Green Purchasing: the Effect of Parenthood and Gender

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Abstract

The extant literature has inquired the effect of several socio-economic individual characteristics on green purchasing, but has paid few attention to parenthood and to the presence of children. If the parents' utility includes that of children, then their presence should affect parents' green purchases. Using data from 61 countries, I provide evidence that having children decreases the probability of buying green products; an increasing number of children has the same effect. However, parenthood and number of children have opposite effects on fathers and on mothers. Policymakers and marketing divisions of firms may benefit from this empirical evidence.

Keywords: green purchasing; parenthood; number of children; gender

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1. Introduction

During the last decades, people around the world have become more and more concerned about the environment, because of the continuous and accelerating depletion of natural resources (Fransson and Gärling, 1999). Over time, different strategies and policies have emerged to contrast the phenomenon of environmental degradation. Reduction in the use of resources, new technologies that allow saving energy and water, responsible and sustainable use of renewable resources etc. are some examples; also the individual behaviour of private citizens has started to change towards the consumption of green products. These may be goods, whose production involves limited use of resources, recycled materials, use of natural instead of chemical components, etc. Roberts (1996) highlights that US consumers have started this process of habit change already in the first part of the 1980s, when the US media began to sensitise the population about the environmental problems. According to Schlegelmilch et al. (1996) in the mid-1990s 82% of the UK citizens already rated environmental problems as urgent, showing a high degree of environmental concern, which translated in a demand for interventions aimed at preserving the environment. In addition, other studies (for example Mohd Suki, 2016) highlight that environmental concern also increases the purchases of green goods.

Several studies (for a survey of the relevant literature see the next section) focus on green consumption[1] and on the individual characteristics that foster it. Green consumers have been found to be opinion leaders, people who like to try new products (Shrum et al., 1995), highly educated (Paul and Rana, 2012) and from affluent households (Chan, 2000a and Zhu et al., 2012). Moreover, already at the beginning of the studies on the subject, Roberts (1996) highlighted that the characteristics that identify green consumers change over time, perhaps as the availability of green products, their price and the information about them also change over time. Contrarily, Tanner and Wölfing Kast (2003), in a study on Switzerland, did not find any relationship between green purchasing and socio-economic variables such as employment status and income class. However, they did not consider many other variables. In addition to shed light on individual behaviour, the study of the demand side for green products is relevant non only because understanding who the green consumer is allows designing strategies that foster this virtuous behaviour. Indeed, Cherian and Jacob (2012) show that green demand fosters green production; in other words, increasing the demand for green products is a way to induce the firms to become greener[2]. Moreover Coad et al. (2009) find that individual environmental concern increases the support for environmental policies.

[1] For a comprehensive presentation and discussion of this concept, please refer to Peattie (2010).

[2] However, Brécard (2013) proposes a theoretical model that shows that as the demand for green products increases, the firms increase the array of their green products (i.e. increase product differentiation). This strategy will end in over-differentiation, which leads to over-pollution. In other words, also the production of green goods should be regulated to avoid negative externalities of this sort.

The extant literature has also unveiled that altruistic people are more likely to be green consumers than non-altruistic (see for example Straughan and Roberts, 1999, which constitutes an early study on the issue). This result is not surprising, as the protection of the environment usually entails to bear costs individually for producing positive externalities for the society. In other words, from an egoistic and rational (this last adjective used with its neoclassical economics meaning) point of view, people should not behave greenly, or, at least, they should be less green than some of them actually are. However, the economics literature shows also that a particular event in life – parenthood – tends to increase the altruism of people who experience it. From a theoretical point of view, the utility models with overlapping generations, and other models, which include the offspring's utility in that of parents, predict that, if some event today will decrease the utility of the children tomorrow, then the parents will try to prevent that event from happening or will try to limit its consequences. Empirically, Ziegelmeyer and Zigelmeyer (2016) show that parents are more conservative when they have to choose for their children than when they have to choose for themselves. What the literature suggests, then, is that parents should care for the environment more than non-parents and that the environmental concern might be an increasing function of the number of children a person has. Indeed, as this number grows, so should do the penalty in terms of parent's utility engendered by the deterioration of the environmental living conditions for the future adults.

Although the literature on individual characterises of green consumers has inquired several aspects, the effect of parenthood and of the number of children on green purchasing has poorly been studied. The analysis presented in this work aims at providing some evidence in favour of the hypothesis that parents are more likely to be green consumers than non-parents and that this behaviour strengthens as the number of children increases. The data used for this study cover 61 countries around the world and are taken from the *World Values Survey* (WVS henceforth). This wide coverage allows for obtaining results whose validity is ample, and goes beyond the borders of one single country, in which the most of the existent studies on the issue are constrained. The price to pay to this generality is the genericity of the measure of green consumption: the WVS does not provide any information about the amount spent to buy green products or the frequency in time of such an action. The WVS only has information whether the household of the interviewee purchased green products within the last 12 months.

The results of the empirical analysis will not fully support the hypotheses outlined before. Indeed, while fathers are more prone to purchase green products than childless men are, the opposite is found when mothers are compared to childless women.

2. Green consumption: a survey of the empirical literature.

In this section, I wish to present the relevant empirical articles, which link observable individual characteristics and green purchase decisions. Having children and their number should enter the list of these individual characteristics. However, as the reader will see in a moment, the extant literature has paid very few attention to this issue. The most salient results of the works presented in this section highlight that income, education and social norms are strong predictors of one's intentions to purchase green goods.

Education is a relevant characteristic for explaining green consumption. Deciding which type of product buying requires to be informed both about the environmental situation and the benefits that responsible consumption brings to its preservation and about which products are green (Shen and Saijo, 2009). For this reason, highly-educated people are more likely to choose green goods (Chan, 2000a). Indeed Chan (2000b) reports the results of a study on Chinese consumers and shows that people with low ecological awareness have low ecological affect and are much less likely to purchase green products than consumers more informed about the environmental problems are. Also Lee (2011) and Kanchanapibul et al. (2014) find a positive effect of information and environmental awareness on green consumption. Examining a sample of UK people, Diamantopoulos et al. (2003) reveal that a positive relationship between the level of education and green consumption exists. Similar results are found by Gan et al. (2008) for a sample of young New Zealanders. Fleith de Medeiros and Duarte Ribeiro (2017) highlight that more educated people are also more confident in the information contained in eco-labels, and this increases their willingness to purchase green goods. According to some authors (Shaw Hughner et al., 2007 and Paul and Rana, 2012), education acts also as a mediator between the desire of healthy lifestyles and the consumption of green products, which may be perceived as healthier than others. Related to education, income is another relevant determinant of green purchases. Indeed, eco-friendly goods are often more expensive than their brown substitutes; consequently, people tend to be less prone to buy them, or, given their budget constraints, they purchase less than they wish (Ali et al. 2011; Zhu et al., 2013 and Zhao et al., 2014). However, Fleith de Medeiros et al. (2016) show that consumers who intend to purchase green goods are willing to pay them about 10% more than their non-green substitutes. This suggests that, while high prices and budget constraints may constitute an obstacle for eco-friendly purchases, the buyers partially counterbalance these negative effects with a higher willingness to pay.

Consistently with some works showing that women have higher levels of environmental concern than men (Hunter et al., 2004 and Xiao and McCright, 2015), Diamantopoulos et al. (2003) found women to purchase more green products than men, and Chekima et al. (2016) find the same results in Malaysia. But this evidence has proved not to be conclusive: Gilg et al., (2005) found no gender effect in the UK; Chen and Chai (2010) did not detect any effect of this type in Malaysia and the same holds for Zhu et al.

(2013) for China. Mostafa (2007) found an even opposite effect, with Egyptian men more concerned about the environment and more prone to purchase green products than women. However, Egyptian men resulted also more informed than women about environmental problems, and this may be the reason of the gender effect observed by the author. However, most of the surveyed articles does not include children as a control, and therefore there is no information about the gender effect, when it is interacted with parenthood.

Straughan and Roberts (1999) show that, in the USA, altruism is a stronger explanatory variable for green purchasing than environmental concern is. Consistently, also Mazar and Chong (2010) run three experiments and find altruistic people to buy more green products than less altruistic individuals. Somehow related to altruism is collectivism, which is another form of prosocial attitude (Batson et al., 2011). Chan (2001) presents results from a study on Chinese citizens, indicating that people with stronger collectivist sentiments are also more involved in green purchasing than the others. Similar results are found in the USA (Kim and Choi, 2005), unveiling that collectivism and its link with green behaviours are not peculiar of Confucian and socialist societies. More recent works point out that individual social norms (that include altruism and collectivism) are strongly related to green behaviour. In particular, Jansson et al. (2010) show that personal norms are determinant in the adoption of eco-innovations; moreover, the consciousness that own decisions affect the future of the environment also contributes to enhance green consumption (Kaufmann et al., 2012). To analogous conclusions comes Moser (2015), analysing the willingness to pay for green goods in Germany. In addition to this evidence about individual values, Mohd Suki (2016) highlights that also social norms and the individual desire to adhere to them fosters green purchasing. Liobikienė et al. (2016) show the relevance of both subjective and social norms in determining green consumption in the countries of the EU. This last study is very relevant, as, among those surveyed in this paper, is the only work that analyses more than one country at a time. Two other very recent studies (Liobikienė et al., 2017 and Yadav and Patak, 2017), respectively for Austria and Lithuania and for India, have shown that personal norms, social norms and social control on individuals has a positive effect on green purchasing.

A consequence of the previous evidence may be that households with children are more prone to green consumption for at least two reasons. The first is that outlined in the introduction: parents are likely to care for their offspring future wellbeing, which entails also the preservation of the environment. The second reason is that family is an institution, where both altruism and collectivism play a crucial role. Therefore, as these two attitudes towards social life are positively related to green purchasing, it is possible that people with children are more eco-friendly and purchase more green products than people without children. Unfortunately, the literature on this matter is almost inexistent: very few (and relatively old) articles have marginally addressed the issue. Considering gender and children together, Laroche et al.

(2001) analyse a sample of Canadians and shows that women with at least one child have a higher willingness to pay for green goods than men or childless women. However, the evidence about the link between parenthood and green purchasing is not univocal: Diamantopoulos et al. (2003) did not find any relationship between the number of children and the green behaviour of a sample of UK citizens; they also find weak evidence that married individuals are heavier green consumers than singles. Given this gap in the literature, the present paper aims at providing some first evidence in favour of a positive link between having children and green purchasing.

Before continuing with the presentation of the data and the methodology used in the empirical analysis, I wish to summarise some of the works that contain policy recommendations. This information will be useful when, in the conclusions of the paper, I will outline some suggestions of policy, based on the empirical results. From a policy perspective, the surveyed literature and some other works suggest that the primary channel to promote green consumption is marketing. Examining the wine market, Barber et al. (2009) proposes to use a selective marketing approach to increase the purchases of green goods. Recently, Rahbar and Wahid (2011), Nittala (2014) and Goh and Balaji (2016), analysing different countries (one for each of the cited articles), have found a positive effect of advertising and trust in eco-labels on purchases; Vazifehdoust et al. (2013) reach analogous conclusions, studying the behaviour of Iranians.

3. Data and methodology

The data used in the analysis are from two datasets. The first is the WVS, from which the variable about green purchasing and the socio-economic characteristics of the interviewee and of her household are taken. In particular, the education, gender, age, marital status, employment status and number of children of the respondent are used as regressors. The choice of including these variables comes from the results of the empirical studies summarized in the previous section. The variable used as dependent in the regressions is dichotomous and takes value 1 if the responder reported that she had bought "products that [she] think[s] are better for the environment" in the last 12 months; the answer is coded 0 if the answer was negative. In particular, the fourth wave (2006 – 2008) of the WVS is used in the analysis. There are two main reasons for this choice: the first is that from the previous waves the question about green purchasing was absent. The second is that the subsequent waves (fifth and sixth) recorded responses after the beginning of the international economic crisis that has affected countries and areas within each country differently (Capello et al., 2015) In addition, as income is a major determinant of green consumption, and the crisis has impacted especially this variable, the inclusion of responses recorded during the crisis may have unnecessarily noised the results. Finally, the crisis has also affected

fertility decisions (Sobotka et al., 2011 and Goldstein et al., 2013), and the impact has been different across countries. All these were considered sufficient reasons to exclude this period of deep economic recession from the present analysis.

The second set of data includes several economic and environmental variables at country level. Indeed, the analysis uses data from 61 countries around the world, therefore it should include at least a dummy variable for each country included, but one, to account for country fixed effects. However, instead of using a battery of 60 dummies, I use a set of variables measured at country level, which capture some characteristics that may influence the ecological behaviour of the citizens. This procedure, together with clustering the standard errors at country level, allows for cleaning the results at individual level from as much noise as possible coming from country fixed effects. These last, in particular, may include environmental policies, the availability of funds to pursue them, the level of economic development of the country. The level of economic development is captured by the very traditional measure of per capita GDP, which is generally positively linked with environmental concern (Halbheer et al., 2006). Other characteristics that may have some impact on the environment are also included; between them is the population density, which increases the consumption of natural resources (Thalmann, 2004) and affects the people's support to environmental policies (Halbheer et al., 2006 and Nelson et al., 2007)). Also the share of population living in urban areas is considered as a relevant control (Cárdenas Rodríguez et al., 2016). The included measure of environmental degradation is the value of CO_2 emissions per capita. Appendix A reports the list of all the countries included in the analysis.

I wish to stress that controlling for country specific fixed effects is very important as Liobikienė et al. (2016) show the presence of differences between countries, even when they are all EU members, i.e. more homogeneous than those used in the present work. Of course, one might focus on one country at a time, or perform separate analyses for each country. However, this procedure may produce results that are valid for a country, but not for others. The point here is that the environmental policies are generally designed at supranational level, as pollution, resource depletion, etc. are world-scale problems and require international responses. One might argue that green consumption is a local issue, as many producers of green goods are local. While this is true, it is also true that multinational companies, which exploit economies of scale, produce large shares of many products (such as cars, food, clothes, paper, etc. .), which may be produced so to be green. To convince them to opt for green goods, the possibility of selling them in large markets should exist, in terms of a large-enough number of potential consumers. In other words, if green consumption is linked to an individual characteristic (such as children) that is present on large scale in many (if not all the) world countries, then also multinational companies will have an incentive for marketing green products. Consequently, an analysis that includes a large number of countries, and shows the existence of some largescale regularity, is important.

The data are analysed through well-established econometric techniques. As some of the interviewees have children while others do not, and as there might be individual characteristics that explain both the decision of having children and that of purchasing green goods, the data are firstly analysed using a Heckman selection model. This has the advantage of presenting the results for the determinants of green purchasing clean of the effect of the variables affecting the decision of having children. However, the second step of the Heckman selection model entails OLS estimation. When, as in the case presented in this analysis, the dependent variable is dichotomous, the second step of the Heckman model produces linear probability estimates (LPE), instead of the maximum likelihood estimates (MLE) that a probit or logit model would produce. The main difference between LPE and probit or logit model (Caudill, 1988) is that the first methodology may lead to a sum of the probabilities attached to the alternative options, which is larger than one. However, Angrist and Pischke (2009) show that the LPE are less distorted than MLE when the underlying hypotheses on the distribution form of the error terms and of the dependent variable are violated (which occurs the most of the times in the empirical works). For this reason, both the Heckman selection model (HSM) is used to estimate the effect of the number of children on the attitude to purchase green products, and, in addition, the paper presents other estimates, obtained through MLE.

The main results obtained from MLE separately report the effect of having children vs. non-having offspring and the effect of the number of children for the subsample of respondents who are parents on green purchasing. In other words, I have estimated first the effect of a dummy capturing whether the respondent has children (dummy = 1) or not (dummy = 0) on whether the household has purchased green products during the last 12 months. Then I estimate another equation, where only parents are included, which inquires the effect of the number of children on the decision of purchasing green. The idea behind these two different estimation is the following: on the one hand I expect that having children induces greener behaviours than being childless. On the other hand, as the number of children increases, I expect the behaviour of the individual/household to become "greener", as I expect the environmental concern to be positively related to the number of children. In both cases, some different specifications are estimated for the sake of providing the reader with robustness checks.

The analyses are conducted in the following order: first probit regressions to study the effect of having vs. non-having children on green purchasing, then the effect of the number of children on the same variables of interest. In this second case, the first results are obtained through HSM, while the second through MLE.

The main variables of interest in all the three cases (HSM and the two MLE) are whether the interviewee has children or not, and their number for the subsample of parents. However, as the extant literature has widely inquired the existence of some gender effect, without finding conclusive evidence,

and as men and women may react differently to parenthood (see for instance Thompson and Walker, 1989 and Schober and Scott, 2012) also gender (dummy: male = 1; female = 0) is a focal variable in the analysis. It is introduced in the regressions both alone and interacted with the dummy for having children or not and with the variable that measures the number of children of the interviewee. The most complete specification includes a large number of controls, which are important to obtain clean estimates for the variables of interest, but do not constitute the focus of the paper. For this reason, the tables included in the main text of the paper present only the coefficients and (where necessary) the marginal effects of the variables of interest[3].

Table 1 presents the descriptive statistics for the variables used in the analysis. From this table it is also possible to see all the controls that are included in the different specifications estimated. As it may be noticed, the country-specific controls are measured before 2006, to avoid problems that may have arisen from contemporaneity. I wish to stress that the most of these variables are hardly subject to relevant variations from a year to another, so that their value in 2002 may be considered representative as that in 2006.

4. Results and discussion

Table 2 reports the probit estimates that show the impact of having children on green purchasing. The columns of the table show different specification, including different controls. The first five columns are estimated for the full sample (172,848 individuals), while the last three columns report the estimates for the same specification as that in column 5, but for different age groups. In particular, in the regression presented in column 6 individuals aged between 20 and 44 included are considered; column 7 includes the interviewees aged between 46 and 65 and, finally, the last column of the table is for the subsample of the over-65. According to the figures in the table, having children reduces the probability of purchasing green goods; the effect has the same sign even in the specification where it is not statistically significant. This lack of significance may be due to the lack of enough controls; in other words, the estimates in columns (1) and (2) are noised by the crossed effects between the controls that are not included and the regressors used.

The results are in contrast with the expectations discussed in the first two sections of the paper. However, among others Delle Fave and Massimini (2004) show that parenthood decreases the parents' time available for daily activities including gathering information and purchasing goods; therefore this result is consistent with this change in time use. Moreover, Craig and Baxter (2016) show that this

[3] Full tables are available upon request to the author.

reduction in time available for daily duties other than childcare affects both men and women. In line with other studies, I also find that men are on average less prone to purchase green products than women are. Of course, there may be countries (such as Egypt), where the opposite holds (Mostafa, 2007), but the negative effect of being male on the variable of interest is largely prevalent in the countries analysed.

The most interesting result of Table 2 is perhaps the sign of the interaction between gender (male) and having children. The coefficients and the marginal effects are almost always positive and statistically significant. This suggests that parenthood increases the probability than men purchase green goods. The total net effect for fathers is still negative in all the columns, indicating that women are anyway more willing to buy eco-friendly products than men are. However, having children affects fathers' behaviour virtuously, while this does not happen for women. In other words, men's environmental concern seems to be positively affected by parenthood. This result is consistent with the models that include the offspring's utility in that of the parents and is very robust to the inclusion of several controls.

Another interesting result is offered by the figures presented in the last three columns of the table. In the last, no effect of gender or of having children is detected. There are two main possible explanations for this outcome. The first is that the sample size is too small for any coefficient to be significant. While there are almost 16,000 interviewees included, they are distributed between 61 countries. However, one may also deem that such a number of observation is anyway sufficient to reveal statistical significance, if any. In this second case (which is that preferred by the author of the analysis), the figures suggest that the effect of parenthood is transitive and tends to disappear with age, and so does the effect of gender. It seems that as people approach the last days of their life, their preferences become more homogeneous between sexes and parenthood has no longer effect on green purchasing. This may be explained by the fact that parents are particularly concerned about their offspring's life, when children are young and parents bear heavy responsibilities towards them. A second possible interpretation, consistent with the theoretical models that include offspring's utility in that of parents, is the following. People aged 65 or more have children who are older than those of younger individuals. Consequently, the first have a residual life expectation, which is shorter than that the second. Indeed, the older a person is, the less relevant environmental damages are for her utility. Even assuming that all the interviewees are representable through a utility function that includes that of their children, old parents know that the degradation of the environment will have small impact on the lives of their children. The same is not true for young people and relatively young parents: on their lives the progressive deterioration of the environment will have a heavy impact. All this implies that we should observe more environmental concern (and therefore a higher probability of buying green products) in the young than in the old cohorts.

Table 3 presents the estimates obtained using HSM. Here, the selection variable in the first step is having children, while the dependent variable of the second step is, as in Table 2, whether the family of the respondent has purchased green goods in the last 12 months. The figures show that as the number of children increases, the probability of purchasing green products decreases. Consistently with the results presented in the previous table, the interaction term between "Male" and "Number of children" has a positive effect and the coefficient is statistically significant in all the specifications. Finally, the usual gender effect holds. These results, together with those presented before, suggest that not only parenthood has a negative impact on green purchases, but also that these last are a decreasing function of the number of children. In other words, the data show the opposite of what we expected at the beginning of this analysis. Parents do not seem to pursue green household policies when compared with non-parents; and the same holds for individual with many children when confronted with people with few children. What is seems plausible is that the lack of time generated by the presence of (many) children reduces both the time available to gathering information, which is positively linked to green habits, and that available to select products with the aim of purchasing the green.

An additional possible explanation, which is supported also by the results presented in Table 3 and by those not shown here, but present in the full regressions estimated, is that parents lack money to purchase green products. Indeed, income is positively related to the probability of buying eco-friendly goods, and the literature is explicit in pointing out that these products are in general more expensive than their brown equivalents. The same literature shows also that, on average, consumers may be willing to pay more for a green good than for its brown substitute. However, it is very likely that having children increases the burdens on the household budget, and that these pressures grow with the number of children a couple has. This interpretation is consistent also with the age profile of the phenomenon: parents aged more than 64 usually no longer provide their children with money or consumables. Therefore, for them having children does not affect their decisions about which type of products buying.

As anticipated, Table 4 proposes estimations that are similar to those presented in Table 3. The difference between the two tables is that the figures in Table 3 are estimated using HSM on the whole sample, while those in Table 4 report MLE (namely probit) for the subsample of parents only (i.e. childless interviewees were dropped before running the regressions). The specifications estimated are the same as those presented in Table 2. The outcome does not differ from that of Table 3: males are generally less prone to purchase green goods than females are, the number of children *per se* negatively affects the probability of buying green products, but the coefficient of the interaction between "Male" and "Number of children" is again positive and statistically significant. Consistently with what observed in Table 2, the mentioned effects are not statistically significant for the subsample of interviewees aged 65 or more. The same caveats and the same comments exposed commenting the results in Table 2 hold also in this case.

What is interesting is also the fact that the figures reveal not only a clear distinction between parents and non-parents, but also between families with few and many children. In other words, the effect of parenthood is not dichotomous, but appears to be rather continuous. A last remark is about the net effect of gender: in all the tables, the effect of being male (with or without children) on green purchasing is always negative, and the distance increases with the number of children, as the coefficient (HSM) and the marginal effect (MLE) of the interacted term is always smaller in absolute value than the coefficient of the number of children. In other words, while both this last variable and parenthood induce men to increase their green purchases, none of them is strong enough to overcompensate the negative effect of gender.

From a methodological point of view, the fact that MLE and HSM produce results that are qualitatively similar supports the robustness of the estimates presented in the analysis, in spite of the weaknesses highlighted in the third section of the paper. The effects estimated through HSM are smaller than those obtained by MLE, but the differences are minor. This outcome suggests that the bias introduced by neglecting the selection factors is small and that, therefore, also the estimates in Table 4 are reliable.

5. Conclusions

The analysis presented in this paper contributes to the extant literature on green consumption in some ways. The first is by addressing a research question (whether parenthood and children affect green purchasing) that has so far received poor attention in the literature, but whose answer may have relevant policy implications both at country-wide and at firm level. The second is by presenting an analysis based on 61 countries around the world, which allows for a high degree of external validity, so far not reached by the extant studies, which are almost all based on data from one country only at a time. The results of the analysis are indeed statistically robust and indicate the presence of room for policy interventions.

From a policy perspective, the results of this paper suggest that young parents should be sensitised more about environmental problems and green products, if the intention of policy makers is to increase the consumption of green goods. While the data used in the analysis do not allow for testing whether parenthood reduces green consumption because of lack of time to spend on information and selection of products or because the green products cost more than the brown, actions to incentivise parents to purchase eco-friendly products are needed. In particular the aspect of the prices of green products needs considering by the policymakers. There are different options on the table: subsidies to

parents, proportioned to the number of children, subsidies to the producers of green goods in exchange of lower prices, VAT cuts on green products, etc.

The results presented in this paper may also suggest some action to the marketing divisions of the firms producing green goods. There are two main suggestions. The first is that, to increase sales of their green products, they may target young and middle-age fathers specifically. The second is that they may start campaigns that reduce prices for families with (many) children. Besides increasing sales through the reduction of prices, such an action may also better off the image of the firm, whose social responsibility would be strengthened. In addition, such a campaign might be positively welcomed especially in those countries of continental Europe, where fertility rates are low. A combination of public-private policies in this sense would be desirable. A third possibility for the firms is to strengthen the lines of green products dedicated to children and to parents. Increasing the supply may stimulate the demand, with positive externalities through the peer effect in consumption. Of course, such a strategy may lead the firms to over-differentiate their products, generating negative externalities in terms of pollution, as the theoretical literature has already warned.

As I have already mentioned, the main limit of the analysis proposed in the paper is the genericity of the question asked about green purchases. Future analyses are expected to go deeper, using data about how children affect the level of green consumption, allowing for some monetary quantification of the phenomenon. Nevertheless, the results of the present work constitute a positive basis on which planning researches based on more complete datasets.

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Appendix: list of countries included in the analyses.

Table A.1 List of the countries included in the analyses	
Albania	Malaysia
Algeria	Mali
Australia	Mexico
Bangladesh	Moldova
Belarus	Morocco
Bosnia-Herzegovina	Nigeria
Brazil	Norway
Bulgaria	Pakistan
Burkina Faso	Philippines
Canada	Poland
Chile	Romania
China	Russia
Colombia	Rwanda
Cyprus	Saudi Arabia
Dominican Republic	Serbia
Egypt	Slovakia
Ethiopia	Slovenia
France	South Africa
Georgia	Spain
Germany	Sweden
Ghana	Switzerland
Guatemala	Thailand
India	Trinidad and Tobago
Indonesia	United Kingdom
Iran	United States
Italy	Uruguay
Jordan	Ukraine
Kyrgyzstan	Venezuela
Latvia	Vietnam
Lithuania	Zambia
Macedonia	

Table 1. Descriptive statistics of the variables used in the econometric analyses.

	Mean	Standard deviation
Purchased green goods in the last 12 months (%)	47.74	49.94
Male	48.45	49.98
Has children	73.04	44.37
Children	1.97	1.82
GDP per capita (USD 2002)	7,300.59	10,110.31
Population density (log)	4.208	1.268
CO_2 emissions (tons per capita) in 1998	5.27	4.76
Protected areas (log km^2) in 2002	8.91	8.48
Urbanisation (% of people living in urban areas)	62.97	19.75
Economic growth in 2002 (% values)	1.09	1.10
Consumption of electricity (Kwh per capita) in 200	3,828	4,316
Age	40.31	15.91
Part-time employees (%)	7.50	26.33
Self-employed (%)	10.94	31.22
Unemployed (%)	9.42	29.21
Retired (%)	11.45	31.84
Married (%)	58.34	49.30
Widows (%)	5.89	23.53
Divorced (%)	3.09	17.30
Secondary education (%)	44.49	37.69
Tertiary education (%)	14.34	35.04
Generalised trust (average on 0 - 1 scale)	0.268	0.443
Size of town (average on 9 size classes)	5.049	2.524

Table 2. Effect of having children on green purchasing. Probit estimates, standard errors between parentheses.

Specification	(1)		(2)		(3)		(4)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Male	-0.196	-0.0778	-0.234	-0.0929	-0.235	-0.0936	-0.234	-0.0932
	(0.0373)***	(0.0149)***	(0.0349)***	(0.0138)***	(0.0319)***	(0.0127)***	(0.0390)***	(0.0154)***
Male x having children	0.0680	0.0271	0.101	0.0401	0.0610	0.0243	0.0216	0.00862
	(0.0346)**	(0.0138)**	(0.0309)***	(0.0123)***	(0.0328)*	(0.0131)*	(0.0396)	(0.0158)
Having children (yes = 1)	-0.0289	-0.0115	-0.0226	-0.00901	-0.115	-0.0460	-0.0978	-0.0390
	(0.0438)	(0.0175)	(0.0333)	(0.0133)	(0.0353)***	(0.0141)***	(0.0385)**	(0.0154)**
Constant	0.767		2.236		-4.423		-4.412	
	(0.0358)***		(1.428)		(1.813)**		(1.807)**	
Country-specific controls	No		Yes		Yes		Yes	
Marital status	No		No		Yes		Yes	
Education	No		No		Yes		Yes	
Employment status	No		No		Yes		Yes	
Income	No		No		Yes		Yes	
Age	No		No		Yes		Yes	
Male x education	No		No		No		Yes	
Male x marital status	No		No		No		Yes	
Generalised trust	No		No		No		No	
Size of town	No		No		No		No	
Observations	172,848		172,848		172,848		172,848	

Specification	(5)		(6) 20-45		(7) 46-66		(8) over 66	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Male	-0.220	-0.0877	-0.233	-0.0928	-0.134	-0.0534	-0.0736	-0.0291
	(0.0523)***	(0.0207)***	(0.0535)***	(0.0212)***	(0.0783)*	(0.0312)*	(0.105)	(0.0417)
Male x having children	0.0476	0.0190	0.0800	0.0319	-0.0943	-0.0376	-0.112	-0.0443
	(0.0512)	(0.0204)	(0.0460)*	(0.0183)*	(0.0838)	(0.0334)	(0.111)	(0.0435)
Having children (yes = 1)	-0.111	-0.0443	-0.107	-0.0425	-0.111	-0.0443	-0.0623	-0.0247
	(0.0471)**	(0.0188)**	(0.0393)***	(0.0156)***	(0.0653)*	(0.0259)*	(0.0871)	(0.0346)
Constant	-6.699		-1.631		-26.32		22.01	
	(2.128)***		(5.138)		(28.02)		(73.96)	
Country-specific controls	Yes		Yes		Yes		Yes	
Marital status	Yes		Yes		Yes		Yes	
Education	Yes		Yes		Yes		Yes	
Employment status	Yes		Yes		Yes		Yes	
Income	Yes		Yes		Yes		Yes	
Age	Yes		Yes		Yes		Yes	
Male x education	Yes		Yes		Yes		Yes	
Male x marital status	Yes		Yes		Yes		Yes	
Generalised trust	Yes		Yes		Yes		Yes	
Size of town	Yes		Yes		Yes		Yes	
Observations	172,848		101,199		52,582		15,983	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3. Effect of the number of children and gender on green purchasing. Heckman selection estimates; s.e. in parentheses.

	Green purchase (yes = 1)	Selection equation	Green purchase (yes = 1)	Selection equation	Green purchase (yes = 1)	Selection equation
Male	-0.0740	-0.00306	-0.0804	0.000681	-0.0801	0.000932
	(0.0162)***	(0.0183)	(0.0111)***	(0.0181)	(0.00980)***	(0.0182)
Male x number of children	0.00771		0.00698		0.00821	
	(0.00412)*		(0.00387)*		(0.00301)***	
Number of children	-0.00870		-0.00867		-0.0138	
	(0.00568)*		(0.00680)		(0.00442)***	
Constant	1.008	-0.915	-1.784	-0.837	-1.161	-0.834
	(0.235)***	(0.142)***	(0.599)***	(0.145)***	(0.778)	(0.147)***
Income	Yes		Yes		Yes	
Education	Yes		Yes		Yes	
Employment status	Yes		Yes		Yes	
Marital status	No		Yes		Yes	
Age	No		Yes		Yes	
Country-specific variables	No		No		Yes	
Observations	172,848	172,848	172,848	172,848	172,848	172,848

Table 4. Effects of the number of chldren on green purchasing; only parents included in the regressions. Probit estimates, standard errors in parentheses.

	(1)		(2)		(3)		(4)	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Male	-0.174	-0.0692	-0.208	-0.0825	-0.235	-0.0935	-0.284	-0.113
	(0.0410)***	(0.0164)***	(0.0361)***	(0.0144)***	(0.0422)***	(0.0167)***	(0.0659)***	(0.0260)***
Male x number of childre	0.0192	0.00763	0.0305	0.0122	0.0252	0.0100	0.0264	0.0105
	(0.0131)	(0.00521)	(0.0113)***	(0.00451)***	(0.0129)*	(0.00515)*	(0.0125)**	(0.00497)**
Number of children	-0.0358	-0.0143	-0.0626	-0.0249	-0.0365	-0.0145	-0.0367	-0.0146
	(0.0223)	(0.00892)	(0.0114)***	(0.00453)***	(0.0142)**	(0.00567)**	(0.0142)***	(0.00567)***
Constant	0.856		2.432		-4.552		-4.507	
	(0.0626)***		(1.434)*		(1.964)**		(1.955)**	
Country-specific controls	No		Yes		Yes		Yes	
Marital status	No		No		Yes		Yes	
Education	No		No		Yes		Yes	
Employment status	No		No		Yes		Yes	
Income	No		No		Yes		Yes	
Age	No		No		Yes		Yes	
Male x education	No		No		No		Yes	
Male x marital status	No		No		No		Yes	
Generalised trust	No		No		No		No	
Size of town	No		No		No		No	
Observations	126,484		126,484		126,484		126,484	

	(5)		(6) 18 - 44		(7) 45 - 65		(8) over 65	
	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects	Coefficients	Marginal effects
Male	-0.277	-0.110	-0.235	-0.0934	-0.337	-0.134	-0.117	-0.0461
	(0.0878)***	(0.0346)***	(0.0546)***	(0.0216)***	(0.0606)***	(0.0238)***	(0.180)	(0.0707)
Male x number of childre	0.0243	0.00969	0.0346	0.0138	0.0389	0.0155	-0.0231	-0.00911
	(0.0146)*	(0.00582)*	(0.0194)*	(0.00775)*	(0.0158)**	(0.00630)**	(0.0432)	(0.0171)
Number of children	-0.0280	-0.0111	-0.0530	-0.0211	-0.0439	-0.0175	-0.000319	-0.000126
	(0.0143)**	(0.00598)*	(0.0168)***	(0.00670)***	(0.0159)***	(0.00636)***	(0.0278)	(0.0110)
Constant	-7.317		-4.521		-34.47		-62.61	
	(2.489)***		(5.576)		(29.11)		(87.31)	
Country-specific controls	Yes		Yes		Yes		Yes	
Marital status	Yes		Yes		Yes		Yes	
Education	Yes		Yes		Yes		Yes	
Employment status	Yes		Yes		Yes		Yes	
Income	Yes		Yes		Yes		Yes	
Age	Yes		Yes		Yes		Yes	
Male x education	Yes		Yes		Yes		Yes	
Male x marital status	Yes		Yes		Yes		Yes	
Generalised trust	Yes		Yes		Yes		Yes	
Size of town	Yes		Yes		Yes		Yes	
Observations	126,484		69,132		44,354		12,099	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1