



Exploring additional determinants of energy-saving behaviour: The influence of individuals' participation in cultural activities



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ABSTRACT

Consumer behaviour towards energy saving has attracted growing attention in several national policy measures, and has been discussed in a large number of interdisciplinary studies. In this paper, we argue that cultural capital, specifically individuals' participation in cultural activities, is significantly related to pro-environmental behaviour and is therefore a relevant, additional driver of electricity-saving behaviours. We apply a Heckman two-step selection strategy approach to microdata gathered from the latest sample of the annual "Aspects of daily life" survey for the year 2014, conducted by the Italian National Institute of Statistics. Our results, besides confirming the role of the socio-demographic determinants already investigated in the extant literature, also provide evidence that individuals who participate in some cultural activities show a higher probability of adopting electricity saving behaviours at home. Furthermore, the sign of such a relationship is differentiated depending on the characteristics of the cultural activity. Some policy implications are derived from the analysis.

1. Introduction

Consumer behaviour towards energy saving has attracted growing attention in several national policy measures, and has been discussed in a large number of interdisciplinary studies (Gillingham et al., 2009; OECD, 2008; World Energy Council, 2016).

Behaviour-based savings have been progressively recognised as a major issue in energy use in buildings, an essential resource for improving the sustainability of energy systems and the deployment of energy efficient technologies, as well as for energy resources development (Laitner et al., 2009; Lopes et al., 2012; OECD/IEA, 2016). At the household level, an efficient use of electricity combined with improvements in efficiency of large new appliances may fundamentally contribute to offsetting the rise in energy consumption due to increasing equipment ownership (ODYSSEE-MURE, 2015a). Notably, lifestyle and behavioural aspects are deemed to be one of the major barriers to effective energy use reduction in the residential sector, and policy-makers increasingly point out individual consumers' responsibility in climate change policies (Lucas et al., 2008; Steg, 2008; Steg and Vlek, 2009). The potential scale of behaviour-based savings can be significant (Ehrhardt-Martinez, 2010; Laitner et al., 2009). Moreover, those savings can often be achieved with little or even negative costs and

faster than energy conservation measures requiring large-scale policy or infrastructure changes (Carrie Armel et al., 2013; Dietz et al., 2009).

Despite the fact that a number of policies have been enacted to achieve cost-efficient decreases in energy consumption, energy savings due to behaviour are far from fulfilling their potential (Gynther et al., 2012; ODYSSEE-MURE, 2013). Therefore, to improve the effectiveness of government measures and to successfully achieve large-scale reductions in energy consumption and carbon emissions, it is important to improve our understanding of the determining factors that have a bearing on individuals' domestic energy-saving behaviours, with particular reference to electricity.

There are few empirical research studies investigating how different habits and/or lifestyles may affect domestic electricity saving behaviours and practices, although studies in this field using microdata are rapidly increasing (Belaïd and Garcia, 2016; Ek and Söderholm, 2010; Ford et al., 2016; Gaffney et al., 2015; Wang et al., 2011; Yue et al., 2013). Traditionally, the literature on the drivers of energy demand focuses on a narrow set of variables that often include price characteristics, location, building, type of dwelling, climate, home appliances types and efficiencies, etc.. Moreover, socio-demographic factors, and, in particular, gender, age and socioeconomic status, as well as educational background, social norms, interactions, etc. are usually

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included to explain lifestyle aspects other than technological ones (Boudet et al., 2016; Jackson, 2005; Karatasou et al., 2013; Karlin et al., 2012; Wilson and Dowlatabadi, 2007). While emphasising high complexity and great heterogeneity both at the individual and the context-specific level (Chatterton, 2011; Newman and Fernandes, 2015; Stephenson et al., 2010), a growing body of studies supports the conclusion that individuals' environmental concerns and habits have a significant role in shaping their domestic energy saving behaviours (Abrahamse and Steg, 2009; Ek and Söderholm Patrik, 2010; Gadenne et al., 2011; Han et al., 2013; Karlin et al., 2012; Maréchal, 2010; Martinsson et al., 2011; Urban and Ščasný, 2012). However, models seeking to explore energy saving behaviours often share the narrow assumption of rationally-informed agents, driven by self-interest, whereas the social and environmental psychology perspective emphasises that energy consumption decisions are frequently habitual and guided by automated cognitive processes (Karatasou et al., 2013; Wilson and Dowlatabadi, 2007). This implies that people do not consider the remote environmental impacts of their actions, that domestic energy consumption tends to be automated, that goal-based behaviours are repeated generating a sort of lock-in effect, additionally reinforced by misperceptions and selective attention to information (Lopes et al., 2012; Maréchal, 2010; Steg and Vlek, 2009).

In the light of these arguments, our study investigates whether a correlation exists between cultural capital and individuals' different behaviours around electricity saving. We argue that cultural capital, specifically individuals' participation in cultural activities, is related to environmentally oriented habits and beliefs, as well as to pro-environmental behaviour, and is therefore a relevant, additional antecedent of electricity-saving behaviours. The underlying hypothesis is that by taking into account cultural consumption habits, some limits encountered in the literature on energy behaviours can be partially overcome, especially those related to the individual/social dichotomy, the bounded rationality and the lock-in effects in energy-saving behaviours. From an energy policy perspective, improving our understanding of individuals' domestic electricity saving behaviour provides insights on possibly new dimensions of policy intervention.

The present paper is also one of the few studies focusing on micro-data at the individual-level to investigate the likelihood of adopting behaviours aimed at not wasting electricity. Using data from the annual survey "Aspects of daily life 2014" of the Italian National Institute of Statistics, a Heckman two-step probit model is adopted, which allows self-selection problems to be appropriately taken into account.

Besides, most previous studies have not focused on countries with already high efficiency levels of energy use (Belaïd and Garcia, 2016; Hori et al., 2013; Martinsson et al., 2011; Wang et al., 2011). The understanding of additional electricity saving possibilities is particularly relevant in countries, such as Italy, that already exhibit relatively high performance in terms of energy efficiency, since marginal savings in energy consumption can be more difficult to attain (for instance, mechanisms based on financial compensation would involve too low an incentive). Indeed, Italy exhibits a low energy intensity, defined as the ratio of gross inland energy consumption and GDP, amounting to 98 toe/M€ in 2014, well below EU-28 average of 122 toe/M€. Nonetheless, energy efficiency is a key element of energy policy at the national level. The 2014 National Energy Efficiency Action Plan (MISE, 2014) outlines an energy savings potential of 20% by 2020 and sets an ambitious energy efficiency objective of 20 MTOE of primary energy, equivalent to 15.5 MTOE of final energy and to emissions of some 55 million tonnes of CO₂ per year (ENEA, Italian National Agency for New Technologies, 2015). In 2015, Italian households were responsible for electricity demand of about 66.187 GW h, amounting to a share of 22% of total electricity consumption in the country, even though final energy consumption by households has been declining by 2% in the last ten years. As observed, Italy ranks as a top country at EU level in terms of energy efficiency. In 2016, the American Council for an Energy-Efficient Economy (ACEEE) ranked Italy second, after Germany and

equal to Japan, in terms of national effort to improve energy efficiency levels (Kallakuri et al., 2016). According to the ODYSSEE Database, the electricity consumption per dwelling amounted to about 1717 kW h in 2014, well below the European average of 2266 kW h per dwelling. In addition, in 2014 the electricity consumption per capita amounted to 4631 kW h, which is considerably below the EU-28 average of 5338 kW h, the 6350 kW h of Germany, and 6303 kW h of France (European Commission, 2016). Finally, it is worth noting that Italy is also one of the leading countries in the deployment of smart-metering systems that potentially allow for more interactive management and/or reduction measures of energy demand at the household level (Ehrhardt-Martinez, 2010; Karlin et al., 2015).

The results of our work provide evidence that a statistically significant relation exists between some forms of cultural consumption and the probability of individuals adopting electricity saving behaviour, laying down empirical grounds for some general policy remarks. However, caution must be taken when interpreting these results and deriving possible policy implications. Although our research provides original insights, it suffers from some data limitations. Therefore, the evidence provided in our work must be considered as preliminary, and further research on this topic is needed to derive more detailed policy implications and to design specific policy measures.

The remainder of this paper is organised as follows. In Section 2, the literature background is presented, in which the role of cultural capital in shaping individuals' pro-environmental behaviour is discussed. Building on that conceptual background, Sections 3 and 4 present the empirical strategy and the available data. Section 5 discusses the results and their implications. Section 6 draws conclusions, provides some preliminary policy implications and discusses the limitations of the research and its possible future development.

2. Literature background

In general, people are aware and concerned about the problems related to domestic energy use (Abrahamse, 2007), although there is still a lack of clarity about the causal processes involved (e.g., Bord et al., 2000). Steg (2008) and Newman and Fernandes (2015) argue that pro-energy saving behaviours are still very complex and they are difficult to understand. As a matter of fact, the literature review provided by Urban and Ščasný (2012) has revealed that several socio-demographic (e.g., the age of respondents, their gender and education, household size, presence of children in the household), economic variables (e.g., household income, ownership of the dwelling, size of the apartment) and structural variables (e.g., energy metering, prices of energy, available energy sources) are likely to become confounding variables in influencing energy behaviour in households. According to Belaïd and Garcia (2016), even the respondents' working conditions and the type of dwelling affect electricity saving behaviour: individuals who spend more time at home (retired people and home-maker), and those living in highly energy-consumption buildings (such as rural dwellings) tend to behave in a more energy-saving manner.

Most studies on energy behaviour in the last decade have been dominated by psychology research. Steg and Vlek (2009) systematised factors underlying households' pro-environmental behaviour, identifying motivational factors, contextual factors and habitual behaviour. The motivational factors consider that individuals weigh the pros and cons, making rational choices to maximise their benefits considering perceived costs and benefits, moral and normative concerns and affection. The contextual factors are related to the influence of social norms, of the valuation of environmental beliefs, environmental concerns and the moral obligation to act pro-environmentally. Habitual behaviour makes use of affective and symbolic factors to explain environmental behaviour. Other scholars maintain that past behaviour or experience of individuals in some energy saving measures may affect their intention to engage in more energy saving behaviours (Dianshu et al., 2010; Zografakis et al., 2010).

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