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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. Main results are that a higher general interest in environmental issues pushes people, on average, to increase recycling by 7.5 percentage points, while easy access to facilities increases recycling by 5.3 percentage points. More educated households are also more inclined to behave pro-environmentally: a university degree or a Ph.D. increases the probability of recycling by 5.2 percentage points. Finally, the paper provides evidence that people locally perceiving environmental degradation are 5.8 percentage points less likely to recycle. These results may be explained by bounded rationality and/or to conditional social cooperation, which both may lead to an environmental poverty trap. The final message is that the evidence so gathered on the role of intrinsic motivations, bounded rationality and social preferences in governing behavior is difficult to reconcile with the "homo oeconomicus" hypothesis still prevailing in standard economic theory and that these "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

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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 analysing 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, called the “Ronchi Decree” established specific incentives to reduce waste at source and promote separate collection and recycling of municipal solid waste with respect to five main components (paper, glass, plastic, aluminium and biodegradable waste). Waste disposal is managed at the municipal level in accordance with national legislation, but methods and results differs widely from area to area. Recycling is legally compulsory for households, but to comply with the rules remains to a large extent a choice, as non compliance is seldom sanctioned. Indeed, urban separate waste collection was only 38% in 2012 even if it increased to 58% in 2018.¹

Any agent who reduces the negative human impact 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 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 which are costly to them while their benefits flow to society as a whole. As will be seen in greater detail later, a transversal theme across the various approaches proposed to offer an explanation of pro-environmental behavior is the role of social norms and of moral and cultural values as antecedents of such behavior even if it also depends on external constraints determining its opportunity cost. Indeed the convenience and affordability of recycling have been shown to be important elements in increasing waste separation behaviour (Fan et al., 2014; Miafodzyeva and Brandt, 2013; Schwab et al., 2014).

The conventional view in economics is that individual maximize their welfare, given constraints and given fixed exogenous preferences. However, this fixity and exogeneity are clearly counterfactual: just think about the influence in shaping preferences of education, acknowledged by utilitarian philosophers since the nineteenth century, and about the enormous marketing and advertising expenses by firms, which would be inexplicable if consumers’ tastes were unmodifiable. Indeed, there is now a growing body of literature arguing that preferences are endogenous and influenced by contextual factors (see among many others Bowles, 2016). In this paper it is shown that the conditions of the environment in which people live are an important driver of their recycling behavior and this creates the possibility of an environmental poverty trap. Indeed, if people infer from the state of the environment itself what are the prevailing environmental social

¹These 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. An important step has been the so called Ronchi’s decree(D.Lgs. 5 february) 1997. 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.

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. Another influence of environmental conditions on environmental behavior may arise from “bounded rationality” effects studied by behavioral economists, implying that a loss produces higher disutility than the utility yielded by a gain of the same size (Kahneman et al., 1991). If this is the case, 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.

In this paper, the MHS data are used to contribute to the literature on the antecedents of pro-environmental behavior by providing answers to the following questions. First, what is the impact on domestic waste recycling of pro-environmental attitudes? Do respondents who express a concern for the environment recycle more? Second, what is the impact on domestic waste recycling of opportunity costs? Do respondents declaring easy access to recycling bins recycle more? Third, does education play any role in recycling decisions? Fourth, does an easy access to containers strengthen or weaken the inner motivation for recycling? Fifth, what is the impact on recycling of perceived bad local 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 possible and indeed likely that perceived bad environmental conditions are associated with poor provision of 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 answers that the MHS data provide to these questions are as follows. First, being eco-conscious is found to be associated with more recycling. This finding offers evidence in favor of a role for inner not egoistic motivations in determining pro-environmental behavior. Second, the perceived easiness of access to containers, implying lower perceived opportunity costs, also increases the probability of recycling. Third, more educated households are more inclined to behave pro-environmentally. Fourth, intrinsic motivation is more successful as a driver for recycling when people are confronted with external limitations than when they are not. Fifth, the worse the conditions of the local environment people perceive the less they respect recycling rules, thus further worsening the situation. Last, the effect of environmental degradation on recycling does not vary with the level of education. A subjective perception of bad environmental conditions produces the same results across all educational levels: a lower willingness to recycle.

The aim of this assessment of the weight of economic, non-economic and external 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

The aim of this paper is to show how different sets of motivations determine the choices of people as regards recycling. To clarify the theoretical background of the analysis the paper starts with a short survey of related works, focussing in particular on the insights that behavioral economics has to offer on pro-environmental behavior.

2.1 Literature Review

Influential psychological frameworks used for the analysis of pro-environmental behavior are the “Norm Activation Model” (Schwartz, 1977), the “Theory of Reasoned Action” (Fishbein and Ajzen, 1980), the “Theory of Planned Behavior” (Ajzen et al., 1991) and the “Values-Beliefs-Norms Theory (VBN)” (Stern et al., 1999). According to the Norm Activation Model or Theory (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. The Theory of Reasoned Action (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). The Theory of Planned Behavior was proposed by Ajzen et al. (1991) to improve on the predictive power of the TRA by including perceived behavioral control. The Value-Belief-Norm Theory 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 a certain behavior and the related ascription of responsibility may concern any valued objects, not necessarily other people.

Insights on individual choices relevant for the environment also come from the work of behavioral economists who aim to integrate into economic analysis psychological results from the laboratory or from natural and field experiments, as opposed to the approach of a pure self-interested fully rational agent, postulated in standard economic models.²

The evidence gathered by behavioral economists shows that individuals deviate from the “homo oeconomicus” paradigm in two main directions. First, people are not fully but rather “boundedly” rational. Second their choices are not always purely selfish and in many instances can be in fact only explained by other-regarding preferences.

As regards the first direction, experiments show the relevance of departures from the expected utility framework such as “loss aversion” and “status quo bias”, two key concepts from Prospect Theory (Kahneman et al., 1991). 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, with $v(0) = 0$. 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

²For overviews on behavioral economics and environmental policies, see e.g. Venkatachalam (2008), Gsottbauer and Van den Bergh (2011) and Pasche (2016).

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 hope of a gain. These effects 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 to do so.

As regards the second direction, there is ample evidence of behavior not motivated exclusively by self-interest but better explained by sociability, altruism, reciprocity, identity seeking etc.³ Strategies chosen in experimental games, such as the dictator, ultimatum and public good games, are difficult to reconcile with preferences driven exclusively by self-interest, see for instance Kahneman and Knetsch (1992), who maintain that contributing to a public good is a “purchase of moral satisfaction”.

There is evidence that individuals subscribing to values beyond their immediate own interests, that is prosocial or biospheric values, are more likely to engage in environmentally significant behaviour (see e.g. De Groot and Steg, 2008). Individual motivations in choosing such behavior 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 behaviour may depend on the behaviour of others within a given group through reciprocity, reputational concerns and social norms (Rabin, 1993; Fehr and Gächter, 2000; Bénabou and Tirole, 2006). 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). 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 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 behaviour, if it draws attention to environmental problems.

The literature on the antecedents of pro-environmental behavior often distinguishes between extrinsic and intrinsic concerns (Deci, 1971). Intrinsically motivated behaviors are self-rewarding, while extrinsically motivated behaviors are enacted to pursue an external reward. Pure altruism or the ‘warm glow’ effect can be classified as intrinsic motivations, while any behavior caused by external benefits, whether monetary or social is driven by extrinsic motivations. It is not always easy to say whether behaving accord-

³For 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).

ing 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 believe they intimately approve of the norm, so that respecting the norm creates a warm glow benefit and fosters their sense of identity. 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. Social change requires an innovation in personal norms, which may start among pioneers and then spread across communities through contagion effects. Indeed, the literature on social learning proposes that new behaviors can be acquired by observing and imitating others. Social interactions may then lead to sustainable behavior by restructuring individual identities and institutions towards more ecological robustness, see Reed et al. (2010).

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 in fact 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 a data set from Canada, show that socially minded people recycle more. Berglund (2006) looking at data from a municipality in northern Sweden finds a higher willingness to pay to avoid recycling in people with lower “Green Moral Index” Using Norwegian survey data Halvorsen (2008) finds that believing that recycling contributes to a better environment, considering oneself a responsible person, wanting others to do the same as well as following the golden rule are all associated with more recycling. Viscusi et al. (2011) empirically investigate the role of personal and social norms in affecting recycling of plastic water bottles in the US, finding only personal norm are effective.⁵ Koford et al. (2012) reports on the results of giving households in Lexington, Kentucky, monetary rewards or communication appeals (informative, guilt, and feel good inducing appeals) to recycle. The \$1 monetary incentive had the greatest impact on household recycling, while the monetary incentives interacted negatively with communication appeals. The communication appeals by themselves had little impact overall. Abbott et al. (2013), using English local authorities data find that social norms (proxied by the mean recycling volume of a reference group of local authorities) are positively associated with individual recycling, but find no evidence of warm-glow motivations, which should not lead to a proportional decrease in time spent recycling when kerbside quality goes up. 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 to prefer to pay taxes to cover waste management based on the quantity generated. D’Amato et al. (2016), again using English data, show that giving a positive answer to questions about knowledge and interest in climate change and the environment is associated with more waste reduction and recycling. Arbues and Villanúa (2016) find that Spanish respondents’ concern about the environment is a significant factor influencing the recycling of batteries.

⁵In particular respondents who would be upset if neighbours 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.

Tong et al. (2018) report on a recycling experiment in a residential community 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) uses the 1998 wave of the MHS and focuses on social capital and on individual income as determinants of recycling, whereas environmental concern, entered as a control attracts a significant positive coefficient. Aprile and Fiorillo (2019), again using the 1998 wave of the MHS, looks at how the ranking in terms of relative importance by respondents of climate change, pollution, depletion of natural resources, and loss of biodiversity among the environmental problems correlates with recycling.⁶ 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. 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) estimate a sizable mean willingness to pay, which the paper attributes to a warm glow effect, to achieve a high recycling performance (77 euros a year per family), although with a large variance across agents.

Also related to the analysis in this paper are works on the possibility of environmental poverty traps or vicious circles. Antoci (2009) and Antoci and Borghesi (2012) develop theoretical models in which people may consume more to self-protect from environmental degradation, provoking further degradation and trapping society in a non-Pareto-optimal equilibrium. Examples are air conditioning in reaction to global warming, or to urban sprawl and increased fuel emissions to avoid urban pollution. In analogous fashion, people perceiving degradation, e.g. dirtiness in the streets, might be induced to view their own efforts at recycling as hopeless. Crociata et al. (2016) and Agovino et al. (2016) find evidence of strong spatial dependence between provinces in terms of separate waste collection rates and they interpret this an instance of institutional “behavioral contagion”.

2.2 Hypotheses development

The evidence from an increasing number of studies conducted by a wide spectrum of methodological and scientific perspectives shows that non monetary motivations, personal values and beliefs as well as peer effects are an important determinant behavior.

⁶The idea is that some concerns (e.g. pollution) are more egoistical than other concerns (e.g. loss of biodiversity) and can therefore condition behavior in a different way. 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 exhibit a negative relationship with water saving behavior.

Specifically, individuals holding prosocial or biospheric values, are more likely to engage in environmentally significant behaviour, as acting in line with those values may give rise to warm glow/positive self image effects. To capture this association empirically a good index for these values is needed. Cecere et al. (2014) writes: “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 and membership in environmental associations, so offering a good proxy of non economic motivational perspectives. In this paper this proxy is used to study the impact of these perspectives on recycling.

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 affect 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. The second hypothesis of this study will therefore be:

H2. *Low perceived opportunity costs lead to more 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). While the MHS data do not contain direct information on respondents’ income it does contain information about their educational attainment. Finding a positive effect 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:

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

Furthermore, the ways in which economic antecedents (e.g. opportunity costs) and non-economic antecedents (e.g. intrinsic motivations) interact in determining behavior are debated (Van Den Bergh, 2008). In some studies economic and non-economic aspects provide additive motivations and of crowding-in effects (e.g. Abbott et al., 2013; Cecere et al., 2014). Unlike them⁷ this paper uses a measure of intrinsic motivation based on

⁷Abbott 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.

‘the individuals’ involvement in environmental issues’ as seen above. Other studies, for instance 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 behavioural 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 they 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 do. In fact, social norms are devices for ensuring the conditions for 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 affects 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 i.e. 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.

Finally, the paper studies how the impact of environmental degradation on recycling behavior varies depending on respondents’ education. 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). As said above the only available proxy for the socio-economic conditions of respondents in the MHS data is education. A further hypothesis can then be tested:

H6. *Education plays a role in the impact of 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 in order 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 about 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, p. 923).

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 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 interests 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. The dataset also included regional dummies in order to control for regional fixed effects given the heterogeneity of local rules governing waste management in Italy.

[Table 1 and 2 here]

3.2 Econometric Model

The following equation estimates individual recycling behavior:

$$R^* = \delta_b D_b + \lambda_s X_s + \epsilon \quad (1)$$

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. Since the actual measure of R^* is categorical the following ordered probit gives an estimate of the coefficients of the variables of interest.

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

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

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

where k_0, \dots, k_3 are the cut points. The average marginal effects of the model variables are estimated by calculating a marginal effect for every observation in the sample and then averaging these effects.

Furthermore, as indicated in the hypotheses testing, it is interesting to know how perceived degradation affects recycling behavior both in the full sample and when external constraints are taken into account. There is a measure of perceived degradation in the data. However, it is plausible that those who **do not** have access to a well-functioning waste system will perceive a higher level of degradation. If this is the case, the estimates may be biased since they would include the spurious measure of access to facilities in the measure of perceived degradation. 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. Recycling was introduced in Italy by the Ronchi decree in 1997 and assuming that the availability of containers is a good proxy for the quality of waste management services provided by the municipalities, it therefore allows us to get the true estimate of the effect of perceived degradation on recycling practices.

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 otherwise⁸; 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:

$$\Pr(Y_1 = 1|X_1) = \alpha + \gamma_1 X_1 + \varepsilon_1 \quad (2)$$

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.⁹ 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 this case, the VIF is always less than 10 and the conditional index is lower than 30.

As discussed in the previous section, both the ordered probit model and the ordered probit model with sample selection account for some interacting effects. The model implied by H4 embeds the interaction term ($D_1 \times D_2$) between the two discrete variables for environmental interest, D_1 , and access to containers, D_2 . The marginal effect of a discrete change in D_1 at each value of D_2 is:

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

where $\Delta \Pr(R=i)$ with $i = 0, \dots, 4$ denotes the change in the predicted probability of outcome $R=i$ when the binary variable D_1 takes values 0 and 1. When dealing with non linear models, the interactive effects cannot be calculated as in linear models (Ai and Norton, 2003) since as shown in (3) the marginal effect of D_1 is not a constant, but rather depends on the values of both D_1 and D_2 (and, more broadly, other covariates) via the nonlinear function $\Pr(R=i)$.

As a result, the average marginal effects of the variable of interest, D_1 , must be estimated at each level of the interacted variable, D_2 , and in general taking into consideration the specificity of the models. Therefore, in the ordered probit model implied by H4, the average marginal effects of environmental interest (D_1 takes values 0 and 1) are calculated at each value of access to containers ($D_2 =$ access and no access). Similarly, the ordered probit model implied by H6 embeds the interaction between perceived

⁸Unfortunately, there are no objective health measures in our data set.

⁹Please 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).

degradation and education and the average marginal effect of perceived degradation (D_1 takes values 0 and 1) are calculated at each level of education ($D_2 =$ compulsory, secondary and tertiary education). The result of this calculation shows the change in the probability of recycling when perceiving environmental degradation and having compulsory, secondary or tertiary education.¹⁰

4 Results and discussion

This section presents the results obtained on the hypotheses that have been described in subsection 2.2. Tables present all the results from the ordered probit model,¹¹ 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 a strong driver of recycling and that the opportunity cost of recycling also matters. In fact, being interested in environmental issues increases the probability of recycling by 7.5 percentage points ($p < 0.01$) while being able to reach the containers easily increases the probability of recycling by 5.3 percentage points. Hence, both **H1** and **H2** cannot be rejected.

[Table 3 here]

Finding (**H1**) that environmental awareness leads to more recycling corroborates 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 loose importance subsequently, when recycling had become routine. However this had not yet happened in 2012 when, as shown, intrinsic motivations were still important.

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 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 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 from (**H2**) indicate that the convenience of available recycling infrastructure positively influences individuals’ recycling behaviour: this adds

¹⁰The interaction effects are computed in Stata after running the ordered probit models by using the post estimation command `margins D1, dydx(D2)`. The command computes the derivative (marginal effect) for each outcome of the dependent variable with respect to the variable D2 at different values of the other variable D1.

¹¹All 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. Novotný et al., 2018).

to the evidence for Italy by Aprile and Fiorillo (2019) based on the 1998 wave of the MHS where they found that recycling infrastructure are fundamental parts of any recycling policy. The results provided in this paper confirm that extrinsic factors related to the opportunity cost of waste disposal, in addition to intrinsic motivations, remained important drivers of recycling behavior in Italian families in 2012.

Coming to results on education (**H3**), table 3 shows that having a high-school diploma increases the probability of recycling by 3.3 percentage points, while having a university degree or a Ph.D. increases the possibility of recycling by 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 et al., 2014; Padilla and Trujillo, 2018). According to Ajibade and Boateng (2021) higher education, particularly holding a master’s degree, predicts participation in pro-social behaviour in general. This result is important from a policy and practical perspective because it shows how policies relating to higher education investment are necessary not just to ensure an informed population, but also to prompt behavioral changes that can lead to a sustainable lifestyle. This apparent link between higher education and pro-social behaviour could potentially lead to more people discovering innovative solutions to global environmental problems (Ajibade and Boateng, 2021).

The other socio-demographic controls entered have effects which are in line with those found in previous studies (Crociata et al., 2015; Fiorillo, 2013). In particular age has a positive impact on 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 increases the probability of recycling by 2.5 percentage points, while being above 65 raises it by 3.7 percentage points. 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 psychological and/or material conditions that at least a part of these families are likely to be experiencing. 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 about the interaction between environmental interest and access to containers (**H4**). As seen above being interested in environmental issues increases the probability of always recycling paper, bottles, food and glass. The effect of this motivation is slightly attenuated when people have no difficulty reaching the containers. Indeed, the probability of recycling all items always for those have difficulties reaching the containers increases by 7.8 percent ($p < 0.01$) if they are interested in environmental, while the probability of recycling all items always for those who have no such difficulties increases 7.5 percent ($p < 0.01$) if they are interested in environmental issues.

It can be concluded that findings related to **H4** suggest that intrinsic motivations are more powerful as a driver for recycling when people are confronted with external limitations 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. As previously noted, Abbott et al. (2013) and Cecere et al. (2014) economic and non-economic aspects reinforce each other (crowding-in). The difference with results reached here could be due to the different proxies for intrinsic motivation used.¹²

[Table 5 here]

Overall, results do not lead to **reject H5**. As table 5 shows when people perceive environmental degradation, they are less likely to recycle: people do not react proactively 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 pro-environmental behavior can be a response to environmental quality. A (vicious) relationship between place and behaviour has been investigated in (Cialdini et al., 1990) where it is reported that the absence (presence) of litter makes further littering less (more) likely. The role of place in shaping pro-environmental behaviour is also addressed in Uzzell et al. (2002) who consider a sample of 180 residents in two neighbourhoods in England and find that respondents who have a greater sense of identification with their place of residence and perceive fewer environmental problems of the area have stronger environmental attitudes and are more supportive of sustainable environmental behaviours.¹³

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 per cent of respondents perceive air pollution, 26 per cent perceive dirtiness on the streets and 17 per cent declare to live in a degraded environment. Almost 50 per cent of respondents declare to perceive at least one of these problems in their local environment.

The results of the regression 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 reduces the probability of recycling by 3.8 percentage points, while living in a degraded environment reduces it by 5.8

¹²Abbott et al. (2013) captures concern for the environment through the available area of green space per capita. This may or may not reflect personal attitudes towards the environment. Whereas in Cecere et al. (2014) the intrinsic motivation variable measures to what extent individuals prefer to pay taxes to cover waste management based on the quantity generated.

¹³In Uzzell et al. (2002) respondents’ environmental attitudes and behaviours 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. Instead, the current study focuses on a specific type of pro-environmental behaviour related to waste separation. In addition, the small sample size and the limited geographic coverage of the study by Uzzell et al. (2002) do not allow to generalise the results to the entire population and draw broad policy conclusions.

percentage points. Finally, perceiving polluted air reduces the probability of recycling by 0.4 percentage points, but the effect is not statistically significant.

These findings imply that environmental degradation reduces recycling much more when the perceived degradation is more closely related to recycling. Indeed, although perceived environmental degradation or dirtiness on the streets have a significant and sizable negative effect on recycling, perception of polluted air has a small and not significant effect on recycling habits. This difference may 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 recycling habits of fellow citizens.

A comment is in order. This analysis uses measures of perceived dirtiness, landscape degradation and pollution. These capture the subjective rather than the objective state of things as the MHS data reflect people’s perception of dirtiness, but not the real level of dirtiness. 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”.¹⁴ 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) impact of perceived degradation differs depending on one’s social background.¹⁵ To provide a proper answer to this question, detailed information on the respondents’ income and socioeconomic background would be needed. Unfortunately, as said above, these kinds of details are not included in the data set used. However, interacting variables of perceived degradation with those measuring education can shed some light on the issue.

[Table 6, 7 and 8 here]

Table 6 shows that perceiving dirtiness on the streets or degradation reduces the probability of recycling slightly more at lower levels of education. Perceiving dirtiness

¹⁴Tversky 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”).

¹⁵We take the opportunity to thank an anonymous referee that made this point in a previous version of the paper.

on the streets, for example, reduces the probability of recycling by 3.9 percentage points for individuals with a low education level, and by 3.7 percentage points for those who have a tertiary level of education.

Table 7 reports results as regards degradation and pollution. The findings are similar to those in table 6: perceiving degradation has a negative impact on recycling, and the effect is slightly attenuated by education level. When an ordered probit with sample selection is used instead of a basic ordered probit, the same picture emerges. Finally, the results concerning air pollution may be found in table 8. Again perceiving polluted air does not affect recycling habits.

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

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 general interest in environmental issues induces people to recycle more. This is interesting because previous works studying recycling habits in Italy report mixed findings on the role of intrinsic motivations. Second, results show that pro-environmental behavior is opportunity-driven: 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, about their living in more spacious dwellings, in which domestic waste management is easier, or about their feeling more obligated towards the rest of society and therefore more willing to respect legal rules (see 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 behavioral economics, 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) so as to change the individual payoffs of alternative behaviours 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 shows 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 from behavioral economics 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.

On a positive note, 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 would 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 a number of 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 evaluate whether these measures have played a positive role in improving household 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 it is likely that behavior changes over time. Public measures and local environmental changes (reduced pollution, dirtiness, and degradation) may take long to elicit a pro-environmental response. Unfortunately, it is not possible to pinpoint these long-term pathways using cross-sectional data.

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Figure 1: Conceptual framework

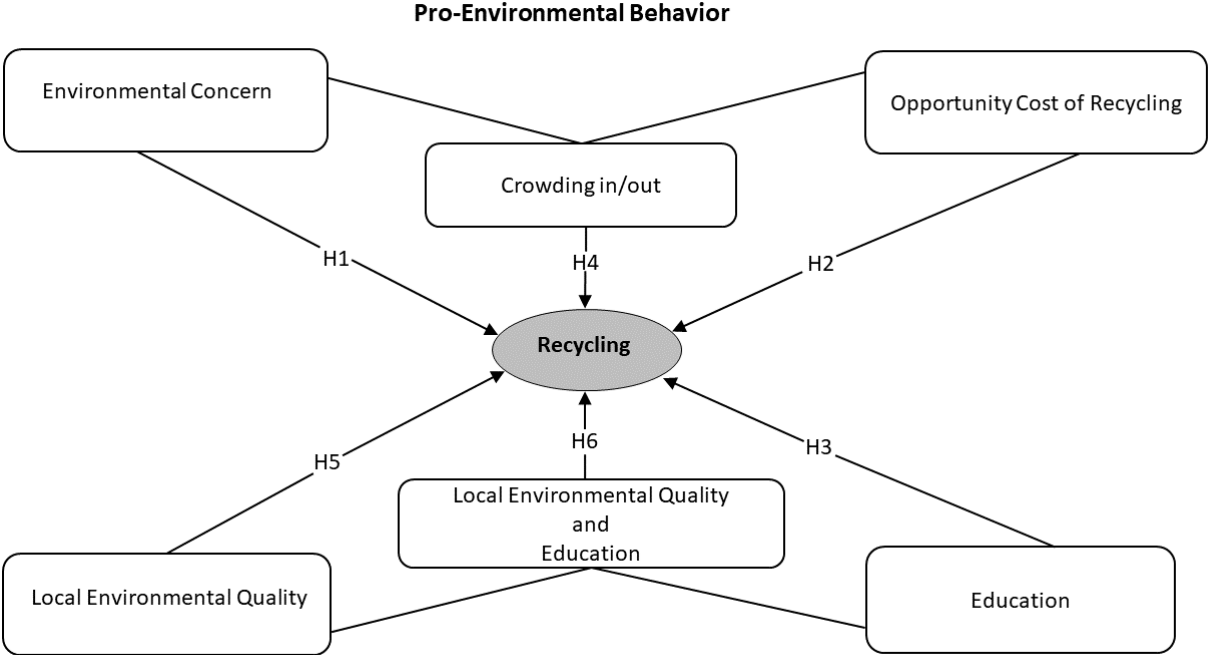


Table 1: Variable description

Variable	Description
<i>Socio-demographics</i>	
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
<i>Intrinsic Motivation</i>	
Interest in Environmental Issues	Dummy =1 if respondent is very or enough interested in environmental issues; 0 otherwise
<i>Local Environmental Conditions</i>	
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
Dirtyness	Dummy =1 if respondent perceives to live in a dirty area; 0 otherwise

Table 2: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
<i>Socio-demographics</i>					
Age (18-30)	0.351	0.477	0	1	19266
Age (30-65)	0.188	0.390	0	1	19266
Age (≥ 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
<i>Recycling (Paper, bottles, food and glass)</i>					
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
<i>Interest in Environmental Issues</i>					
Very or Enough interested	0.479	0.5	0	1	18960
<i>Local Environmental Conditions</i>					
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*** (-7.613)	-0.005*** (-7.398)	-0.005*** (-7.435)	-0.009*** (-7.589)	0.053*** (7.653)
Interest in Env. Issues	-0.049*** (-12.308)	-0.007*** (-11.239)	-0.007*** (-11.586)	-0.012*** (-12.109)	0.075*** (12.436)
Female	0.011*** (2.796)	0.002*** (2.785)	0.002*** (2.789)	0.003*** (2.792)	-0.017*** (-2.798)
Secondary Education	-0.022*** (-4.775)	-0.003*** (-4.622)	-0.003*** (-4.632)	-0.005*** (-4.608)	0.033*** (4.739)
Base category=Compulsory Education	-0.033*** (-5.568)	-0.005*** (-5.192)	-0.005*** (-5.163)	-0.009*** (-5.036)	0.052*** (5.426)
Tertiary Education	-0.017*** (-2.986)	-0.002*** (-2.938)	-0.002*** (-2.930)	-0.004*** (-2.909)	0.025*** (2.970)
Age 30-64	-0.024*** (-5.293)	-0.003*** (-5.260)	-0.003*** (-5.287)	-0.006*** (-5.358)	0.037*** (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 items). Each column reports the average marginal effects for a corresponding outcome level. Standard errors are corrected for heteroskedasticity.

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*** (-12.308)	-0.007*** (-11.239)	-0.007*** (-11.586)	-0.012*** (-12.109)	0.075*** (12.436)
Base Category= No interest in Env. Issues					
Access to Containers	-0.035*** (-7.613)	-0.005*** (-7.398)	-0.005*** (-7.435)	-0.009*** (-7.589)	0.053*** (7.653)
Interest in Env. Issues x No Access Containers	-0.054*** (-12.236)	-0.007*** (-10.892)	-0.007*** (-11.079)	-0.010*** (-10.831)	0.078*** (12.299)
Interest in Env. Issues x Access Containers	-0.048*** (-12.322)	-0.007*** (-10.980)	-0.007*** (-11.263)	-0.013*** (-11.674)	0.075*** (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 items). Each column reports the average marginal effects for a corresponding outcome level. Demographic controls are age, gender and education. Standard errors are corrected for heteroskedasticity.

t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Perceived Degradation and Recycling

	(1)	(2)	(3)	(4)	(5)
	Less than 1 item Always	At least 1 item Always	At least 2 items Always	At least 3 items Always	All four items Always
Panel A					
Functional form: Ordered Probit					
Dirtiness	0.025*** (5.924)	0.003*** (5.783)	0.003*** (5.813)	0.006*** (5.858)	-0.038*** (-5.928)
Degrade	0.038*** (7.715)	0.005*** (7.471)	0.005*** (7.496)	0.009*** (7.597)	-0.058*** (-7.736)
Pollution	0.003 (5.295)	0.000 (5.166)	0.000 (5.205)	0.001 (5.267)	-0.004 (-5.308)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B					
Functional form: Ordered Probit with Sample Selection					
Dirtiness	0.021*** (5.295)	0.004*** (5.166)	0.004*** (5.205)	0.008*** (5.267)	-0.036*** (-5.308)
Degrade	0.028*** (6.159)	0.005*** (6.002)	0.005*** (6.043)	0.011*** (6.144)	-0.050*** (-6.194)
Pollution	0.005 (1.243)	0.001 (1.240)	0.001 (1.239)	0.002 (1.239)	-0.008 (-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 items). 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. 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					
Functional form: Ordered Probit					
Compulsory Education x Dirtiness	0.027*** (5.784)	0.003*** (5.783)	0.003*** (5.863)	0.006*** (6.047)	-0.039*** (-5.869)
Base category= No Dirtiness					
Secondary Education x Dirtiness	0.025*** (5.772)	0.003*** (5.760)	0.004*** (5.828)	0.006*** (6.047)	-0.038*** (-5.858)
Tertiary Education x Dirtiness	0.023*** (5.742)	0.003*** (5.749)	0.004*** (5.808)	0.007*** (5.896)	-0.037*** (-5.850)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B					
Functional form: Ordered Probit with Sample Selection					
Compulsory Education x Dirtiness	0.022*** (5.152)	0.004*** (5.122)	0.004*** (5.194)	0.008*** (5.341)	-0.038*** (-5.235)
Base category= No Dirtiness					
Secondary Education x Dirtiness	0.021*** (5.140)	0.004*** (5.112)	0.004*** (5.181)	0.008*** (5.314)	-0.036*** (-5.228)
Tertiary Education x Dirtiness	0.019*** (5.094)	0.004*** (5.102)	0.004*** (5.169)	0.009*** (5.288)	-0.035*** (-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 items). 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. 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					
Functional form: Ordered Probit					
Compulsory Education x Degradation	0.042*** (7.366)	0.005*** (7.539)	0.005*** (7.707)	0.008*** (8.246)	-0.060*** (-7.609)
Base category= No Degradation					
Secondary Education x Degradation	0.038*** (7.332)	0.005*** (7.465)	0.005*** (7.602)	0.009*** (7.987)	-0.058*** (-7.578)
Tertiary Education x Degradation	0.036*** (7.252)	0.005*** (7.433)	0.006*** (7.551)	0.010*** (7.814)	-0.057*** (-7.552)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B					
Functional form: Ordered Probit with Sample Selection					
Compulsory Education x Degradation	0.031*** (5.859)	0.005*** (5.922)	0.005*** (6.032)	0.010*** (6.386)	-0.052*** (-6.057)
Base category= No Degradation					
Secondary Education x Degradation	0.029*** (5.844)	0.005*** (5.922)	0.005*** (6.032)	0.011*** (6.308)	-0.050*** (-6.044)
Tertiary Education x Degradation	0.027*** (5.777)	0.005*** (5.896)	0.005*** (6.001)	0.012*** (6.241)	-0.049*** (-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 items). 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. 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					
Functional form: Ordered Probit					
Compulsory Education x Pollution	0.003 (0.645)	0.000 (0.647)	0.000 (0.647)	0.001 (0.649)	-0.004 (-0.646)
Base category= No Pollution					
Secondary Education x Pollution	0.003 (0.645)	0.000 (0.647)	0.000 (0.647)	0.001 (0.648)	-0.004 (-0.646)
Tertiary Education x Pollution	0.002 (0.646)	0.000 (0.647)	0.000 (0.647)	0.001 (0.647)	-0.004 (-0.646)
Controls	Yes	Yes	Yes	Yes	Yes
Regional Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B					
Functional form: Ordered Probit with Sample Selection					
Compulsory Education x Pollution	0.005 (1.236)	0.001 (1.240)	0.001 (1.241)	0.002 (1.245)	-0.008 (-1.240)
Base category= No Pollution					
Secondary Education x Pollution	0.005 (1.236)	0.001 (1.240)	0.001 (1.241)	0.002 (1.244)	-0.008 (-1.240)
Tertiary Education x Pollution	0.004 (1.236)	0.001 (1.240)	0.001 (1.240)	0.002 (1.243)	-0.008 (-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 items). 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. t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$