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I.PETEV[1]
P.COULANGEON[2]

[1] CREST, CNRS, ENSAE, Université Paris-Saclay, E-mail : Ivaylo.petev@ensae.fr

[2] OSC, CNRS, Sciences Po, E-mail : philippe.coulangeon@sciencespo.fr

Greening lifestyles with good intentions: Cross-country evidence on the association between intention to act and environmentally significant actions

Ivaylo D Petev[a] Philippe Coulangeon[b]

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Institutional affiliations:
[a] CREST, CNRS, ENSAE, Université Paris-Saclay
[b] OSC, CNRS, Sciences Po

Corresponding author: Ivaylo D. Petev, CREST, CNRS, ENSAE, Université Paris-Saclay, 60 rue Etienne Dolet, 92240, Malakoff, France. E-mail: ivaylo.petev@ensae.fr.

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Abstract

In a context of heightened awareness of the dangers of climate change, the environmental impact of contemporary lifestyles has come under increasing scrutiny. Previous research has built solid evidence on the considerable potential individuals possess to intervene, their widespread willingness to do so but also the sizeable barriers they face to reduce their environmental footprint. In this study we investigate whether pro-environmental attitudes can serve as potent drivers of individual actions with consequential environmental impact. Bridging across work in several disciplines, we address directly the association between intent to act and a range of actions and scale up the analysis to a cross-country setting using European Union data and multilevel latent class models. We find a strong, positive association which holds beyond standard sociodemographic and country-level controls. We interpret the robustness of the intent-actions association as a positive signal on its likelihood to foster behavioral change with high environmental impact. A country's economic development and affluence affect the association whereas sociodemographic differences exhibit considerable variability on both intent and actions and are generally contingent on contextual factors. This, we argue, is evidence of the limits of mitigation strategies that focus exclusively on behavioral change without consideration of country-level characteristics.

Introduction

As climate change and environmental risk assessments grow ever more alarming, the public and scientific debate has shifted attention from a historic focus on the environmental impact of public and economic entities to the present emphasis on the impact of individual lifestyles. A fundamental premise of the shift is, first, that individuals can initiate a considerable reduction of environmental footprint by adopting ”greener” lifestyles, and second, that the probability of them doing so is considerable owing to high levels of sensibility to environmental issues. Change in attitudes to the environment can in other words spur a change in behavior and therefrom a reduction in carbon emissions.

Is this prediction realistic? Readers of the relevant literature are left with mixed feelings. The potential for intervention open to individuals appears high. A large portion of worldwide greenhouse gas emissions can be linked to the impact of private consumption (Hertwich and Peters 2009). Households appear to have at their disposal a host of energy saving actions whose adoption can yield considerable decline in carbon emissions, in late-industrial societies at least (Dietz, et al. 2009). And individuals declare, in large numbers and worldwide, to be highly concerned by environmental issues (Franzen and Vogl 2013) and, crucially, willing to act upon those concerns (Brechin and Bhandari 2011). But the social importance of the above evidence is put to question by findings on the strong behavioral, socioeconomic and societal barriers to action that individuals face (Steg and Vlek 2009; Swim and Clayton 2011) and on which pro-environmental attitudes appear to exert negligible influence (Bamberg and Möser 2007). In sum, the high theoretical potential for an individual action-driven reduction in carbon emissions appears dwarfed by the hard social reality that individuals face, independent of their “good” intentions.

It would be imprudent, however, to reach definitive conclusions on evidence that originates from literatures with competing priorities and often incommensurate approaches. Lying at the intersection of three research streams, our understanding of the odds for an action-driven reduction in carbon emissions is poor because it cumulates shortcomings of each. The reliance by social psychologists, who contribute the more rigorous work on the weak intention-action link, on easy-to-measure but low-impact curtailment behaviors and small-N samples undermines the relevance and the generalizability of results. The macro-level perspective of other social scientists on the broad diffusion and high intensity of environmental concern is of limited use in the absence of measures of behavioral change and environmental impact. And in so far as environmental scientists provide quality information on such measures and their potential for action, their data sources lack the sociodemographic and attitudinal measures necessary to evaluate the prospects for individual agency.

Building bridges between ordinarily separate research streams is essential in this debate. Mindful of the stakes involved, we propose to revisit the basic questions: Is there an association between intention and action? Does it imply environmentally significant impact? And does it hold beyond controls for individual- and country-level effects? To each question we provide evidence to answer in the positive. Our results are not definitive in so far as we are tributary - like the handful of recent studies on the subject (Pirani and Secondi 2011; Hadler and Haller 2013; Pisano and Hidalgo 2014; Pisano and Lubell 2015) - to strong limitations in available data and measures. But, we believe, the results are compelling enough to invite for a better consideration of issues of scope

conditions, scale of analysis, and variable choice that are crucial in our empirical approach and in future iterations to improve on previous shortcomings.

We proceed with a brief review and synthesis of the literature, from which we draw insights on the construction of our hypotheses and our empirical approach, described in the subsequent two sections. We follow with sections on the empirical analysis and a discussion of results.

Research background

For an individual action-driven reduction in carbon emissions to take place at least four conditions would seem necessary to be met: 1) that there is sufficient potential for intervention open to individuals, 2) that those individuals are willing to take action, 3) that they translate that willingness into actions, and 4) that the effect of those actions results in a substantial decline of environmental footprint. According to the prevailing division of labor in the literature on the subject, environmental scientists take upon the first and last points to estimate the level of carbon emissions reduction (known as technical potential) associated with the adoption of specific actions; most social scientists (i.e., in sociology, political science and economics) focus on the study of the diffusion and the determinants of environmental attitudes whereas individual behavior and its associated drivers remain the privileged domain of social psychologists. In this section we take on each of these literatures so as to elaborate on the main findings and shortcomings of each approach. This background is essential to identify the blind spots on which we build in the subsequent section as we try to bridge across the three research streams and construct an improved research strategy.

On potential for intervention

It has become common place, when referring to the environmental impact of individual lifestyles, to speak in terms of greenhouse gas emissions. About 72 percent of worldwide greenhouse gas emissions can be linked to the impact of household consumption (Hertwich and Peters 2009). At face value, this estimate hints at an immense potential for intervention. In reality, a large portion of it, close to a half in late-industrial countries[1], is due to indirect emissions associated with the production, distribution, and disposal of food, building materials, and consumer products and services. Indirect emissions pose a number of methodological challenges[2] and the contribution of individuals is difficult to pin down to a particular estimate or action.

Researchers have had an easier time estimating the potential for intervention in direct emissions over which individuals have more latitude. Such emissions are concentrated in energy consumption related to transportation and heating. That is where high-impact actions are found.

[1]For example, indirect emissions accounted for 40% of total household emissions in France (Lenglart, Lesieur and Pasquier 2010) and for 50% of emissions in the United States (Weber and Matthews 2008) and the Netherlands (Kok, Benders and Moll 2006).

[2]Environmental scientists have developed sophisticated tools like life-cycle analysis or input-output analysis (Kok, Benders and Moll 2006) whose application to cross-country data is both methodologically challenging and tributary to severe data limitations.

In one of the more comprehensive recent studies Dietz and colleagues (2009) use American data to identify a set of high environmental impact actions and recommend a series of thirty-three energy saving actions. These fall in two broad categories: the adoption of more efficient equipment (e.g., one-time investments in energy-efficient building shells and equipment; regular upgrades to more energy-efficient household appliances, equipment and motor vehicles) and adjustments in the use of equipment on hand (e.g., infrequent, low-cost equipment maintenance; infrequent, no-cost equipment adjustments; conscious changes in routine actions). Their adoption by individual households is estimated to yield, over a ten year period, a 20% decline in household emissions.[3] The study predicts similar reductions in countries with comparable carbon profiles like Canada and Australia and half the level of savings for European Union countries and Japan due to a less energy intensive household sector (Dietz, et al. 2009, 18455).

For the purposes of our paper - whose limits fall short of exhaustivity of research on technical potential - the main conclusion to be drawn from this and similar studies (Gardner and Stern 2008) is the strong evidence on the presence of a high theoretical margin for intervention available to individuals. There are two important caveats however. First: this margin of intervention spreads across a host of actions whose singular contribution (in terms of emissions reduction) is comparatively small. Second: the realization of that margin depends on behavioral changes in individuals whose contribution on their own is infinitesimal. In other words, the realization of the margin of intervention to its full potential is conditional on behavioral changes on massive, world scale and across the whole set of environmentally significant actions. The feasibility of such a feat depends on a finer understanding than the data, which environmental scientists use to estimate technical potential, provide of the drivers of behavioral change in general and in particular with relation to the set of actions with high potential environmental impact. These issues, to which we turn in the subsequent subsections, social scientists have paid greater attention to.

On willingness to take action

Among the determinants of behavioral change, environmental sensibility and related attitudes attract particular attention as a potential bottom-up driver of change in individual lifestyles. The attention is further reinforced by the decades-old record of high levels of environmental concern worldwide. In this vein the comparative interdisciplinary literature on global trends in environmental concern is instructive given the objective to scale up the analysis and to uncover the determinants of contemporary environmentalism at the cross-country level (McCright, et al. 2016).

Empirical research focuses on two general, competing mechanisms (Nawrotzki and Pampel 2013). On one side are those, who argue that environmentalism emerges at high levels of economic prosperity and among individuals with higher socioeconomic status. One version of this argument is that both foster post-materialist values in favor of environmental protection (Inglehart 1995). An alternative version does not imply any value change neither at the macro level nor at the individual level. Accordingly, rising environmental concern in rich countries and at higher

[3]To get a sense of the scale: this amounts to 123 million metric tons of carbon or 7.4% of total yearly U.S. emissions, equivalent of the total national emissions of France (Dietz, et al. 2009, 18452).

levels of socioeconomic status is due to the fact that wealth provides the means to take action (Franzen and Meyer 2010). On the other side stand those, who argue that environmentalism is equally if not more likely to emerge in less prosperous countries and in social groups with lower socioeconomic status for whom the stakes of protection are higher due to their greater exposure and vulnerability to environmental and health threats (Dunlap and York 2008).[4]

To each mechanism generating environmental concern corresponds a qualitatively different experience. On one side there is the experience of a diffuse environmental risk in response to which individuals are likely to declare themselves willing to pay a higher price (Franzen and Meyer 2010) and to make commitments in line with postmaterialist values of environmentally conscious lifestyles (Inglehart 1995). On the other side there is the experience of concrete threats to the immediate environment and personal health to which vulnerable and exposed social groups are likely to respond by summoning the responsibility of public authorities and by engaging in various forms of pro-environmental activism (Brechin 1999).

A voluminous comparative empirical literature reports evidence in support of both sides: of a positive association of environmental concern with national income and socioeconomic status (Franzen and Meyer 2010) but also of a negative association (Brechin 1999; Givens and Jorgenson 2011). Recent work helps make sense of these contradictory findings. It shows that postmaterialism and affluence theories have support in higher income countries with better environmental conditions whereas the so called global environmentalism thesis finds empirical confirmation in lower income countries with worse environmental conditions (Pampel 2014). Another study (Nawrotzki and Pampel 2013) nuances those conclusions in regard to high-income countries. It shows that the positive association between socioeconomic status and environmental concern is strong among older cohorts but weaker in younger cohorts in result of the diffusion over time of pro-environmental values across socioeconomic categories. These findings support the global environmentalism theory and its expected zero or negative correlation between environmental concern and wealth, at least at the cross-national level (Brechin 1999; Dunlap and York 2008). At the individual level, the positive relationship between socioeconomic status and environmental concern remains empirically robust (Pampel 2014).

The behavioral implication of these findings has not been directly obvious however. Common practice in the literature is to emphasize the positive association between environmental sensibility and willingness to take action (Brechin and Bhandari 2011). But there is little direct reference to how environmental sensibility or willingness to take action translates into environmentally significant actions. We can draw a parallel between environmental concern and environmentally significant actions in so far as the associated research reports that, at least in affluent societies, both are positively correlated with socioeconomic status and financial resources. Whether these are sufficient conditions to suppose a causal link between attitudes and action is nonetheless unclear and requires direct empirical investigation. A few recent studies tend to give credence to this supposition with cross-country data on attitudes and actions (Pirani and

[4]The contrast between these alternate views on the link between affluence and environmental concern may not be exaggerated, though. Inglehart himself admitted that poor objective environmental conditions that individuals in poorer societies face may be sufficient to foster environmental concern, which in richer societies is more likely to originate in subjective postmaterialist values (Inglehart 1995).

Secondi 2011; Pisano and Lubell 2015). Our empirical analysis follows in this vein but beforehand we review in the following subsection research that studies specifically the causal link between attitudes and actions and elicits some doubts about its strength.

On likelihood of taking action

Research on behavioral change identifies four types of determinants. Attitudes, including norms, beliefs and values, affect the motivation for action. Sociodemographic differences are understood as having an effect on the distribution of "knowledge and skills required for particular actions (e.g., mechanical knowledge and skills), availability of time to act, and general capabilities and resources such as literacy, money, and social status and power" (Stern, P. C. 2000, 417). Contextual variables come in consideration to account for the influence of laws and regulations and of the unequal spatial distribution of infrastructure and policy interventions. Habit and routine form yet another, albeit less studied, factor (Aarts, Verplanken and Knippenberg 1998; Shove and Warde 2002; Warde 2005).

Environmental social psychologists, who are most actively invested in research on the subject, focus particularly on the influence on individual behavior of attitudes and sociodemographic differences, thus filling in on a missing link in the aforementioned literature. In this vein, empirical research consistently - though not entirely uncontested (Diamantopoulos, et al. 2003) - reports that attitudes have a weak direct effect on environmentally significant consumption and behavior. More specifically, environmental concern, as a general attitude, is held responsible across a diverse and numerous set of micro-level studies for no more than 10 per cent of explained variance (Bamberg 2003, 22), although a recent study nuances this conclusion (Morren and Grinstein 2016). Better explanatory power has been documented for the influence of specific beliefs, norms and values. But their influence is behavior-specific and is generally limited to low-cost environmental and energy-saving behaviors (Steg and Vlek 2009; Stern, P. C. 2011, 306–307).

A general finding in the literature is that engagement in actions leading to significant reduction in environmental impact requires the presence of non-negligible household infrastructure, is strongly correlated with home ownership, and comes at considerable financial cost/investment. The effect of attitudes on this type of engagement is lesser than the effect of sociodemographic and contextual determinants. Among the best predictors of energy use tend to be "household income, [household] size, life cycle stage, and geographic location, which in turn affect other major determinants of overall [environmentally significant] consumption, such as home size, ownership of motor vehicles and appliances" (Stern, P. C. 2011, 306).

Such evidence would appear sufficient to put to rest the debate on the probability of an attitudes-driven change in environmentally significant actions. But there are at least two reasons to explore further. One has to do with how well findings, which originate mainly from country-specific, small-N, often non-probability samples (Morren and Grinstein 2016, 95), scale up to a macro-, cross-country level. To this can be added the limits in generalizability of such studies due to their tendency to rely on easy-to-measure but low-environmental-impact target behaviors (Stern, P. C. 2011, 306–307) or composite behavioral measures that pose difficulties in cross-study comparisons (Steg and Vlek 2009, 310). While understood as liabilities here, these have guaranteed a high level of methodological rigor and data quality, making possible the careful study

of the causal chains underlying the interaction of determinants and their influence on behaviors and unleashing important theory building and accompanying empirical evidence on the influence of cost-benefit decisions (Ajzen 1991), moral or normative concerns (Stern, P. C. 2000), affect (Gatersleben 2007), to mention the most prominent ones. But the question about the scope conditions of this research remains open. Given, as we learn from the work in environmental science, that it is only at cross-country level that individual-driven behavioral change can be a factor in climate change, arguably the contribution of attitudes need to be tested in macro-level settings.

To sum up, the overarching question to the literature we discuss above is whether individual intentions to take environmentally significant actions lead to actions that are susceptible to lower carbon emissions on a cross-country scale. The fact that the literature is composed of distinctive research streams that evolve somewhat independently of each other leaves a number of blind spots. There is solid evidence from environmental scientists that individuals have a high theoretical margin for intervention but poor understanding on how much of that potential individuals do translate into actions. Social scientists provide a long, cross-country record of high levels of environmental concern and of willingness to act but how those relate to taking environmentally significant actions remains unclear. And while this last point has been put under serious doubt by empirical research in environmental social psychology, limits to generalizability of the results leave the question open.

It is worth noting that a handful of recent studies (Hadler and Haller 2011; Pirani and Secondi 2011; Hadler 2013; Hadler and Haller 2013; Pisano and Hidalgo 2014; Pisano and Lubell 2015) have begun to address these shortcomings with cross-country data.[5] The focus (i.e., the dependent variables) of the empirical analyses are individual actions: a somewhat comprehensive list of environmentally significant actions in one case (Pirani and Secondi 2011) and a mix of a few such private-sphere actions with public-sphere activities related to membership in environmental organizations, signing of petitions, donations and participation in demonstrations (Hadler and Haller 2011; Hadler and Haller 2013; Pisano and Hidalgo 2014; Pisano and Lubell 2015). All of them show evidence of strong levels of pro-environmental activity, although less widespread and more action-specific across the 27 European Union member states (Pirani and Secondi 2011) than in a more diverse set of countries (Hadler and Haller 2011; Pisano and Hidalgo 2014; Pisano and Lubell 2015). Two studies using historical data on recycling and on forgoing car use (Hadler 2013; Hadler and Haller 2013) find evidence for their increased practice (in contrast to public activities) in economically less prosperous countries; in the more affluent societies the comparatively higher rates appear to stagnate over time. Country-level variation is significant but not necessarily consistent with a positive effect of economic affluence on pro-environmental activity: manifestly

[5]The recurrence of some authors in the list of studies speaks of the narrow interest in comparative empirical research on environmentally significant actions. While we do not claim our bibliographic list to be exhaustive, Pisano and Hidalgo (2014, 24) performed an extensive web-based search of academic articles on the same subject for the period 1995-2013 that yielded only three titles, two of which we cite (Hadler and Haller 2011; Pirani and Secondi 2011). We do not mention the third study (Guerin, Crete and Mercier 2001) because its empirical analysis, while using cross-country data and a multilevel modeling framework, focuses on a single action, recycling.

so in the studies with diverse country samples but narrower list of private-sphere actions (Pisano and Hidalgo 2014; Pisano and Lubell 2015) than in the European-based study of a wide range of environmentally significant individual actions (Pirani and Secondi 2011). A no small part of the variation between countries appears attributable to individual-level factors, of which most notable is the greater likelihood to engage in environmentally significant activities of the elderly, of women and of the better educated. This notwithstanding, most of the effects tend to be action-specific and to vary across studies. Finally, the inclusion of attitudinal measures of environmental risk awareness, of knowledge and concern about environmental issues, of policy preferences, and of intentions to act appears to weather away some of the influence of sociodemographic differences on the likelihood to take environmentally significant actions. The relation between pro-environmental attitudes and actions, while not systematic, indicates a positive association. That is the question that we wish to put at the center of our inquiry.

Research design

The aim of our research design is to bridge across the research streams that define the literature on the attitude-action link so as to overcome the blind spots we highlighted above. In reality, our ability to do so is constrained by the quality of available data. Indeed individual-level data that offer a comprehensive list of environmentally significant actions, that allow the estimate of their environmental impact, that give detailed attitudinal measures, that provide information on sociodemographic and contextual characteristics, and all this at cross-country level - such data are difficult to come about. Bridging across the aforementioned research streams requires us to make careful compromises. Consequently, we construct and present below our research strategy paying close attention to our database of choice and the limitations that ensue with regard to the scope conditions, available measures and definition of research hypotheses.

Dataset

A guiding principle in the choice of dataset is that it be cross-country. This is motivated by the need to put in perspective the findings of micro-level research in social psychology with regard to comparative work in environmental and social sciences. Moreover, given that individual actions have an environmental impact in the aggregate, it is at the macro, cross-country level that it is most suited to analyze their determinants.

But scaling up the analysis of the attitude-action link needs to account for two important scope conditions. First: to ensure relative homogeneity in the environmental quality, available infrastructure and legal and policy regulations. Each conditions strongly the opportunity of individuals for intervention as well as the associated environmental impact. But they are also particularly difficult to measure and control properly, even in a multilevel modeling framework. Second: to focus on a sample of late-industrial societies since most of the detailed and systematic research on the drivers of individual activity and on its potential environmental impact originates in such case-studies.

The choice of adequate datasets is limited. In the very narrow pool of cross-country studies of the attitude-action link, a recent one (Pirani and Secondi 2011) uses a Eurobarometer 2007 survey sample of European Union (EU) member states and four recent studies (Hadler 2013; Hadler and Haller 2013; Pisano and Hidalgo 2014; Pisano and Lubell 2015) use International Social

Survey Program (ISSP) data. The environmental modules of both surveys provide comparable measures of attitudes, actions and basic sociodemographic characteristics. The advantage of the Eurobarometer survey is that it offers at once substantial country-level variation in basic contextual and sociodemographic factors while also ensuring, owing to EU institutions, relative homogeneity in the environmental quality, available infrastructure and legal and policy regulations. Our choice of data falls on the environmental module of the most recent 2011 Eurobarometer survey 75.2 and its collection of nationally representative samples for the 27 member-states of the European Union.

[Table 1 around here]

Measures

The literature on environmentally significant actions provides a number of insights on the choice of measures. To begin with, there is the need to select actions with varying levels of technical (i.e., carbon emissions reduction) potential. The principal reason for this is that actions with high technical potential are not widely accessible options due to financial constraints, among others. Individuals are hence most likely to maximize their environmental impact if they take a mix of actions.

In practice, individuals rarely behave as rational maximizers of environmental impact. First, few are aware of the technical potential of an action. Indeed, often individuals undertake actions with the conscious intention to protect the environment even though the associated impact may be low (Stern, P. C. 2000, 408). Second, there are various, competing motivations that lead people to engage in an environmentally significant activity: impact is one; energy savings, health concerns, social status or simply habit are frequent alternatives (Shove and Warde 2002; Warde 2005). The consideration of a range of actions with varying levels of technical potential is thus useful to relate the association between pro-environmental attitudes and actions to environmental impact.

The Eurobarometer survey contains a measure that captures environmentally significant actions across eight aggregate categories. The typology has the advantage to measure a comprehensive set of actions that reflect at once varying technical potential and different associated benefits (health, savings, symbolic, normative, etc.). Its inconvenience is the level of aggregation which does not allow to asses precisely the environmental impact of the associated actions.

It is worth noting that the survey question behind the measure captures behavioral change: respondents are asked to declare actions taken during the month preceding the interview. This fits well with our objective, which is not to explain behavior of individuals but to investigate the factors that lead them to change it. Moreover, recent evidence shows that the explanatory power of attitudes, while weak in regard to regular behavior, is greater in cases of behavioral change (Abrahamse and Steg 2009).

[Table 2 around here]

Recall that our objective is to study the potential of attitudes to yield environmentally significant change in the actions of an individual. We are therefore interested to investigate this potential under conditions that maximize its probability of occurrence. In this vein, we draw on work by Bamberg and Möser (2007, 21) and privilege a measure of intention to act. Intention to act appears to mediate the effect of attitudes and is associated with a stronger explanatory power

than the individual effects of the range of pro-environmental attitudes that may influence environmentally significant actions. Given our scope conditions, a focus on intention to act (precisely a measures of willingness to pay a higher price) is also in line with research that emphasizes the prevalence of the conative component of environmental concern[6] in affluent societies like the Eurobarometer sample of EU countries. This is so because affluent societies can afford to invest more resources to improve environmental quality (Diekmann and Franzen 1999) and their citizens face a relatively lower trade-off between consumption of goods and paying for environmental quality (Franzen and Meyer 2010). Willingness to pay is thus an established measures of environmental concern in affluent societies (Gelissen 2007) (less so in comparisons of societies with wide differentials in economic wealth and distribution in light of potential bias of economic inequality (Brechin 1999; Dunlap and York 2008)).

Hypotheses

With the above data and measures at hand we move to define a research strategy to address the question of whether individual intentions to take environmentally significant actions lead to actions that are susceptible to lower carbon emissions on a cross-country scale. We operationalize the question into four specific inquiries for which we advance testable hypotheses.

First and foremost, we are interested to observe whether there is an association between declared intent and any environmentally significant actions taken. In line with previous research (Pirani and Secondi 2011; Hadler and Haller 2013; Pisano and Hidalgo 2014; Pisano and Lubell 2015), *we expect the intent-action association to be positive (H1)*. Second, we wish to observe whether this association, if present, concentrates to a few or instead concerns the whole range of actions. The carbon footprint of individuals is a sum of a large diversity of actions, some easier to commit to (ex., more recycling) than others (ex., lower car use). Our review of research in environmental science pointed to the importance of a wide-ranging commitment for individuals if they are to maximize their environmental impact. In line with the findings of Pirani and Secondi (2011)*, we expect to observe a cumulative effect of the intention to take environmentally significant actions on the actions taken (H2)*.

H1 captures the general prediction of a positive association whereas H2 reflects an expectation about the association's strength in so far as we predict an effect of intent across a wide spectrum of actions. It is worthwhile making the case for the corresponding null hypotheses of a non-positive association with a narrow spread across action types. There are reasons to expect the relation between intent and actions to be more complex than we predict. Individuals have competing motivations (e.g., ethics, savings, health concerns, social status, habit and routine) to adopt an environmentally significant action that may in certain situations play a stronger role in behavioral decisions than concerns over environmental footprint. It is therefore not unreasonable to expect that competing motivations weaken the association between intent and action,

[6]Environmental concern is said to consist of three distinct components: cognitive, affective and conative (Maloney, Ward and Braucht 1975). The cognitive component refers to aspects of awareness and knowledge of environmental issues. The affective component captures a commitment to environmental issues based on beliefs, values, norms. The conative component describes dispositions to act in favor of the environment.

potentially by limiting the range of commitments if not entirely neutralizing or reversing the direction of the association.

Third, in order to test the potential of high environmental concern among individuals to serve as a driver for lowering carbon emissions, we wish to verify that the association between pro-environmental attitudes - measured here with a proxy for the intention to act - and environmentally significant actions is not spurious, explained away by well-known sociodemographic and contextual, country-level determinants of individual behavior. As per our literature review, research in both environmental science and in social psychology emphasizes that many environmentally significant actions, especially those with high impact, face important barriers at both individual and societal levels. This notwithstanding, comparative research points out the fact that affluent societies like the EU countries in our sample can afford to invest more resources to improve environmental quality (Diekmann and Franzen 1999; Franzen and Vogl 2013) and that their citizens face lower barriers to action and lower trade-offs between maintaining high living standards, on one side, and on the other, paying for environmental quality (Franzen and Meyer 2010) or acting upon their post-materialist values (Inglehart 1995) . In this vein and following recent corroborating evidence with cross-country data by Pisano and Lubell (2015), *we expect the intent-action association to withstand the influence of individual- and country-level determinants (H3)*.

Finally, we are interested to investigate the nature of the effect of individual- and country-level determinants. As Pisano and Hidalgo write (2014, 396), there is long-standing perception in the literature of environmentalism as driven by a "hard social base" characterized, among others, by a consistent positive, direct (Franzen and Meyer 2010) or indirect (Inglehart 1995), effect of socioeconomic status. But against this perspective stands a sizable list of national and comparative studies that show a complex influence of sociodemographic characteristics on environmental attitudes and actions: positive in some cases, negative in others or absent altogether (Diamantopoulos, et al. 2003). While we take note of recent cross-country evidence on the tendency of sociodemographic determinants to be both context- and behavior-specific (Pisano and Hidalgo 2014; Pisano and Lubell 2015), we believe that by virtue of its relative political, socioeconomic and infrastructural homogeneity, the EU region presents a strong if somewhat unique test case for the prediction that *individuals with higher socioeconomic status are more likely to declare having the intent to take pro-environmental actions as well as to declare taking such actions (H4)*.

In this vein, we also wish to test whether *the more affluent the country the higher the likelihood that individuals declare having the intent to take environmentally significant actions and taking such actions (H5)*. On this specific issue, that, to our knowledge, only a couple of recent studies deal with directly, the findings diverge: on one side, there is corroborating evidence on the link between a society's affluence and the engagement of its citizens in environmentally significant actions as recorded in a study of a large and diverse sample of 30, mostly OECD countries (Pisano and Lubell 2015, 17), and on the other side, some evidence to the contrary in a sample of EU countries (Pirani and Secondi 2011, 82).

[Table 3 around here]

For measures of the above predictions as well as for the remaining determinants, we take inspiration from comparative research on the subject that provides a list of factors: at the

individual level, socioeconomic status (Givens and Jorgenson 2011), education (Marquart-Pyatt 2012), life-cycle stage (Marquart-Pyatt 2012), residential status (Marquart-Pyatt 2012), and gender (Hunter, Hatch and Johnson 2004); at the country level, economic development and inequality (Franzen and Meyer 2010), political participation (Botetzagias and van Schuur 2012), population size and environmental infrastructure and development (Swim and Clayton 2011, 253–255). The list is not exhaustive; instead it includes determinants for which we have been able to find proxies in the Eurobarometer survey. We used external sources to gather a small list of contextual measures, beyond which we expect little residual variance at the country level due to the relative political, socioeconomic and infrastructural homogeneity of the region in question.

Methodological approach

We operationalize our research hypotheses with a multilevel latent class model which is formally expressed as follows:

$$P\left(Y_j|v_i^{cov}, w_j^{cov}\right) = \sum_{t=1}^{T}\left[P\left(Z_j = t|\, w_j^{cov}\right)\prod_{t=1}^{N_j}\left[\sum_{s=1}^{S} P\left(X_{ij} = s|\, v_i^{cov}, Z_j = t\right) \times \prod_{k=1}^{K} P\left(Y_{ijk}|X_{ij} = s\right)\right]\right]$$

where *i* refers to the sample of individual respondents and *j* refers to the countries from which they originate. We denote responses to questions to our indicator variables by $k = 1,\ldots, K$, where $Y_{ijk} = 1$, if a respondent *i* from country *j* declares a certain level of intent or having performed a given action *k*, and $Y_{ijk} = 0$ otherwise. Vector Y_{ij} collects responses for an individual *i* and Y_j denotes the observed responses for the sample of respondents from country *j*. The model assumes that a limited number of segments, denoted $s = 1,\ldots, S$, describe the patterns of responses of the full, cross-country sample. The model also assumes that the countries in the sample belong to a limited number of country segments, denoted by $t = 1,\ldots, T$. For this multilevel aspect of the model we use a discrete latent variable X_{ij} to represent membership in the individual-level segments and another, higher-level discrete latent variable Z_j to represent membership in the country segments. On each latent variable we also include covariate effects: for respondents' sociodemographic characteristics, denoted by v^{cov}, on X_{ij} and for contextual, country-level characteristics, denoted by w^{cov}, on Z_j.

For the model and the above description we take close inspiration from the approach in a study by Bijmolt, Paas and Vermunt (2004) with comparable objectives and on data with similar structure. There (Bijmolt, Paas and Vermunt 2004, 326–328) and elsewhere (Vermunt 2003), more details on the model and its estimation can be found than we have space to provide here. For more clarity, suffice it to paraphrase the authors' distinction of three components in the right-hand side of the equation (Bijmolt, Paas and Vermunt 2004, 326–327), moving from left to right: 1) the probability that country *j*, after controls for contextual differences, belongs to a particular country segment, 2) the probability that individual *i*, after controls for sociodemographic differences, belongs to a particular segment of response patterns, given the country segment membership, and 3) the probability of a particular response on indicator *k*, given the segment membership. The probabilities that we observe in our data on patterns of intention and actions correspond to a weighted average probability, where the weights are the country segment and individual segment probabilities.

Our model differs in one important specification. We use a multilevel discrete latent factor model (Vermunt and Magidson 2005, 28–33). Like in the standard latent class framework the objective is to represent the associations between indicators by way of membership in the segments of an unobserved latent variable.[7] The particularity of the discrete latent factor model is that we can load the measures of intent and actions on two separate latent variables, also known as factors, allowing for an association between them and, crucial to the test of our hypotheses H1 and H2, to measure the strength of the association. For the remaining hypotheses, the inclusion of covariate, sociodemographic and higher-level country-specific effects allows us to test the resilience of the association (H3) and to observe their specific contribution on each of the two latent factors (H4 and H5).

Results

To reiterate, the objective of this paper is to test the presence, content and strenght of the association between pro-environmental intentions and actions with cross-country data and following controls for standard sociodemographic and contextual determinants. In the first part of our empirical analysis, we test the association with simple descriptive statistics whose aim is to illustrate the basic relations in the data. We then use latent class analysis techniques and the software LatentGOLD 4.5.0 to model the association, which we describe by way of a set of intention-actions latent patterns. In a third section, we observe changes in the strength of the intention-actions association following the introduction of individual- and country-level controls. Their direct effects on the latent patterns we comment in a subsequent fourth subsection so as to explain the composition and determinants of pro-environmental intentions, actions and their relation.

Preliminary test of hypotheses

A quick glance at the descriptive, univariate statistics for our measures of intent and actions in table 2 corroborates the general observations in the literature. There is a high degree of sensibility to environmental issues. Some three quarters of European Union respondents declare themselves ready to pay a higher price for environmentally friendly products. Their commitment, in so far as can be judged from their declarations on undertaken actions, is however unequally distributed across action types. On one end, there is recycling, which is at once the most cited commitment (68%) and, given the infrastructural development and environmental legislation of EU member states, probably among the least difficult and least costly environmentally significant action. On the other end, there is the purchase of environmentally friendly products (19%) and lower car use (22%), which are actions, whose undertaking is arguably

[7]The fundamental, local independence assumption of latent class models is that the entire association between indicators can be explained away by the introduction of latent constructs. It is standard practice to combine exploratory and confirmatory modeling and rely on goodness of fit statistics of the Bayesian Information Criterion kind and bivariate residual statistics to identify the best fitting latent structure but also to verify that fundamental assumption. In our case, the assumption is violated in four cases for which we follow standard practice (Vermunt and Magidson 2005, 24) to allow for association between the following pairs of indicators whose strong association (positive in each case) makes substantive sense: energy consumption - water consumption, labeled products - local products, car use - eco-friendly transportation and labeled products - WTP intention.

more costly and difficult for individuals. This contrast notwithstanding, the observed hierarchy in the level of commitment between the eight action types does not follow a clear continuum of decreasing difficulty, cost or environmental impact. The most glaring example is the reduction of energy consumption, which is financially beneficial, difficult in so far as it is generally associated with sacrifice, and a direct and influential factor in environmental footprint reduction. The proportion of respondents declaring having cut energy consumption (56%) is a close second to the considerably easier-to-do recycling.

In a simple test of our first hypothesis, figure Erreur ! Source du renvoi introuvable. illustrates the association of our measure of intent with each of the eight action types. The associations, as predicted, are all positive though they vary in strength. No single overarching pattern is apparent. In view of our measure of intent - willingness to pay a higher price - the two extremes make logical sense. On the one hand, the associations are lowest for actions that imply, besides a reduction in environmental footprint, lower financial costs: in this case, cutting down on energy and water consumption. On the other hand, the associations are highest for actions that entail higher financial costs: purchase of eco-labeled and local products.

These contrasts fail to explain the order of magnitude for the remaining behavioral types however. In all likelihood, for these as well as for all action types and their association with pro-environmental intent, a host of motivations apply: cost, difficulty, environmental impact but also visibility, information, health concerns, ethical sensibility, symbolic value, infrastructural conditions, etc. Crucially, in spite of the diverse set of motivations underlying our behavioral typology and in spite of the economic well-being component in our measure of intent, we observe a positive association in each case.

[Figure 1 around here]

We also predicted, in our second hypothesis, that the number of actions taken increases at higher levels of declared intent. In another simple test, we present in figure Erreur ! Source du renvoi introuvable. the association between our variable of intent and a measure of the count of actions taken. The results confirm our prediction, showing that higher levels of pro-environmental intent are indeed associated with a higher count of action types taken. The result is all the more significant in light of the reasonable assumption that the environmental impact of individual actions is a function of the range of commitments.

[Figure 2 around here]

We advanced hypotheses regarding the determinants of the intent-actions association. In table 4 we provide a preliminary glance at the relation between that association and measures for social class categories and GDP per capita. As in figure Erreur ! Source du renvoi introuvable., we measure the strength of the association with the square root of the Nagelkerke pseudo-R squared derived from simple ordinal logistic regressions, which are estimated for category-specific samples. The strength of the association is positively associated with higher social class categories and with higher levels of GDP per capita. In so far as both measures serve as standard proxies for socioeconomic status and country-level affluence, we find preliminary confirmation of our predictions in hypotheses H4 and H5.

[Table 4 around here]

Patterns of the intent-actions association

We now model the intent-actions association by loading the intent - willingness to pay (WTP hereafter) - variable on one discrete latent factor and the variable of the set of eight environmentally significant actions (ESA hereafter) on another discrete latent factor. Our first step is to identify the optimal, best fitting model by varying the number of hierarchically ordered segments for each factor. The objective here is parsimony: to describe distinctions in the sample data across the two variables with the least amount of segments. We report the goodness of fit statistics in table 5.

[Table 5 around here]

We begin with a model, which contains as many segments per factor as there are categories in each of the two types of variables: four segments for the factor on which the WTP variable is loaded and eight segments for the factor on which the eight ESA variables are loaded. This model yields a large number of segments with zero or near-zero sample sizes. We compare its goodness of fit statistics to those of models with a lower number of segments. For the comparison we use four types of parameters. The BIC and CAIC statistics favor model #5 whereas the AIC and AIC3 statistics favor model #3. Both, however, contain segments with too small a proportion of the sample population to be of any informative value. Substantive reasons lead us to favor model #7 in which both factors have 3 segments, all of which are well populated. Bootstrap tests (with 500 iterations) show that the addition of an extra segment on each factor (in models #6 and #5 respectively) do not improve in a statistically significant manner on our preferred model, #7.

In table 6 conditional probabilities illustrate the resulting structure of model #7. Given that the clusters in the discrete latent factors are by definition hierarchically ordered, each 3-segment factor can be intuitively described as containing low, middle and high levels. Accordingly, the low level of the WTP intent factor corresponds to a segment, in which the majority, about 74%, disagrees with the idea of paying a higher price for environmentally friendly products or services. In the middle level, some 55% of the segment agrees with this statement and another 22% express total agreement. Total agreement describes 66% of the members of the segment with high level of intent.

[Table 6 around here]

In the case of the ESA factor, low-level activity is limited to a modest (27%) share of this segment's respondents reporting an increase in recycling and an even smaller proportion reporting a decrease in energy and water consumption (respectively, 12% and 11%). At the middle- and high-level segments, these proportions increase along with the proportions of respondents reporting engaging in the other types of activity. As the model's parameter estimates (equivalent to factor loadings) in table 7 show, recycling - most likely due to legal obligations and the diffusion of relevant infrastructure throughout European Union countries - is an activity with low distinctive character. The corresponding factor loading is lowest (.299). In this vein, increasing the purchase of local products (.416) and decreasing the use of disposables (.422) stand as the most distinctive practices. The contribution of the other categories in defining the ESA factor is also important.

[Table 7 around here]

Strength and resilience of the intent-actions association

Having defined the two latent factors, we turn to the main objective of our modeling strategy: to observe the association between intent and actions, which we predict to be positive (H1) and strong (H2). Evidence of the association's presence and strength is found in each of the above three tables. Table 5 includes a goodness of fit statistics test comparing our preferred model #7 with model #7', in which the association between the two factors is defined to equal zero. All four goodness of fit statistic estimates confirm the better fit of model #7. In table 6 the conditional probabilities for each category of intent and actions illustrate that the association is positive: to higher levels of the WTP factor correspond higher levels of ESA commitments; similarly, to higher levels of the ESA factor correspond higher levels of intent. Finally, we provide in table 7 a precise estimate of the strength of the association, which, as measured by the magnitude of the correlation coefficient, stands particularly high, at .78.

The correlation that we observe between the WTP and ESA factors is indeed high. It does not however account for the influence of sociodemographic and country-level differences, which empirical findings in the literature report. In hypothesis H3 we predict that the association will hold beyond controls for these differences. We proceed to test this prediction. For the purpose we re-estimate the model, keeping all parameters fixed with two exceptions, which we allow to vary as we add individual- and country-level covariates to the model: the correlation parameter for the association between the two latent factors and the size of the segments. The covariates include the full set of variables presented in table 3.

We proceed in several steps, which are summarized in table 8. First, we include in model #7 the full set of individual-level sociodemographic variables (model #8). Next we account for country-level differences by fitting the set of 27 European Union member states into a small number of latent segments. This results in a type of hierarchical two-level latent discrete factor model for which we test two versions: one with 2 latent country segments (model #9) and one with 3 latent country segments (model #10). We continue with the inclusion of our set of country-level covariates in each of the last two models. We end with a model (#13) with 3 latent country segments, country-level covariates, and individual-level covariates whose parameters are allowed to vary across the latent country segments.

[Table 8 around here]

Three main findings come out from our analysis of the intent-actions association. First and foremost, our results show that the association persists beyond standard controls. These include important sociodemographic factors that previous literature has shown to exert considerable influence over environmentally significant actions. Our controls include also substantial cross-country variation and measures of economic, political and environmental development that research on the subject has shown to influence pro-environmental attitudes and intentions. In spite of these controls, the positive association between the WTP and ESA factors remains statistically significant and relatively strong, with a correlation coefficient of .56 for the most elaborate model (#13).

Our second finding is that the persistence of the association notwithstanding, its strength decreases at the inclusion of controls. The factor correlation coefficient declines from the initial value of .78 to .63 following the inclusion of sociodemographic variables in the model. It declines further as we account for variance at the country level. In line with empirical evidence in the

literature our findings acknowledge that part of the association between intent and actions is explained away by sociodemographic and contextual differences.

Our third finding, as illustrated by changes in segment sizes of each latent factor, complements the first two. We see that the inclusion in the model of exogenous explanatory variables yields a slight redistribution of the sample population away from the large middle-level categories of the two latent factors. In other words, the inclusion of sociodemographic and contextual, country-level characteristics reveals a slight increase in the polarization between categories of high- and low-levels of intent and actions.

Determinants of the intent-actions association

We proceed to investigate the specific effects of covariates, paying particular attention at proxies for socioeconomic status (H4) and for country-level affluence (H5). We focus on model #13, which includes both individual- and country-level variables; three higher order latent segments that regroup the 27 European Union member states; the individual-level parameters are allowed to vary across the latent segments of countries. Our choice of model is motivated at once by its superior goodness of fit statistics (available upon request) and by the fact that its structure provides substantial details on the influence of sociodemographic and country-level effects. Tables 9 and 10 present the results for the model.

To begin with, we comment on the higher order latent structure that we use in the model to measure between-country heterogeneity at the level of the European Union. The distribution across the three country segments is in line with regional differences that are common place in European comparisons. One segment, as shown in table 9, assembles countries from South and Northeastern Europe that have comparatively lower socioeconomic living standards and development in the EU. From this same perspective, the second segment groups together countries with a slightly higher level of living standards and development that include the central European post-socialist republics, the two large Mediterranean economies of Italy and Spain along with Ireland and Estonia. The countries with the highest living standards in the EU, a majority of Northwestern economies, constitute the last and largest segment.

[Table 9 around here]

The country-level effects that we include in the model and present in Table 10 corroborate the above description and our insistence on the level of socioeconomic development as a defining feature of the higher order latent structure in so far as lower Gross Domestic Product per capita is associated with membership in the first segment. Membership in the segment with Northwestern economies is also positively associated with the number of Green Party seats won at the 2009 European Parliament elections. The rest of the coefficients lack statistical power as is common in comparative work with this small number of countries. Their interpretation follows nonetheless a predictable direction: higher levels of Gini-measured inequality go along with membership in the segment of EU countries with lowest living standards, while GDP per capita shows positive coefficients for the more prosperous societies of the second and third segments; better scores at the Environmental Performance Index are associated with membership in the third segment of the most developed EU states; population density seems to play no discernible role given its near-zero coefficients; the measure of success of the Green Party at the 2009

elections shows negative coefficients for the second segment and a near-zero coefficient for the first segment of countries.

[Table 10 around here]

Recall that in hypothesis H5 we predicted a positive effect of country affluence on intent and actions. In table 9 we present both conditional probabilities and model parameters associated with the position of each country segment on the WTP and ESA factors. The third group stands out by its higher conditional probability for scoring on the high levels of both factors. In other words, coherence between intent and actions is most likely to be found among individuals living in the most prosperous EU countries. Given that their segment represents more than half of the sample (and of the EU population), the scale of this population is important. Moreover, it contrasts starkly with the other two segments whose conditional probabilities for the high levels of the two factors are low - with a slight advantage for the first segment on the WTP factor and for the second segment on the ESA factor. These contrasts notwithstanding, there is a strong overall tendency towards the middle levels that both the conditional probabilities and the model parameters demonstrate. The model parameters also corroborate that the segments of the least and of the most prosperous EU states represent the two opposing sides of environmental intent and actions, whereas the second segment forms a kind of middle ground.

Recall also that according to hypothesis H4 we expect to observe a positive effect of socioeconomic status on intention and actions. Our model includes three proxies for socioeconomic status: years of education, occupational category and a living standards index. We report in table 11 the corresponding coefficients along with the effects of age and sex;[8] all coefficients vary across the three country segments.

Starting with the WTP factor and the segment of the least prosperous countries, the parameters provide little substance for discussion judging from the virtual lack of statistical significance. The direction of the coefficients for education level, occupational category and living standard index indicate an expected positive association of higher socioeconomic status with pro-environmental intentions. But, besides the coefficients for the middle service occupational category, the individual-level parameters do not meet even the .10 p-value threshold. It may well be that for this subsample the main driver of pro-environmental intentions is economic development as measured at the higher order latent structure by the strong, statistically significant coefficient of GDP per capita.

The individual-level parameters of pro-environmental intentions reveal much more regarding the second segment of more or less prosperous, Mediterranean and post-socialist central European societies. The age effect shows a clear split between the youth who harbor strong pro-environmental intentions and the rest of the population who do not. It is tempting to interpret this result as an evidence of a nascent sensibility to the environment among the young generations. There is evidence of a relatively well-known higher sensibility among women. There is also a positive association of pro-environmental intentions and higher levels of education and higher living standards.

[8]The model includes also controls for urban status, household size and occupational status (active-inactive) which are not presented but available upon request.

We find some of the same effects on the pro-environmental intentions for the sample of individuals from the segment of prosperous EU states. There is the positive influence of education, several specific effects of occupation and scoring higher on the living standards index. The difference lies in an interesting reversed effect for age: the only positive sign is for the statistically significant coefficient of the 55+ age group. In other words, in the prosperous and environmentally friendly countries of the EU it is the elderly who express strong pro-environmental intentions. Absent a strong and precise measure of financial well-being - our only available proxy is an index based on material belongings - we are not in a position to exclude that the contrast in age effects between the two subsamples captures not differences in the culture of generations - nascent versus established pro-environmental values - but life-course differences related to the better economic status of the elderly in Northwestern European countries compared to their status in post-socialist republics.

[Table 11 around here]

Concerning the ESA factor, the results reveal several similarities between the three subsamples. One of them relates to a contrast between young and elderly individuals. Its meaning, however, lends itself to different interpretations if closer attention is paid at the individual coefficients. Among the segment of least prosperous countries, the split appears most fundamental in so far as it cuts in half the subsample with a negative likelihood for the under-40 and a positive likelihood for the over-40-year olds. For the second segment of countries, the negative likelihood concerns only individuals under 25-years of age. Given that the coefficients on this factor are a mirror image of the coefficients on the WTP factor, these results seem to point to incoherence between declared intentions and actions for this subsample. The opposite appears true for the third subsample, corroborating the image that came out from the preceding discussion of Northwestern Europeans as leading drivers of the association between pro-environmental intent and actions.

The split across age groups appears as the defining characteristic for the first subsample. The few other parameters that pass the p-value threshold of .10 are not particularly informative. The positive effect of being a woman, present also in the other two subsamples, is expected. Given that many of the environmentally significant actions fall in the domestic realm, women's preponderant role in the division of domestic labor is a plausible explanation for the observed positive coefficient. We find it difficult to interpret the positive effect for the middle service occupation category. Its coefficient, also statistically significant, has the opposite sign on the WTP factor, which at least points to a disassociation between intent and action for that sociodemographic group.

For the two other subsamples the model parameters speak to at least one substantive difference. Socioeconomic status measured in terms of high levels of education and membership in upper service professions is positively associated with taking up environmentally significant actions for the second segment. The signs of the coefficients (also statistically significant) for the middle service category and for individuals with 15 years or less of education are both negative. On the contrary, in the subsample from the segment of prosperous European countries, socioeconomic status is negatively associated with taking up environmentally significant actions. The signs of the coefficients for the education categories are inversed, although not statistically

significant. The parameters for the middle service and the manual and non-manual occupations, all of which are statistically significant, hold positive signs.

Discussion and conclusion

In a context of heightened awareness of the dangers of climate change, previous research has built solid evidence on the considerable potential for individuals to act upon it, their widespread willingness to do so but also the sizeable barriers that they face in taking up environmentally significant actions. The ambition of this study was to bridge across the various disciplines that compose the literature and to scale up the analysis to the cross-country level at which the environmental impact of individual actions can only be meaningful. In line with the handful of similar recent studies that combine cross-country data with multilevel methods, we contributed an analysis that engages directly with the association between intent to act and a comparatively wide set of environmentally significant actions. We sought to answer the following questions: Is there an association between intent and action? Does it imply environmentally significant impact? And does it hold beyond controls for individual- and country-level effects? The results of our analysis provide answers and highlight some interesting aspects.

First, we find a positive and strong association between intent and action. We attribute that strength to a cumulative effect: stronger intentions to act are associated with a wider range of actions individuals declare engaging in. This is interesting in light of the varying degrees of feasibility and the conflicting motivations (e.g., ethics, security, savings, health concerns, social status, habit and routine) that characterize environmentally significant actions. Most importantly, the finding upends the two caveats in the literature that we identified on page 5. Briefly, while there is strong evidence that individuals have high theoretical margin for intervention, the realization to its full potential is conditional on behavioral change on a world scale and across a wide range of actions whose individual environmental contribution is otherwise infinitesimal. We take the cumulative effect of intent on actions that we observe at the level of individual respondents and throughout our sample of 27 EU member states to be a positive signal of the likelihood of pro-environmental intentions (and attitudes in general) to act as a bottom-up, individual-level driver of behavioral change with high environmental impact.

Certainly, that likelihood depends, at the least, on evidence that the intent-actions association is not spurious. Our second important result is to demonstrate that while its intensity logically declines, the association withstands the introduction of a standard list of sociodemographic and country-level controls. The robustness of the association is evidence of the intrinsic nature of the link between intent and actions. While this notion has been questioned by some (Bamberg 2003) albeit not all (Diamantopoulos, et al. 2003; Morren and Grinstein 2016) research using micro-level and experimental settings, the cross-country perspective adopted in our analysis increases the scope of the result.

Beyond our specific research questions, a third result we wish to highlight is the strong, positive link between coherence of intent and actions and a country's level of economic development and affluence. We interpret this as evidence on how structural constraints condition people's behavior. Whatever the willingness of individuals to comply with environmental norms and values, their ability to act is fundamentally limited by available infrastructure: legal, political, socioeconomic and material. To cite one obvious example whose logic, though, applies widely,

recycling practices are highly and evidently conditioned by the existence of dedicated facilities (Derksen and Gartrell 1993). More generally, the greater convergence of intent and actions in more affluent societies points to the limits of mitigation strategies that focus exclusively on behavioral change (Maniates 2001; Webb 2012).

And forth, the multilevel modeling strategy adopted in this article points to the considerable variability of individual-level determinants of both intent and actions and their contingency on contextual, country-level factors. We had considered the sample of EU member states - by virtue of their relative affluence and legal, political and socioeconomic coherence - to constitute a favorable ground to observe a positive effect of socioeconomic status on pro-environmental intentions and actions. Pisano and Hidalgo (2014), in their critical discussion of the long-lasting debate on the competing role of sociodemographic and attitudinal factors, call this prediction the "hard social base" of environmentalism. With bibliographic and original empirical evidence in hand, they argue the case for a "soft base": the notion that the individual-level determinants of environmentalism are behavior- and attitude-specific, vary widely across populations and depend strongly on a country's characteristics (2014, 397). Our results confirm this viewpoint and likewise call for better appreciation of the interactive nature of the influence of individual and contextual factors on both attitudes and actions (Pampel 2014).

The bottom line of our study is that pro-environmental intentions and attitudes can in all likelihood serve as potent drivers of individual actions with consequential environmental impact. Further and finer investigation is necessary to understand how to foster these drivers beyond the small minority for which we observed this to be the case. We argued that the quality of such an investigation depends on its capacity to explore a wide range of actions with varying technical potential, to measure environmental impact, to account for the interaction of individual and contextual characteristics, to scale up the analysis to a cross-country level, among others. While we have tried to stay close to these standards, we, like others before us, were tributary to substantial limitations in publicly available data. We have had to make serious compromises with the precision of our analysis and with the relevance of our results: in the inability to trace causal links between intentions and actions; in the reliance on aggregate categories of self-reported behavior; in the absence of a direct measure of environmental impact; in the use of a sample of affluent and sociopolitically homogeneous societies. This notwithstanding, we believe our study addresses crucial blind spots in the present literature and helps push research forward. But we are also convinced that a full-fledged investigation of the subject is contingent on the future production of and public access to data that enables researchers to meet the above high standards. The stakes of climate change are by any measure a sufficient justification for the investment.

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TABLES

Table Erreur ! Source du renvoi introuvable.. European Union member states, country codes and sample sizes

		Sample size (in %)	
Country	Code	Unweighted	Weighted
Austria	AT	4.0	1.8
Belgium	BE	4.0	2.2
Bulgaria	BG	3.7	1.6
Cyprus	CY	1.8	0.2
Czech Republic	CZ	3.8	2.3
Denmark	DK	3.7	1.1
Estonia	EE	3.7	0.2
Finland	FI	3.6	1.1
France	FR	3.8	11.4
Germany	DE	5.9	16.4
Great Britain	GB	4.9	13.0
Greece	GR	3.8	2.1
Hungary	HU	3.9	2.1
Ireland	IE	3.8	0.9
Italy	IT	4.0	12.6
Latvia	LV	4.0	0.4
Lithuania	LT	3.7	0.7
Luxembourg	LU	2.0	0.1
Malta	MT	1.9	0.1
Netherlands	NL	4.0	3.3
Poland	PL	3.5	7.5
Portugal	PT	3.7	1.9
Romania	RO	3.8	4.3
Slovakia	SK	4.1	1.1
Slovenia	SL	3.6	0.4
Spain	ES	3.6	9.4
Sweden	SW	3.9	1.9
Sample size		21,237	21,237

Note: Weighted sample reflects a country's population as a proportion of total EU population.

Table Erreur ! Source du renvoi introuvable.. Measures of intent and actions, definitions, and proportions

		in %
Intent: Willingness to pay (WTP)		
Question: "You are ready to buy environmentally friendly products even if they cost a little bit more."		
Totally agree		23.6
Tend to agree		51.0
Tend to disagree		16.9
Totally disagree		8.5
Environmentally significant actions (ESA)		
Question: "Have you done any of the following during the past month for environmental reasons?"		
Reduced Travel	"Chosen a more environmentally friendly way of traveling (by foot, bicycle, public transport)"	29.9
Reduced Disposables	"Reduced the consumption of disposable items (plastic bags, certain kind of packaging, etc.)"	38.4
Increased Recycling	"Separated most of your waste for recycling"	67.6
Reduced Water consumption	"Cut down your water consumption (e.g., not leaving water running when washing the dishes or taking a shower, etc.)"	44.0
Reduced Energy consumption	"Cut down your energy consumption (e.g., turning down air conditioning or heating, not leaving appliances on stand-by, buying	55.5
Purchased Labelled products	"Bought environmentally friendly products marked with an environmental label"	18.8
Purchased Local products	"Chosen locally produced products or groceries"	30.2
Reduced Car use	"Used your car less"	21.5

Table Erreur ! Source du renvoi introuvable.. Sociodemographic and contextual measures and means/proportions

	in % (mean)
Individual-level	
Age	
15-24	6.9
25-39	28.8
40-54	31.0
55+	33.4
Sex	
Female	51.5
Urban status	
rural area or village	34.4
small to middle-sized city	40.4
large city	25.2
Household size	(2.6)
Years of education	
15 or less	20.2
16-19	49.4
20 or more	30.5
Occupation category	
farmers	2.5
self-employed	4.8
upper service	11.6
middle service	13.9
non-manual workers	32.7
manual workers	30.1
not applicable	4.4
Professional status	
active	59.3
Living standard index (number out of five semi-durables)	(3.8)
Country-level	
Gini	(30.9)
Environmental Performance Index 2011	(65.0)
GDP/c (log)	(4.4)
Population density	(172.9)
Green vote (% EU Parliament 2009 seats for Green party)	(7.6)

Table Erreur ! Source du renvoi introuvable.. Estimates of inter-category variation in the strength of the intent-actions association for selected covariates

Occupation category		GDP per capita	
farmers	.20	Lower tier	.21
self-employed	.19	Middle tier	.27
upper service	.33	Upper tier	.35
middle service	.30		
non-manual workers	.26		
manual workers	.26		
not applicable	.17		

Note: Estimates represent the square root of Nagelkerke pseudo-R squared of a simple ordinal logistic regression with dependent variable the measure of WTP intent and independent variable the measure of number of actions.

Table Erreur ! Source du renvoi introuvable.. Goodness of fit tests for a model with 2 Discrete Latent Factors with different number of clusters

M	Definition and number of segments	LL	BIC(LL)	AIC(LL)	AIC3(LL)	CAIC(LL)	Npar	Bootstrap LL p-value (s.e.) for M# to M7
1	F1=4 (WTP), F2=8 (ESA); with F1-F2 association	-122,707	245,763	245,485	245,520	245,798	35	
2	F1=4 (WTP), F2=7 (ESA); with F1-F2 association	-122,708	245,755	245,484	245,518	245,789	34	
3	F1=4 (WTP), F2=6 (ESA); with F1-F2 association	-122,707	245,743	245,480	245,513	245,776	33	
4	F1=4 (WTP), F2=5 (ESA); with F1-F2 association	-122,715	245,749	245,494	245,526	245,781	32	
5	F1=4 (WTP), F2=4 (ESA); with F1-F2 association	-122,716	245,741	245,494	245,525	245,772	31	0.38 (0.05)
6	F1=4 (WTP), F2=3 (ESA); with F1-F2 association	-122,733	245,766	245,527	245,557	245,796	30	0.69 (0.05)
7	F1=3 (WTP), F2=3 (ESA); with F1-F2 association	-122,733	245,755	245,524	245,553	245,784	29	
7'	F1=3 (WTP), F2=3 (ESA); w/o association	-123,153	246,585	246,362	246,390	246,613	28	

Note: WTP - Willingness to pay; ESA - Environmentally significant actions.

Table Erreur ! Source du renvoi introuvable.. Conditional probabilities for the Discrete Latent Factor Model #7

	F1: WTP			F2: ESA		
	Low	Middle	High	Low	Middle	High
Intent (WTP)						
Totally agree	0.02	0.22	0.66	0.05	0.22	0.48
Tend to agree	0.24	0.55	0.32	0.30	0.55	0.43
Tend to disagree	0.31	0.17	0.02	0.29	0.17	0.07
Totally disagree	0.43	0.06	0.00	0.37	0.06	0.02
Actions (ESA)						
Reduced Travel	0.10	0.29	0.63	0.08	0.27	0.64
Reduced Disposables	0.08	0.38	0.83	0.05	0.35	0.84
Increased Recycling	0.32	0.69	0.92	0.27	0.68	0.93
Reduced Water consumption	0.15	0.44	0.78	0.11	0.42	0.79
Reduced Energy consumption	0.17	0.56	0.90	0.12	0.55	0.92
Purchased Labelled products	0.02	0.17	0.60	0.02	0.14	0.57
Purchased Local products	0.07	0.29	0.74	0.04	0.26	0.76
Reduced Car use	0.05	0.20	0.56	0.04	0.18	0.58

Note: all conditional probabilities are statistically significant at the 0.05 level (two-tailed tests).

WTP - Willingness to pay; ESA - Environmentally significant actions.

Table Erreur ! Source du renvoi introuvable.. Estimates for indicator loadings and interfactor association for Discrete Latent Model #7

Standardized estimates	F1: WTP	F2: ESA
Loadings		
1 Intent: Willingness to pay (WTP)	0.375	
2 ESA: Reduced Travel		0.327
3 ESA: Reduced Disposables		0.422
4 ESA: Increased Recycling		0.299
5 ESA: Reduced Water consumption		0.333
6 ESA: Reduced Energy consumption		0.367
7 ESA: Purchased Labelled products		0.356
8 ESA: Purchased Local products		0.416
9 ESA: Reduced Car use		0.368
Correlations		
F2: ESA	0.781	

Note: All estimates have a p-value < .001 (two-tailed tests).

Not shown are the model's local dependencies and intercepts, available upon request.

WTP - Willingness to pay; ESA - Environmentally significant actions.

Table Erreur ! Source du renvoi introuvable.. Changes in interfactor correlation and segment sizes in Discrete Latent Factor Model #7 following controls for individual- and country-level measures

		Covariates		# Country-level Latent	F1-F2	F1: WTP			F2: ESA		
M#	Definition	Individual level	Country level	Segments	Correlation Coefficients	Low	Middle	High	Low	Middle	High
7	Basic model				0.78 ***	0.09	0.84	0.07	0.09	0.78	0.13
8		X			0.63 ***	0.11	0.80	0.09	0.10	0.76	0.14
9		X		2	0.56 ***	0.12	0.78	0.10	0.10	0.77	0.13
10		X		3	0.57 ***	0.12	0.78	0.10	0.10	0.77	0.13
11		X	X	2	0.58 ***	0.12	0.77	0.11	0.10	0.76	0.14
12		X	X	3	0.58 ***	0.12	0.76	0.12	0.10	0.76	0.14
13	Individual-level covariates vary by country-level latent segment	X	X	3	0.56 ***	0.12	0.76	0.12	0.10	0.76	0.14

Note: *** p<.001 (two-tailed tests). WTP - Willingness to pay; ESA - Environmentally significant actions.

Table Erreur ! Source du renvoi introuvable.. Conditional probabilities and parameter estimates for Second Order Latent Country Groups of Model #13

F1: WTP		Conditional Probabilities				Model Parameters		
Segments	Country Codes	Total	Low	Middle	High	Low	Middle	High
1	BG, GR, LV, LT, PL, PT, RO	0.19	0.13	0.83	0.05	-2.90 *	3.49 ***	-0.59
2	HU, IT, ES, CZ, EE, IE, SK	0.29	0.14	0.85	0.01	-3.15 ***	4.00 §	-0.85
3	DK, FR, NL, DE, LU, BE, GB, FI, SE, AT, CY, MT, SI	0.53	0.10	0.68	0.21	-3.21 ***	1.75 ***	1.46 *
F2: ESA		Conditional Probabilities				Model Parameters		
Segments	Country Codes	Total	Low	Middle	High	Low	Middle	High
1	BG, GR, LV, LT, PL, PT, RO	0.19	0.26	0.73	0.01	4.45 ***	2.38 ***	-6.84 ***
2	HU, IT, ES, CZ, EE, IE, SK	0.29	0.09	0.84	0.08	3.17 ***	2.14 ***	-5.30 ***
3	DK, FR, NL, DE, LU, BE, GB, FI, SE, AT, CY, MT, SI	0.53	0.05	0.72	0.23	2.05 *	2.12 ***	-4.17 ***

Note: § p<.10, * p<.05, ** p<.01, *** p<.001 (two-tailed tests). WTP - Willingness to pay; ESA - Environmentally significant actions.

Table Erreur ! Source du renvoi introuvable.. Parameter estimates for country-level determinants of belonging in Second Order Latent Country Groups of Model #13

	Country Segments		
	1	2	3
Gini	0.157	-0.162	0.005
EPI	-0.029	-0.068	0.097
GDP/c (log)	-16.145 **	11.024	5.121
Population density	-0.001	-0.003	0.004
Green vote	-0.012	-0.256	0.268 *
Constant	67.693 **	-36.860	-30.833

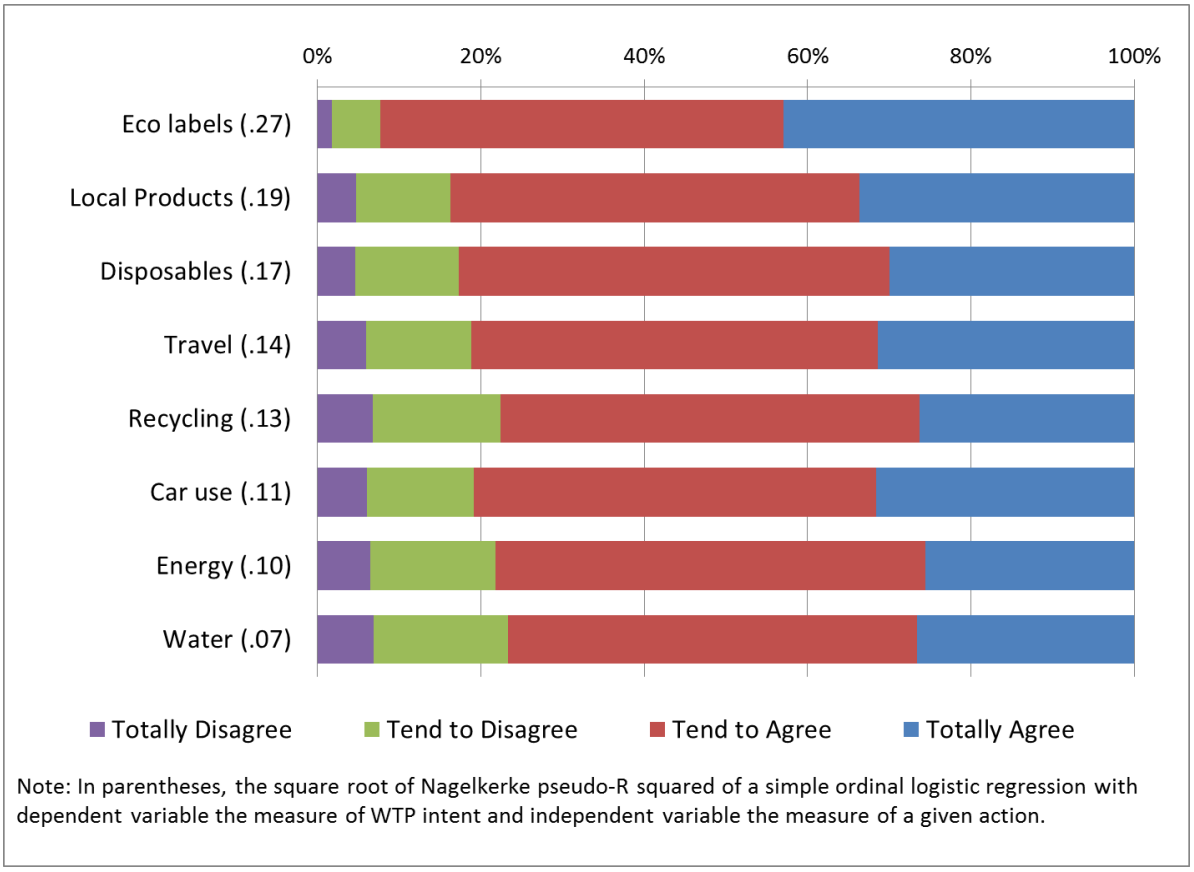
Note: * p<.05, ** p<.01 (two-tailed tests).

Table Erreur ! Source du renvoi introuvable.. Parameter estimates for individual-level determinants of position on Discrete Latent Factors by Second-Order Latent Country Groups of Model #13

	F1: WTP			F2: ESA		
Segments	1	2	3	1	2	3
Age						
15-24	-0.108	4.818 ***	-1.264 *	-0.742 *	-3.563 ***	-0.861 §
25-39	0.524	-2.112 ***	-0.440 §	-0.585 ***	0.763 ***	0.111
40-54	-0.483	-1.553 ***	-0.203	0.773 **	1.212 ***	0.924 ***
55+	0.068	-1.153 *	1.906 ***	0.554 ***	1.588 ***	-0.174
Sex						
Female	-0.085	0.261 *	-0.124	0.378 ***	0.219 §	0.776 **
Years of education						
15 or less	-3.319	-0.325 *	-0.848 *	-0.175	-0.917 **	0.037
16-19	-2.178	0.051	-0.438 *	0.032	-0.110	0.053
20 or more	5.497	0.274	1.285 **	0.142	1.027 ***	-0.090
Occupation category						
farmers	0.006	0.381	0.504	0.192	-1.204	-1.493 §
self-employed	1.522	5.116	0.327	-0.352	0.849	-0.202
upper service	0.972	-4.782	1.105	0.472	2.146 ***	0.385
middle service	-2.648 ***	8.329	-0.820	2.085 ***	-0.776 §	1.891 **
non-manual workers	-0.836	-2.851	-0.981 **	0.287	0.701	1.325 ***
manual workers	-0.178	-3.645	-1.745 ***	-0.762	0.245	0.629 *
not applicable	1.162	-2.548	1.611 §	-1.920 ***	-1.960 ***	-2.536 *
Living standard index	0.959	0.696 ***	0.344 *	0.331	0.251 §	0.165

Note: § p<.10, * p<.05, ** p<.01, *** p<.001 (two-tailed tests). Categorical variables are effect-coded, i.e. the reference category for each variable is its grand mean. Not shown are parameter effects for urban status, household size and occupational status (active-inactive). WTP - Willingness to pay; ESA - Environmentally significant actions.

FIGURES



Note: In parentheses, the square root of Nagelkerke pseudo-R squared of a simple ordinal logistic regression with dependent variable the measure of WTP intent and independent variable the measure of a given action.

Figure Erreur ! Source du renvoi introuvable.. Association of Intent and Actions in order by strength

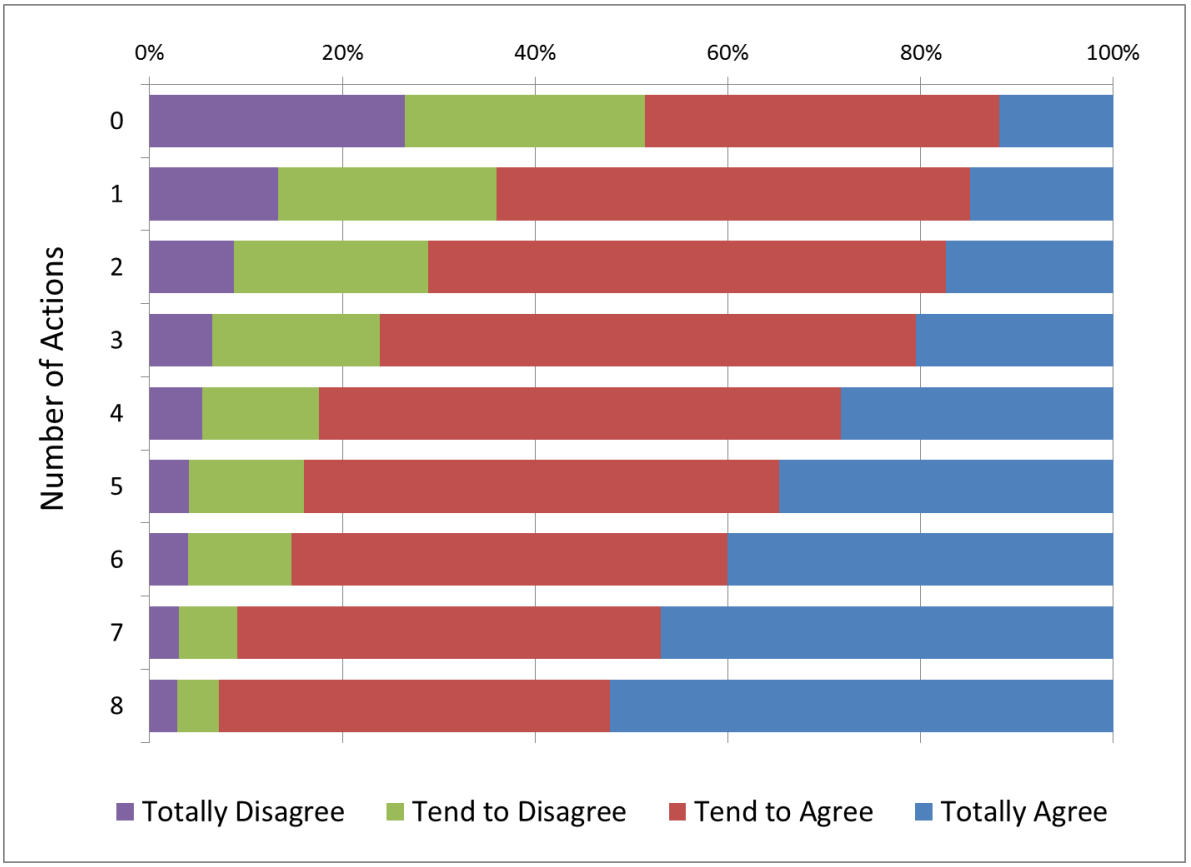


Figure Erreur ! Source du renvoi introuvable.. Association of Intent and Number of Actions