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Households' pro-environmental habits and investments in water and energy consumption: Determinants and relationships

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ABSTRACT

Economic instruments have received a lot of attention in the literature dealing with water and energy demand management. However factors driving households' behaviour/habits and investment in water-saving and energy-saving equipment have been seldom studied. The main purpose of this article is to contribute to this literature by analysing the main determinants of a set of households' conservation habits and pro-environmental investment decisions. Using household-level data from Spain, we show that conservation habits and the purchase of resource-efficient appliances are not independent.

1. Introduction

Increasing scarcity of natural resources and environmental degradation in general has induced a number of governments to call for sustainable consumption. Campaigns promoting water and energy savings, waste recycling, use of public transportation, and other eco-friendly behaviour are more and more common in industrialised countries. As far as the purchase of eco-friendly appliances is concerned, measures such as eco-labelling, tax incentives, and subsidisation policies are instruments commonly used in a number of countries. The effectiveness of these policies has been assessed in a number of articles, with a particular focus on the purchase of energy-efficient appliances.[1]

These studies usually control for heterogeneity in the population by including variables describing socio-economic and socio-demographic characteristics of the households or respondents (income, household size and composition, education, ownership status etc.) along with variables describing their living environment (urban versus rural area, average weather conditions, etc.). More recently variables measuring opinions and attitudes of the respondents have been included.[2] These variables have been shown to play a significant role in driving households' behaviour in different areas (transportation, water, energy, waste, food), as shown by a recent household survey conducted by the Organisation for Economic Co-operation and Development (OECD) in ten countries (OECD, 2011).[3]

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[1] For a recent survey, see Linares and Labandeira (2010).

[2] See van den Bergh (2008) for a review of the use of psychological factors in the study of environmental behaviour.

[3] The survey was run in the following countries: Australia, Canada, Czech Republic, France, Italy, Korea, Mexico, Netherlands, Norway, and Sweden.

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In this article we propose to contribute to this literature by assessing the role of socio-economic and socio-demographic factors, concern and awareness about environmental problems, and average weather conditions in driving household's decisions to undertake a number of pro-environmental behaviours. One original feature of this article is that it considers a set of environmental behaviours that combines three habits and three investment decisions across different areas: water use, electricity consumption, and waste recycling. The estimation of a multivariate probit model using a cross-sectional survey of Spanish households allows us to control for unobserved household and regional-specific effects that may influence households' choices possibly correlated across all six decisions. Our analysis focuses on a single country (Spain) but goes beyond the analysis conducted in OECD (2011) in the sense that we allow for unobservable variables to have correlated impact across different areas (here, water use, energy use, and waste recycling).

Water use, energy consumption, and waste generation have traditionally been key targets of environmental public policies and Spain is particularly affected by some pressing problems related to those areas. First, residential energy consumption, which accounts for about 30% of final electricity consumption (Labandeira et al., 2006), has been rising during the last decades due to the increasing number of households and the higher comfort standards they have demanded (IDAE, 2011). Second, Spain is the European country most severely affected by droughts and water shortages and it will likely be hit hardest by the expected effects of future climate change (EEA, 2009). Third, in terms of waste generation, recent EUROSTAT statistics show that the Spanish representative household generates a higher amount of waste and recycles a slightly lower proportion of it than its average European Union (EU) counterpart.[4]

In this context, several public policies have been aimed at promoting pro-environmental behaviours among Spanish households. Those policies have been especially focused on water and energy conservation.[5] One of the most relevant programs for this study is the *Plan Renove* or Household electrical appliance renewal programme. This subsidy program was launched in Spain as part of the 2005–2007 Energy Saving and Efficiency Action Plan and was followed by a second wave of subsidies in 2008-2012.[6] Its primary purpose was to provide financial incentives to households to replace electrical appliances (fridges, freezers, washing-machines and dishwashers, electric ovens, gas hobs and induction hobs) by others with a class A or A+ energy label.[7] The subsidy was aimed at compensating for the price differential between the conventional appliance and the energy-efficient one.[8] The level of the subsidy, which was determined by each Autonomous Region (or Autonomous Community, AC), varied from 85 to 125 euros depending on the appliances.[9] The Spanish governmental bodies have also developed several initiatives to promote water conservation. Although residential water prices in Spain are among the lowest in the EU, they have been substantially increased during the last years.

The paper is structured as follows. In Section 2 the literature on factors driving pro-environmental decisions is reviewed. Section 3 describes the data set and variables used, while we explain the empirical method and discuss the main results in Section 4. Section 5 concludes with some policy implications.

2. Existing literature: factors driving pro-environmental decisions

A large number of studies have tried to identify determinants of households' pro-environmental behaviour. These factors can be classified in three categories: 1) economic and socio-demographic factors; 2) values, attitudes, beliefs, and other psychological/attitudinal factors; and 3) public policies. We discuss them in turn and summarise the main findings from the literature.

2.1. Socio-economic and socio-demographic characteristics

A higher education level is expected to be positively correlated with knowledge and awareness about environmental-related issues so one would expect more educated households/respondents to be more likely to undertake pro-environmental actions. The analysis of the OECD survey undertaken in ten countries showed that the level of educational attainment increased pro-environmental behaviours in the five areas (transportation, water, energy, waste, and food) covered (OECD, 2011). Martínez-Espiñeira and García-Valiñas (2013) found that lower levels of formal education were negatively correlated with adoption of water-efficient technologies, although Lam (2006) had earlier shown that formal education had no effect on the behavioural intention to conserve water.

The role played by income in driving households' decisions is difficult to assess a priori. On the one hand wealthier households should have greater financial ability to invest in (costly) water- or energy-saving equipment. On the other hand their water and energy demand may be less elastic to prices than those of households with lower income. Berk et al. (1993) report that income had a positive effect on water conservation, whereas De Oliver (1999) shows that households developing water conservation activities have lower income in general. Sütterlin et al. (2011) found that lower-income households were more likely to adopt energy saving habits. Martínez-Espiñeira and García-Valiñas (2013) also detected a negative relationship between income levels and the adoption of pro-saving water behaviour.

Owners are usually expected to be more willing to invest in efficient appliances because they should find it worthwhile to invest in durable goods that help decrease future water bills or to take advantage of having the investment capitalised in the house price when selling it (Berk et al., 1993). Being an owner also increased the probability to invest in water-saving appliances in the study based on the 10-country OECD survey (Millock and Nauges, 2010).

Berk et al. (1993) provide some evidence that households with children are more likely to engage in water conservation practices.

[4] For further details see: http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/data; accessed 22 July 2013.

[5] For further details about these policies, see e.g. IEA (2009) or Galarraga et al. (2011).

[6] More details of this program can be found at http://www.idae.es/.

[7] The energy-consumption labelling scheme was implemented in Europe by the European Union Directive 92/75/EChttp://en.wikipedia.org/wiki/European_Union_energy_label – cite_note-0. Energy-efficiency of appliances are rated in terms of a set of energy efficiency classes varying from A (the most energy-efficient) to G (the least energy-efficient).

[8] Using data collected from nineteen retailers in the three provinces of the Basque Autonomous Community in Spain, Galarraga et al. (2011) estimated that the presence of the A+ energy label increases the price of dishwashers by 16% ceteris paribus, which is about 80 euros on average. They also calculated the total discounted saving from replacing an A, B, C or D labelled dishwasher by an A+ labelled one: they estimated savings to vary between 8% and 35% of the average price, taking into account energy consumption, electricity cost, and energy savings.

[9] Households who incur expenditures aimed at environmental protection and/or resource conservation may also benefit from tax credits provided by the central and/or regional governments. In most cases, this tax credit is in the range of 5–10% of the amount spent on such investments/expenditure.