavior is debated (Van Den Bergh, 2008). In some studies, economic and non-economic aspects are shown to provide additive motivations so that crowding-in effects emerge (e.g. Abbott et al., 2013; Cecere et al., 2014). Unlike other works, this paper uses a measure of intrinsic motivation based on 'the individuals' involvement in environmental issues'.[9] Heller and Vatn (2017) and Varotto and Spagnolli (2017) report evidence of a possible trade-off and of crowding-out effects, while Reijonen et al. (2021) find that the interaction between perceived behavioral costs and environmental concern is non-significant. To gather evidence on this issue a fourth hypothesis to be considered is:

H4. *Easier access to facilities may increase or decrease the impact of environmental interest on recycling.*

Do the perceived conditions of the environment people live in affect their recycling behavior? If the answer is positive, what kind of impact these contextual factors have?

As already hinted at, findings from behavioral economics indicate two different reasons why the impact can be negative. The first is the loss aversion/status quo bias hypothesis, which implies people will be more active in environmental preservation than in environmental improvement. Bimonte et al. (2020) report on an interesting online experiment with 181 participants in which people who are exposed to a flash image of a clean environment are more likely to pay for environmental protection than those who are exposed to a flash image of a degraded environment.

The second reason people may recycle less if they perceive to live in a degraded environment is the conditional cooperation hypothesis, according to which people are more likely to cooperate if they believe other people will. In fact, social norms are just devices for ensuring cooperation. People may infer from the state of the environment they live in what are the prevailing environmental social attitudes and norms and act accordingly. The fifth hypothesis is then:

H5. *Perceived environmental degradation is associated with recycling practices.*

To test **H5** both a full sample estimation and an estimation with sample selection are offered. The latter filters out people who cannot recycle due to external constraints so that only people who can freely choose whether or not to recycle are included in the sample. These are people who have "appropriate opportunities, facilities" and who are not "physically prevented from recycling" (Tonglet et al., 2004). This filtering allows to separate the effect on recycling of a poor recycling infrastructure from the effect of bad environmental conditions. This is important because the two regressors could be associated.

[9]Abbott et al. (2013) captures concern for the environment through the available area of green space per capita which is an objective measure that may not reflect personal attitudes towards the environment. Whereas Cecere et al. (2014) intrinsic motivation variable measures to what extent individuals prefer to pay taxes to cover waste management based on the quantity generated.

Finally, the paper studies how the association of environmental degradation with recycling behavior varies depending on respondents' education. A further hypothesis can then be tested:

> **H6**. *Education plays a role in the relationship between environmental degradation on recycling.*

Figure 1 illustrates the set of hypotheses.

[Figure 1 here]

3 Data and Empirical Strategy

3.1 Data

The data used in this study come from the Multipurpose Household Survey (MHS) collected by ISTAT (Italian National Statistics Office). The MHS is conducted every year and leads to a cross-sectional data set since every year different households are surveyed. This data set is widely used by researchers to study pro-environmental behavior in Italy (see e.g. Crociata et al., 2015; Agovino et al., 2017; Aprile and Fiorillo, 2017). The MHS consists of various questionnaires that survey roughly 20 thousand households from all Italian regions. All questions about the family's habits are answered by the family's head of household, while other questionnaires on personal behaviors or beliefs are filled out also by the family's other members (each member of the family has their own form). The data set is composed of about 40 thousand individuals. As recycling habits is the dependent variable and the related question was posed only to the heads of families, the final data set consists of 19266 observations. The data refers to the 2012 wave which includes several questions on environmental concern, participation in environmental groups, and recycling habits.

The dependent variable is the recycling habits of the household. In the survey, individuals are asked: *"Does your family have the habit of collecting the following wastes separately and then throwing them into their containers?"* Where wastes refer to paper, glass, plastic bottles, drugs, batteries, cans, food, others. People can answer: *"Yes, always; Yes, sometimes; Never"*. In Italy, the types of wastes to be disposed of separately can differ across municipalities. The measure of recycling habits is built by using the most commonly recycled type of wastes which are paper, food, plastic bottles and glass (ISPRA, 2014). Hence, the dependent variable is an ordinal variable ranging from 4 (for those who declare to recycle all the items always) to 0 (for those who declare to recycle sometimes, or never all the selected items).

Table 2 describes the independent variables used for this study. The first variable of interest captures a general concern for the environment. In the survey, individuals are asked to state "*how much they are interested in environmental issues on a scale from 1 - very interested- to 4 -not interested at all*". A variable equal to one if the respondent declares to be very interested or enough interested and zero otherwise was created from this question. Thanks to this question it is possible to capture intrinsic motivation in a direct way as advocated by Cecere et al. (2014).

The second variable of interest relates to access to recycling containers. Individuals are asked whether he/she "*has no difficulties in reaching the containers*". A variable equal to one if the respondent declares to have no difficulties (zero otherwise) was created from this question. Thanks to this question it is possible to capture the presence of external constraints for recycling.

Second, the paper considers variables that further help to investigate whether people act pro-environmentally when they believe they are living in poor environmental conditions. In the survey, people are asked if the area in which they live presents *"air pollution"* or *"dirtiness on the streets"*. People may answer *"a lot; enough; a little; none; I don't know"*. The variables of interest are two dummies. The first dummy takes value one if the respondent declares that she lives in an area in which there is "*a lot*" or "*enough*" air pollution and zero otherwise; the second dummy takes value equal to one if the respondent declares to live in an area in which there is *"a lot"* or *"enough"* dirtiness on the streets and zero otherwise. In addition to these two measures, the paper uses also an additional dichotomous variable for landscape degradation. In the survey, people are asked: "*According to you, is the landscape of the place where you live suffering from obvious degradation (dilapidated buildings, degraded environment, deteriorated landscape)?*" and people may answer either yes or no. The dichotomous variable will take value one if the response is "*yes*" and zero otherwise.

The additional variables included in the model are**:** three dummies to control for age -the benchmark being the youngest group 18-30-, three dummies to control for education -the benchmark being compulsory education- and a dummy variable to control for gender. Also included are Regional dummies in order to control for regional fixed effects. This seems important given the heterogeneity of local rules governing waste management in Italy.

[Table 1 and 2 here]

3.2 Econometric Model

The following equation is assumed to represent individual recycling behavior:

$$R^* = \delta_b D_b + \lambda_s X_s + \epsilon \tag{1}$$

where R^* is the latent variable measuring recycling behavior, D_b is a set of variables measuring access to containers, interest for environmental issues or perceived degradation, X_s is a set of control variables and ϵ is the error term. The baseline model does not include controls that might capture the effect of income or wealth on recycling behavior. To rule out spurious correlations possibly attributable to these omitted variables, as a robustness check, we additionally report findings from regressions when controls for the household's economic condition are entered, see Tables A1 and A2 in the online Appendix. The results are similar to those obtained using the baseline model.[10]

Since the actual measure of R^* is categorical, taking values $\{0, 1, 2, 3, 4\}$, the coefficients of the variables of interest are estimated using the following ordered probit model:

[10]We build these controls from the following information contained in the questionnaire: Respondent owns his/her home outright; Respondent is employed; How the respondent judges household economic situation in the last year.

$$\Pr(R = 0) = \Pr(\delta_b D_b + \lambda_s X_s \leq k_0),$$

$$\Pr(R = i) = \Pr(k_{i-1} < \delta_b D_b + \lambda_s X_s \leq k_i) \quad for \quad i = 1, 2, 3,$$

$$\Pr(R = 4) = \Pr(\delta_b D_b + \lambda_s X_s > k_3),$$

where $k_0, .., k_3$ are the cut points. The average marginal effects of the variables are estimated by calculating the marginal effect for every observation in the sample and then averaging over all observations.

As indicated in the previous section, it is interesting to check the association between perceived local degradation and recycling behavior both in the full sample and when external constraints are taken into account. In fact, it is plausible that those who do not have access to a well-functioning waste system will also perceive a higher level of degradation. If this is the case, the estimates may be biased since the measure of perceived degradation and the measure of access will move together. For this purpose, the paper employs a Heckman equation with a two-stage procedure (Wooldridge, 2010) and estimates an ordered probit model with sample selection (Baum, 2006). The computation is derived by Van de Ven and Van Praag (1981) whereas the rationale of this method is derived by Heckman (1979).

The dependent variable used in the first stage allows us to perform the sample selection. The dummy variable that measures the difficulties in reaching the containers is the first stage's dependent variable. This dependent variable is useful in overcoming any potential self-selection bias.

The independent variables of the selection equation are: a dummy variable on the respondent's health which takes a value equal to one if the respondent declares that she feels sick and zero otherwise[11]; a dummy variable taking a value equal to one if the respondent says that she lives in an apartment building; a set of dummy variables to measure the size of the family.

The first stage equation of the model is:

$$\Pr(Y_1 = 1|X_1) = \alpha + \gamma_1 X_1 + \varepsilon_1 \tag{2}$$

where Y_1 is the dummy for having no difficulties in reaching the containers described above and X_1 is the set of control variables of the selection equation.[12] Equation (1) is estimated only for those who can easily reach the containers, and equation (2) performs a sample selection by calculating the probability for an individual to reach the containers easily. Because multicollinearity is common in these models (Cameron and Trivedi, 2009), the paper implements a variance inflation factor (VIF) analysis among the regressors. In the baseline model, the VIF is around 2 and in all models always less than the threshold level 10 (30 for the conditional index).

[11] Unfortunately, there are no objective health measures in our data set.

[12] Please note that -unlike a standard Heckman Sample Selection model- our main equation does not include the Inverse Mills Ratio because we are using the model first presented by Van de Ven and Van Praag (1981), which is a binomial probit with sample selection. Our regressions are computed in a similar way to a bivariate ordered probit with partial observability (Baum, 2006).

As discussed in the previous section, both the ordered probit model and the ordered probit model with sample selection include some interacting effects. In the model used to test H4, for example, we have the interaction $(D_1 \times D_2)$ between the two dummy variables for environmental interest, D_1, and access to containers, D_2.

The marginal (or rather the incremental) effect in this non-linear model is computed as the change in $\Pr(R = i)$ due to a discrete change in D_1 for a given level of D_2:

$$\frac{\Delta \Pr[R = i \mid D_2]}{\Delta D_1} = [\Pr(R = i) \mid D_1 = 1,\, D_2] \; - [\Pr(R = i) \mid D_1 = 0,\, D_2] \tag{3}$$

where $\Delta \Pr(R = i)$ with $i = 0, .., 4$ denotes the change in the predicted probability of the recycling outcome $R = i$.

In non-linear models, the estimates of interactive effects cannot be calculated as in linear models (Ai and Norton, 2003; Karaca-Mandic et al., 2012). This is because the marginal effect of D_1 is not a constant, as would be in a linear model, but rather depends on the values of both D_1 and D_2 (and, more broadly, other covariates) via the non-linear function $\Pr(R = i)$.

Hence, in the ordered probit model used to test H4, the marginal effects of environmental interest are calculated for a given value of access to containers and then averaged across all the relevant observations in the sample to get the average marginal effects.[13] A formalization of our calculation is as follows:

$$\frac{\Delta \Pr[R = i \mid D_2 = \text{ access}]}{\Delta D_1} = [\Pr(R = i) \mid D_1 = \text{ interest},\, D_2 = \text{access}] - [\Pr(R = i) \mid D_1 = \text{ no interest},\, D_2 = \text{access}] \tag{4a}$$

$$\frac{\Delta \Pr[R = i \mid D_2 = \text{ no access}]}{\Delta D_1} = [\Pr(R = i) \mid D_1 = \text{ interest},\, D_2 = \text{ no access}] - [\Pr(R = i) \mid D_1 = \text{ no interest},\, D_2 = \text{ no access}] \tag{4b}$$

Similarly, the ordered probit model implied by H6 includes the interaction between perceived degradation and education, and the average marginal effect of perceived degradation is calculated at each level of education (compulsory, secondary, and tertiary education). For any given level of education, the outcome of this calculation shows the change in the probability of recycling when perceiving environmental degradation (with the base category being perceiving no degradation).[14]

[13] The interaction effects are computed in Stata after running the ordered probit models by using the post estimation command `margins D2, dydx(D1)`. The command computes the "derivative" (marginal effect) for each outcome of the dependent variable with respect to the variable `D1` at different values of the other variable `D2`. The computations follow Karaca-Mandic et al. (2012), which explicitly deals with the estimation of interaction effects in non-linear models. For maximum clarity, the interaction effects are also plotted in Figures A1-A3 in the online Appendix.

[14] To show the difference between interaction effects in the linear and non-linear model, we report estimates obtained with OLS in Table A3 in the Online Appendix. Results are not markedly different in terms of coefficients sign and are slightly different in terms of significance. However, OLS coefficients have a different magnitude. This bias is introduced by the ordinal nature of the dependent variable, which is neglected in the OLS estimates.

4 Results and discussion

This section presents the results obtained about the hypotheses described in subsection 2.2. Tables present all the results from the ordered probit model,[15] while the discussion focuses only on the results concerning the outcome "recycling all four items always".

The results displayed in Table 3 show that a declared interest in environmental issues is strongly associated with recycling and so is an easy access to recycling bins (low opportunity cost). In fact, being interested in environmental issues is associated with an increase in the probability of recycling of 7.5 percentage points while being able to reach the containers easily is associated with an increase in the probability of recycling of 5.3 percentage points. Hence, both **H1** and **H2** cannot be rejected.

[Table 3 here]

Findings on **H1** corroborate the existing evidence in favor of the hypothesis that pro-environmental behavior has an expressive and non-instrumental component, i.e. it is something one does following an intrinsic motivation and confirms the evidence by Fiorillo (2013). This is interesting because Fiorillo (2013) uses data from the 1998 wave of the MHS, i.e. from a period in which, in Italy, recycling was still a pioneers' practice for which intrinsic motivations were likely to be important. These motivations could be expected to lose importance subsequently, when recycling had become routine. However, there is evidence that this had not yet happened in 2012.

The only two other works that look at the effect of intrinsic motivations on domestic recycling in Italy, Gilli et al. (2018) and Massarutto et al. (2019), reach opposite conclusions, as only Massarutto et al. (2019) finds a positive effect. An important limitation of these studies is the limited size and therefore representativeness of the samples used. The sample in Gilli et al. (2018) is orders of magnitudes smaller than the MHS sample. The sample in Massarutto et al. (2019) is less than twice the size of the one in Gilli et al. (2018) and has the further disadvantage that the questionnaire was administered as a web survey so that participants are younger and considerably more educated than the average Italian citizen. The results for **H2** indicate that easy access to recycling bin is positively associated to individuals' recycling behavior: this adds to the evidence for Italy by Aprile and Fiorillo (2019) based on the 1998 wave of the MHS whose conclusion was that providing good recycling infrastructure is fundamental for any recycling policy. The results in this paper provide confirming evidence as regards recycling behavior in Italian families in 2012.

Coming to results on education **H3**, Table 3 shows that having a high-school diploma is associated with an increase in the probability of recycling of 3.3 percentage points, while having a university degree or a Ph.D. is associated with an increase in the probability of recycling of 5.2 percentage points. These results are consistent with the existing literature where education is generally found to be positively correlated with recycling (Jenkins et al., 2003; Ferrara and Missios, 2005; Aprile and Fiorillo, 2019; Czajkowski

[15] All the ordered probit models achieved convergence. Occasionally, ordered probit models may not converge or show unstable regression parameters across particular categories of the dependent variables (see e.g. Novotnỳ et al., 2018).

et al., 2014; Padilla and Trujillo, 2018).[16] This result is important from a policy and practical perspective because it suggests investments in higher education are also a way to promote a more sustainable lifestyle. This link between higher education and pro-environmental could potentially lead to more people trying to discover innovative solutions to global environmental problems (Ajibade and Boateng, 2021).

Results on the other socio-demographic controls entered are in line with those found in previous studies (Crociata et al., 2015; Fiorillo, 2013). In particular, age positively correlates with recycling habits. As pointed out by an OECD study (Ayalon et al., 2013), old people are usually more likely to recycle and they are usually also more respectful of social norms. The data indicate that being between the ages of 30 and 65 is associated with an increase in the probability of recycling of 2.5 percentage points, and that the increase is even higher (3.7 percentage points) for older people. The coefficient for gender is negative and significant. Because most Italian families were headed by men in 2012, the majority of the responders are men. The fact that families headed by women recycle less in the data considered may not indicate a genuine gender difference in environmental attitudes, but rather the more challenging conditions that at least a part of these families are likely to be experiencing.[17] It is worth noting that there's conflicting information in the literature about the impact of gender on environmental behavior (Kirakozian, 2016; Vicente-Molina et al., 2018).

[Table 4 here]

Table 4 shows results on the interaction between environmental interest and access to containers **H4**. As seen above being interested in environmental issues is associated with an increase in the probability of recycling always paper, bottles, food, and glass. This effect is slightly attenuated when people have no difficulty reaching the containers. Indeed, an interest in environmental issues, is associated with a 7.8 percent ($p < 0.01$) higher probability of recycling all items for those who have difficulties reaching the containers, but only with a 7.5 percent ($p < 0.01$) higher probability for those who do not have such difficulties.[18]

It can be concluded that findings related to **H4** are consistent with intrinsic motivations being a more powerful driver for recycling when people are confronted with objective obstacles than when they are not. A possible explanation is that the benefits in terms of moral satisfaction from performing a certain costly activity may go down with its cost. Previous studies, Abbott et al. (2013) and Cecere et al. (2014) found evidence of crowding-in. The difference with results reached here could be due to the different proxies, which were described earlier, used in these studies for intrinsic motivations.

[Table 5 here]

[16] Another interpretation of this result is that recycling is a normal good. If labor income is not properly controlled for, education can easily capture a spurious correlation between labor income and recycling habits. To account for this possibility, we show in Table A1 the results obtained from a regression including as controls employment condition, house ownership and and how the respondent judges household economic situation in the last year. Yet, we find an association between education and recycling habits very similar to the one in Table 3.

[17] In other words, these results might be driven by spurious correlations generated by the household composition in the data.

[18] Results on this regression can be also found in Figure A1 in the online Appendix.

Overall, results do not lead to reject **H5**. As Table 5 shows when people perceive environmental degradation, they are less likely to recycle: there is no evidence from the data used here that people react pro-actively to perceived environmental degradation even though environmental degradation is found empirically to have a negative and persistent impact on people's subjective well being (Menz, 2011; Ferrer-i Carbonell and Gowdy, 2007). These findings back up a small body of research that suggests that overall environmental behavior can be a response to environmental quality. Antoci (2009) and Antoci and Borghesi (2012) explore the possibility of environmental poverty traps or vicious circles by developing theoretical models in which people may consume more to self-protect from environmental degradation, so provoking even further degradation and trapping society in a non-Pareto-optimal equilibrium. Examples are air conditioning in reaction to global warming, or urban sprawl and increased fuel emissions from cars to avoid city center pollution. Cialdini et al. (1990) reports that the absence (presence) of litter makes further littering less (more) likely. The role of place in shaping pro-environmental behavior is also addressed in Uzzell et al. (2002) who consider a sample of 180 residents in two neighborhoods in England and find that respondents who have a greater sense of identification with their place of residence and perceive fewer local environmental problems have stronger environmental attitudes and are more supportive of sustainable environmental behaviors.[19]

To gauge the effects of local environmental conditions on recycling three different dummies have been employed. The first dummy is built from the question about "*perceived air quality*", the second from the question about "*perceived dirtiness on the streets*" and the third from the question about "*perceived degradation*". The descriptive statistics in Table 2 show that 31 percent of respondents perceive air pollution, 26 percent perceive dirtiness on the streets and 17 percent declare to live in a degraded environment. Almost 50 percent of respondents declare to perceive at least one of these problems in their local environment.

Regression results are shown in Table 5 both for the full sample (Panel A) and for the sample including only people with easy access to recycling bins (Panel B). Interestingly, the marginal effects of environmental degradation on recycling are slightly smaller after the correction. This suggests that inadequate recycling infrastructure may indeed be related to reported perceived degradation.

In the full sample, perceiving dirtiness in the streets is associated with a reduction in the probability of recycling of 3.8 percentage points, while living in a degraded environment is associated with a reduction in the probability of 5.8 percentage points. Finally, perceiving polluted air is associated with a reduction in the probability of recycling of 0.4 percentage points, but the effect is not statistically significant.

These findings suggest that environmental degradation may reduce recycling more when the perceived degradation is more closely related to recycling. Indeed, although perceived environmental degradation or dirtiness on the streets is negatively associated with recycling, the association with polluted air is not significant. This difference may

[19]In Uzzell et al. (2002) respondents' environmental attitudes and behaviors are explored through a wide range of questions ranging from the evaluation of water as a resource, knowledge of the life cycle of waste, ecological considerations in the purchase of products to respondents' sense of responsibility and involvement for the state and care of the common environment. The small sample size and the limited geographic coverage of the study by Uzzell et al. (2002) do not allow to generalize the results to the entire population and draw broad policy conclusions.

seem easier to explain if the link between the conditions of the environment and recycling arises from conditional cooperation than if it arises from loss aversion. In fact, air pollution may say little about the social norms governing the recycling habits of fellow citizens.

A comment is in order. This analysis uses measures of *perceived* dirtiness, landscape degradation, and pollution and therefore capture a subjective rather than an objective state of things. However, perceptions can obviously be crucial in determining behavior, even when they are not correct. For instance, it is known from experiments that choices may be influenced by so-called "framing effects".[20] People who look at the state of the environment with a negative framing could be less inclined to recycle, while those who look at the state of the environment with a positive framing may be more inclined to recycle.

Finally, it is possible that the causation arrow does not go from perceiving bad local environmental conditions to less recycling but in the opposite direction. It is painful to believe one thing while acting against this belief, as stressed by Festinger (1962) in his "A theory of cognitive dissonance". People will then tend to align perceptions with behavior. It is possible that some people not willing to pay the cost of recycling use their perception of environmental deterioration as a justification belief.

H6 is proposed to dig deeper into the relationship between perceived degradation and recycling behavior by investigating whether the (negative) negative association with perceived degradation differ across different levels of education.

[Table 6, 7 and 8 here]

Table 6 shows that the negative association between perceiving dirtiness on the streets or local degradation and recycling is a bit stronger at lower levels of education. Perceiving dirtiness on the streets, for example, is associated with a reduction in the probability of recycling of 3.9 percentage points for individuals with a low education level, and of 3.7 percentage points for those who have a tertiary level of education.

Table 7 reports results for degradation and pollution. The findings are similar to those in Table 6: perceiving degradation is negatively linked with recycling, and the effect is slightly attenuated by the education level. When an ordered probit with sample selection is used instead of a basic ordered probit, the same picture emerges. Finally, results concerning air pollution may be found in Table 8.[21] Again no association is observed between polluted air and recycling habits.

Overall, results related to **H6**, suggest that the the association of perceived environmental degradation with recycling varies little with one's social background. The main result is that, regardless of one's degree of education, perceived degradation is linked with a lower probability of recycling.

[20] Tversky and Kahneman (1981) describe how even phrasing affected participants' responses to a hypothetical life and death situation. Participants were asked to choose between two treatments for 600 people affected by a deadly disease. Treatment A was predicted to result in 400 deaths, whereas treatment B had a 33 percent chance that no one would die but a 66 percent chance that everyone would die. This choice was then presented to participants either with positive framing, i.e. saying how many people would live, or with negative framing, i.e. how many people would die. Treatment A was chosen by 72 percent of participants when it was presented with positive framing ("saves 200 lives") dropping to 22 percent when the same choice was presented with negative framing ("400 people will die").

[21] Results of these regressions are also reported in Figures A2 and A3 in the online Appendix.

5 Implications and conclusions

This paper contributes to the literature on the determinants of pro-environmental behavior by investigating people's recycling habits in Italy. First, it is found that a higher interest in environmental problems is associated with more recycling. This is interesting because previous works using italian data reported mixed findings on the role of intrinsic motivations. Second, results also suggest that pro-environmental behavior is opportunity-driven as we find that people with easier access to containers are more likely to recycle. Third, more educated people recycle more. This may be due to their being better informed about environmental problems, to their living in more spacious dwellings, in which domestic waste management is easier, or to their feeling more obligated towards the rest of society and therefore more willing to respect rules (see e.g. Gilli et al., 2018). A last important finding is that people who state that the area where they live suffers from dirtiness in the streets and/or a generally degraded environment tend to recycle less. This is important because this negative feedback may lead to environmental poverty traps. According to Prospect Theory people encode choices in terms of changes from a reference point. In the case at hand, the current condition of the environment could be the reference point. Moreover, Prospect Theory shows that a loss is more significant than the equivalent gain. This suggests that people will accept to bear the costs of behaving pro-environmentally if by doing so they feel they are preserving a clean environment, i.e. avoiding a loss in its quality. However, the same costs will be deemed too high if aimed at improving the conditions of a deteriorated environment. Another possible explanation for the feedback found is that the perception of environmental degradation hurts cooperation among individuals. A depleted environment signals non-cooperation in producing the public good environment' by fellow citizens and institutions. Indeed, the paper finds that people living in areas with air pollution do not recycle less. This suggests that the forms of environmental degradation more likely to lead to less recycling are those to which non-recyclers could be thought to be, at least in part, contributing.

Several important policy implications follow from these findings. Standard economic theory rests on the premise that individual behavior is mostly shaped by economic incentives. When the impact of this behavior produces a negative environmental externality, the policy recommendation is to use economic instruments (taxes or subsidies) to change the individual payoffs of alternative behaviors and realign private and social costs. Insights into behavioral motivations other than self-interest can cause traditional policy advice to be rethought. For example, the findings that environmental awareness leads to pro-environmental behavior show that informational campaigns on these issues/benefits may be helpful. A further advantage of these interventions is that they do not risk crowding out intrinsically motivated behavior, which is a concrete risk with financial incentives-based policies or law enforcement.

The analysis above recommends a two-pronged approach to policy-making aimed at improving differentiated waste disposal: on the one hand, authorities should remove barriers to recycling caused by a lack of sufficient infrastructure. These barriers, the MHS data show, were still a problem in 2012 for many respondents (Timlett and Williams, 2008).

At the same time campaigns aimed at raising environmental awareness could be

beneficial. The (non mutually exclusive) explanations described above for the finding that people perceiving bad local environmental conditions tend to recycle less suggest that such campaigns should have two desirable features. First, the current environmental conditions should not be represented in negative terms, as this could reinforce these bad conditions as a reference point for individual choices. Stressing and emphasizing what people stand to lose if they do not modify their behavior while presenting the current situation in a positive light, could be more effective. Moreover, promotional efforts should underline that many individuals are working to tackle environmental problems and that good practices are taking place in society so that conditional cooperators are not discouraged from doing their share.

The feedback uncovered in this paper between good environmental conditions and eco-conscious individual behavior leads to the prediction that public measures aimed at environmental improvements could be particularly effective as they could trigger positive spillovers through individual reactions. For instance, more and better provision of recycling infrastructure could induce more recycling not only by lowering its opportunity costs for some people but also because the initial environmental improvement so brought about could induce even people for whom the opportunity costs have not changed to recycle more.

Future research is needed to confirm the findings in this paper in several ways. Italy is today implementing in many areas a door-to-door separate garbage collection system as well as experimenting with monetary incentives to recycling. When the data become available it will be possible to have a closer look at the relative effectiveness of these measures in influencing households' pro-environmental behavior. Moreover, the empirical conclusions of the paper are limited by the cross-sectional nature of the data used. These data provide a snapshot of the relationships between individual behavior and its antecedents. However, behavior changes over time. Public measures and local environmental changes (reduced pollution, dirtiness, and degradation) may take long to elicit a pro-environmental response from the public. Unfortunately, it is not possible to pinpoint these long-term pathways using cross-sectional data.

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Figure 1: Conceptual framework

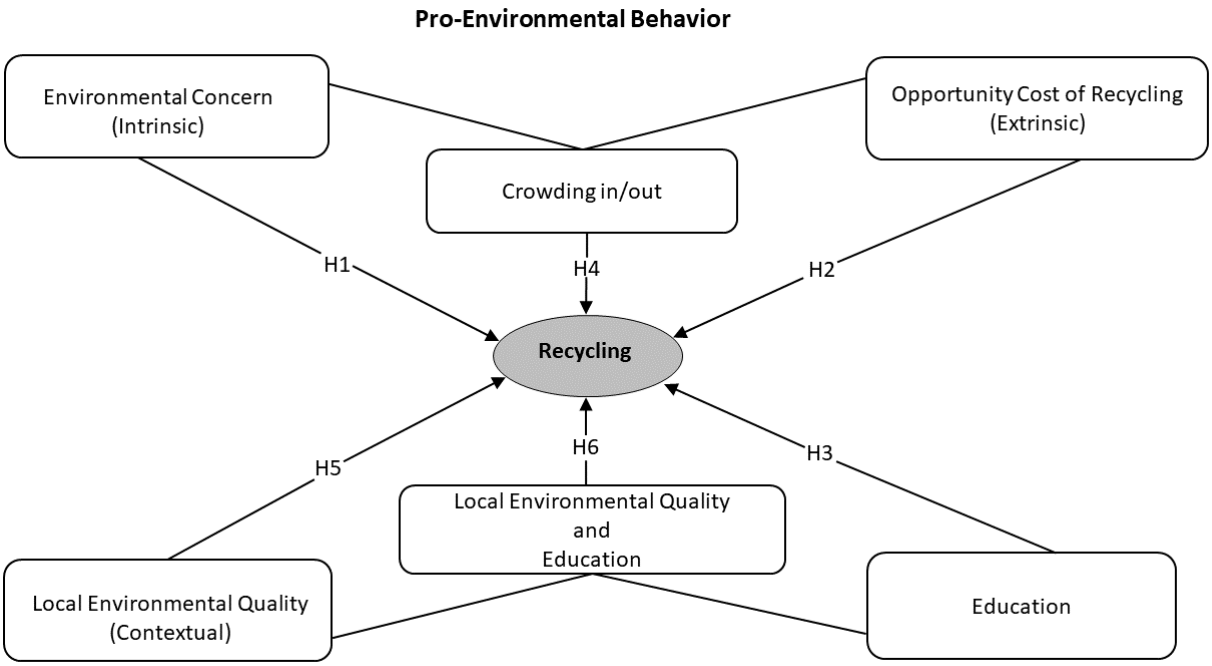

Table 1: Variable description

Variable	Description
Socio-demographics	
Age (18-29)	Dummy =1 if respondent is aged between 18 and 29; 0 otherwise
Age (30-65)	Dummy =1 if respondent is aged between 30 and 64; 0 otherwise
Age (≥ 65)	Dummy =1 if respondent is 65 or older; 0 otherwise
Compulsory Education	Dummy =1 if respondent has elementary education; 0 otherwise
Secondary Education	Dummy =1 if respondent has high-school education; 0 otherwise
Tertiary Education	Dummy =1 if respondent has graduate education; 0 otherwise
Female	Dummy =1 if respondent is female; 0 otherwise
Apartment	Dummy =1 if respondent lives in an apartment building; 0 otherwise
Access to Containers	Dummy =1 if respondent has no difficulties in reaching the containers; 0 otherwise
Recycling	Categorical, ranging from 0 (respondent recycles sometimes or never all items: paper, bottles, food, and glass); to 4 (respondent recycles always all items: paper, bottles, food, and glass)
Feel sick	Dummy =1 if respondent is not satisfied about her health status; 0 otherwise
Intrinsic Motivation	
Interest in Environmental Issues	Dummy =1 if respondent is very or enough interested in environmental issues; 0 otherwise
Local Environmental Conditions	
Polluted Air	Dummy =1 if respondent perceives to live in a polluted area; 0 otherwise
Degrade	Dummy =1 if respondent perceives local environmental degradation; 0 otherwise
Dirtiness	Dummy =1 if respondent perceives to live in a dirty area; 0 otherwise

Table 2: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Socio-demographics					
Age (18-30)	0.351	0.477	0	1	19266
Age (30-65)	0.188	0.390	0	1	19266
Age ($\geq$ 65)	0.462	0.499	0	1	19266
Compulsory Education	0.574	0.494	0	1	19266
Secondary Education	0.307	0.461	0	1	19266
Tertiary Education	0.119	0.324	0	1	19266
Female	0.328	0.469	0	1	19266
North Italy	0.439	0.496	0	1	19266
Central Italy	0.184	0.388	0	1	19266
South Italy	0.377	0.485	0	1	19266
Apartment	0.654	0.476	0	1	19266
Access to Containers	0.756	0.430	0	1	19266
Feel sick	0.054	0.226	0	1	19266
Recycling (Paper, bottles, food and glass)					
Less than 1 item Always	0.166	0.372	0	1	19266
At least 1 item Always	0.037	0.188	0	1	19266
At least 2 items Always	0.046	0.208	0	1	19266
At least 3 items Always	0.126	0.332	0	1	19266
All 4 items Always	0.626	0.484	0	1	19266
Interest in Environmental Issues					
Very or Enough interested	0.479	0.5	0	1	18960
Local Environmental Conditions					
Polluted Air	0.310	0.463	0	1	19266
Degradation	0.172	0.377	0	1	19266
Dirtiness	0.260	0.439	0	1	19266
Polluted Air or Degradation or Dirtiness	0.494	0.5	0	1	19266

Notes: The table shows the mean, standard deviation, minimum and maximum value of the variables used in the study. N is the number of observations.

Table 3: Opportunity and Environmental Interest

	(1) Less than 1 item Always	(2) At least 1 item Always	(3) At least 2 items Always	(4) At least 3 items Always	(5) All four items Always
Access to Containers	-0.035***	-0.005***	-0.005***	-0.009***	0.053***
	(-7.613)	(-7.398)	(-7.435)	(-7.589)	(7.653)
Interest in Env. Issues	-0.049***	-0.007***	-0.007***	-0.012***	0.075***
	(-12.308)	(-11.239)	(-11.586)	(-12.109)	(12.436)
Female	0.011***	0.002***	0.002***	0.003***	-0.017***
	(2.796)	(2.785)	(2.789)	(2.792)	(-2.798)
Secondary Education	-0.022***	-0.003***	-0.003***	-0.005***	0.033***
Base category=Compulsory Education	(-4.775)	(-4.622)	(-4.632)	(-4.608)	(4.739)
Tertiary Education	-0.033***	-0.005***	-0.005***	-0.009***	0.052***
	(-5.568)	(-5.192)	(-5.163)	(-5.036)	(5.426)
Age 30-64	-0.017***	-0.002***	-0.002***	-0.004***	0.025***
Base category=18-29	(-2.986)	(-2.938)	(-2.930)	(-2.909)	(2.970)
Age >=65	-0.024***	-0.003***	-0.003***	-0.006***	0.037***
	(-5.293)	(-5.260)	(-5.287)	(-5.358)	(5.328)
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: The table shows the results of an ordered probit. The dependent variable is an ordinal variable that ranges from 0 (if the respondents declare to recycle sometimes, or never all the selected items) to 4 (if the respondents declare to recycle always all the selected itmes). Each column reports the average marginal effects for a corrensponding outcome level. Standard errors are corrected for heteroskedasticity.
Pseudo R2 is 0.11
t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Crowding Out Hypothesis

	(1) Less than 1 item Always	(2) At least 1 item Always	(3) At least 2 items Always	(4) At least 3 items Always	(5) All four items Always
Interest in Env. Issues	-0.049***	-0.007***	-0.007***	-0.012***	0.075***
Base Category= No interest in Env. Issues	(-12.308)	(-11.239)	(-11.586)	(-12.109)	(12.436)
Access to Containers	-0.035***	-0.005***	-0.005***	-0.009***	0.053***
	(-7.613)	(-7.398)	(-7.435)	(-7.589)	(7.653)
Interest in Env. Issues when Access Containers= No	-0.054***	-0.007***	-0.007***	-0.010***	0.078***
	(-12.236)	(-10.892)	(-11.079)	(-10.831)	(12.299)
Interest in Env. Issues when Access Containers= Yes	-0.048***	-0.007***	-0.007***	-0.013***	0.075***
	(-12.322)	(-10.980)	(-11.263)	(-11.674)	(12.302)
Demographic Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: The table shows the results of an ordered probit. The dependent variable is an ordinal variable that ranges from 0 (if the respondents declare to recycle sometimes, or never all the selected items) to 4 (if the respondents declare to recycle always all the selected itmes). Each column reports the average marginal effects for a corrensponding outcome level. Demographic controls are age, gender and education. Results from this regression are also plotted in Figure A1. Standard errors are corrected for heteroskedasticity.
Pseudo R2 is 0.11
t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Perceived Degradation and Recycling

	(1) Less than 1 item Always	(2) At least 1 item Always	(3) At least 2 items Always	(4) At least 3 items Always	(5) All four items Always
Panel A: Ordered Probit					
Dirtiness	0.025***	0.003***	0.003***	0.006***	-0.038***
	(5.924)	(5.783)	(5.813)	(5.858)	(-5.928)
Degrade	0.038***	0.005***	0.005***	0.009***	-0.058***
	(7.715)	(7.471)	(7.496)	(7.597)	(-7.736)
Pollution	0.003	0.000	0.000	0.001	-0.004
	(5.295)	(5.166)	(5.205)	(5.267)	(-5.308)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B: Ordered Probit with Sample Selection					
Dirtiness	0.021***	0.004***	0.004***	0.008***	-0.036***
	(5.295)	(5.166)	(5.205)	(5.267)	(-5.308)
Degrade	0.028***	0.005***	0.005***	0.011***	-0.050***
	(6.159)	(6.002)	(6.043)	(6.144)	(-6.194)
Pollution	0.005	0.001	0.001	0.002	-0.008
	(1.243)	(1.240)	(1.239)	(1.239)	(-1.242)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: The table shows the results of an ordered probit in panel A and the results of an ordered probit with sample selection in panel B. First stage results are available upon request. The dependent variable is an ordinal variable that ranges from 0 (if the respondents declare to recycle sometimes, or never all the selected items) to 4 (if the respondents declare to recycle always all the selected itmes). Each column reports the average marginal effects for a corresponding outcome level. Controls are interest in environmental issues, age, gender and education. Standard errors are corrected for heteroskedasticity.
Pseudo R2 for ordered probit is always between 0.108 and 0.11
t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Perceived Dirtiness interacted with Education

	(1) Less than 1 item Always	(2) At least 1 item Always	(3) At least 2 items Always	(4) At least 3 items Always	(5) All four items Always
Panel A: Ordered Probit					
Dirtiness when Education= Compulsory	0.027***	0.003***	0.003***	0.006***	-0.039***
Base category= No Dirtiness	(5.784)	(5.783)	(5.863)	(6.047)	(-5.869)
Dirtiness when Education= Secondary	0.025***	0.003***	0.004***	0.006***	-0.038***
	(5.772)	(5.760)	(5.828)	(6.047)	(-5.858)
Dirtiness when Education= Tertiary	0.023***	0.003***	0.004***	0.007***	-0.037***
	(5.742)	(5.749)	(5.808)	(5.896)	(-5.850)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B: Ordered Probit with Sample Selection					
Dirtiness when Education= Compulsory	0.022***	0.004***	0.004***	0.008***	-0.038***
Base category= No Dirtiness	(5.152)	(5.122)	(5.194)	(5.341)	(-5.235)
Dirtiness when Education= Secondary	0.021***	0.004***	0.004***	0.008***	-0.036***
	(5.140)	(5.112)	(5.181)	(5.314)	(-5.228)
Dirtiness when Education= Tertiary	0.019***	0.004***	0.004***	0.009***	-0.035***
	(5.094)	(5.102)	(5.169)	(5.288)	(-5.214)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: The table shows the results of an ordered probit in panel A and the results of an ordered probit with sample selection in panel B. First stage results are available upon request. The dependent variable is an ordinal variable that ranges from 0 (if the respondents declare to recycle sometimes, or never all the selected items) to 4 (if the respondents declare to recycle always all the selected itmes). Each column reports the average marginal effects for a corrensponding outcome level. Controls are interest in environmental issues, age, gender and education. Results from this regression are also plotted in Figures A2 and A4. Standard errors are corrected for heteroskedasticity.
Pseudo R2 is 0.11
t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Perceived Degradation interacted with Education

	(1) Less than 1 item Always	(2) At least 1 item Always	(3) At least 2 items Always	(4) At least 3 items Always	(5) All four items Always
Panel A: Ordered Probit					
Degradation when Education= Compulsory	0.042***	0.005***	0.005***	0.008***	-0.060***
Base category= No Degradation	(7.366)	(7.539)	(7.707)	(8.246)	(-7.609)
Degradation when Education= Secondary	0.038***	0.005***	0.005***	0.009***	-0.058***
	(7.332)	(7.465)	(7.602)	(7.987)	(-7.578)
Degradation when Education= Tertiary	0.036***	0.005***	0.006***	0.010***	-0.057***
	(7.252)	(7.433)	(7.551)	(7.814)	(-7.552)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B: Ordered Probit with Sample Selection					
Degradation when Education= Compulsory	0.031***	0.005***	0.005***	0.010***	-0.052***
Base category= No Degradation	(5.859)	(5.922)	(6.032)	(6.386)	(-6.057)
Degradation when Education= Secondary	0.029***	0.005***	0.005***	0.011***	-0.050***
	(5.844)	(5.922)	(6.032)	(6.308)	(-6.044)
Degradation when Education= Tertiary	0.027***	0.005***	0.005***	0.012***	-0.049***
	(5.777)	(5.896)	(6.001)	(6.241)	(-6.017)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: The table shows the results of an ordered probit in panel A and the results of an ordered probit with sample selection in panel B. First stage results are available upon request. The dependent variable is an ordinal variable that ranges from 0 (if the respondents declare to recycle sometimes, or never all the selected items) to 4 (if the respondents declare to recycle always all the selected itmes). Each column reports the average marginal effects for a corrensponding outcome level. Controls are interest in environmental issues, age, gender and education. Results from this regression are also plotted in Figures A2 and A4. Standard errors are corrected for heteroskedasticity.
Pseudo R2 is 0.11
t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Perceived Pollution interacted with Education

	(1) Less than 1 item Always	(2) At least 1 item Always	(3) At least 2 items Always	(4) At least 3 items Always	(5) All four items Always
Panel A: Ordered Probit					
Pollution when Education= Compulsory	0.003	0.000	0.000	0.001	-0.004
Base category= No Pollution	(0.645)	(0.647)	(0.647)	(0.649)	(-0.646)
Pollution when Education= Secondary	0.003	0.000	0.000	0.001	-0.004
	(0.645)	(0.647)	(0.647)	(0.648)	(-0.646)
Pollution when Education= Tertiary	0.002	0.000	0.000	0.001	-0.004
	(0.646)	(0.647)	(0.647)	(0.647)	(-0.646)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B: Ordered Probit with Sample Selection					
Pollution when Education= Compulsory	0.005	0.001	0.001	0.002	-0.008
Base category= No Pollution	(1.236)	(1.240)	(1.241)	(1.245)	(-1.240)
Pollution when Education= Secondary	0.005	0.001	0.001	0.002	-0.008
	(1.236)	(1.240)	(1.241)	(1.244)	(-1.240)
Pollution when Education= Tertiary	0.004	0.001	0.001	0.002	-0.008
	(1.236)	(1.240)	(1.240)	(1.243)	(-1.240)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes

Notes: The table shows the results of an ordered probit in panel A and the results of an ordered probit with sample selection in panel B. First stage results are available upon request. The dependent variable is an ordinal variable that ranges from 0 (if the respondents declare to recycle sometimes, or never all the selected items) to 4 (if the respondents declare to recycle always all the selected itmes). Each column reports the average marginal effects for a corrensponding outcome level. Controls are interest in environmental issues, age, gender and education. Results from this regression are also plotted in Figures A2 and A4. Standard errors are corrected for heteroskedasticity.
Pseudo R2 is 0.11
t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$