Conference Paper

Boundedly rational consumers, energy and investment literacy, and the display of information on household appliances

Author(s):
Blasch, Julia; Filippini, Massimo; Kumar, Nilkanth

Publication Date:
2016

Permanent Link:
https://doi.org/10.3929/ethz-a-010714201

Rights / License:
In Copyright - Non-Commercial Use Permitted

This page was generated automatically upon download from the ETH Zurich Research Collection. For more information please consult the Terms of use.
BOUNDEDLY RATIONAL CONSUMERS, ENERGY AND INVESTMENT LITERACY, AND THE DISPLAY OF INFORMATION ON HOUSEHOLD APPLIANCES

Julia E. Blasch1,2*, Massimo Filippini2 and Nilkanth Kumar2

1: Institute for Environmental Studies (IVM)
Department Environmental Economics
VU University Amsterdam
De Boelelaan 1087, 1081 HV Amsterdam, The Netherlands
e-mail: julia.blasch@vu.nl, web: http://ivm.vu.nl/

2: Centre for Energy Policy and Economics (CEPE)
CER-ETH, D-MTEC
ETH Zurich
Zurichbergstrasse 18, 8092 Zurich, Switzerland
e-mail: {mfilippini,nkumar}@ethz.ch web: http://www.cepe.ethz.ch/

Keywords: Energy efficiency, Bounded rationality, Energy label, Energy literacy, Choice experiment, Behaviour

Abstract

It is an ongoing debate how to increase the adoption of energy-efficient light bulbs and household appliances in the presence of the so-called ‘energy efficiency gap’. One measure to support consumers’ decision-making towards the purchase of more efficient appliances is the display of energy-related information in the form of energy-efficiency labels on electric consumer products. Another measure is to educate the consumers in order to increase their level of energy and investment literacy. Thus, two questions arise when it comes to the display of energy-related information on appliances: (1) What kind of information should be displayed to enable consumers to make rational and efficient choices? (2) What abilities and prior knowledge do consumers need to have to be able to process this information? In this paper, using a series of recursive bivariate probit models and three samples of 583, 877 and 1,375 Swiss households from three major Swiss urban areas, we show how displaying information on the future energy consumption of electrical appliances in monetary terms, i.e. as an estimate of yearly energy cost (CHF) rather than in physical units (kWh), increases the probability that an individual performs an investment analysis and hence chooses the most (cost-)efficient appliance. In addition, our econometric results suggest that individuals with a higher level of energy and investment literacy are more likely to perform an optimization rather than relying on a decision-making heuristic and are more likely to identify the most (cost-)efficient appliance.
1. INTRODUCTION

Improving the energy efficiency in the residential sector is one of the strategies to reduce total fossil energy consumption and related CO\textsubscript{2}-emissions in Switzerland. One important means to reduce electricity consumption of Swiss households is to foster the adoption of energy-efficient household appliances. One barrier, however, is often referred to as the ‘energy-efficiency gap’, i.e. the frequent observation that individual decision-makers do not choose the most energy-efficient appliance, even if this appliance is also the most cost-efficient choice (minimizing lifetime operating costs). When facing the choice of light bulbs or household appliances, consumers are confronted with the optimization problem of choosing the appliance that provides the desired energy service at the minimum lifetime cost. Consumers wish to reduce their overall expenditure for energy services and to maximize their opportunities to consume all other goods, otherwise they experience a loss in utility. Solving such an optimization problem involves forming expectations about the lifetime costs of appliances and thus has a ‘decision cost’ associated with it [1]. We develop a stylized theoretical model following [2] to study the role of ‘decision cost’ and to examine how energy and investment literacy of an individual and the display of information about the consumption costs per year on household appliances interacts with the choice of the decision strategy, i.e. performing an investment analysis or using a decision heuristic. The choice of the decision strategy also translates to whether or not an individual chooses the most cost-efficient appliance among two (or more) appliances.

Past research evaluates the role of declaring future energy consumption on the energy label of an appliance, either in the form of monetary information or physical information ([3], [4], [5], [6] and [7]) but does not investigate how the decision strategies are related to the final choice. In this paper, we compare appliance choices in a randomized online experiment where we control for the applied decision strategies and the respondents’ energy-related investment literacy, their attitudes towards energy conservation, as well as their socio-demographics.

2. METHODOLOGY

To test our hypotheses, we have organized a household survey and conducted two online randomized controlled choice experiments among Swiss households from three major Swiss urban areas. The sample should represent the Swiss population living in small cities, but, there is only limited availability of some socio-economic statistics (like education and income level) at the city level to compare to. Importantly, the share of respondents who donated money to an environmental organization is found to be in line with reported values for the Swiss population.

The first experiment (1,958 households) was related to a choice among two light bulbs whereas the second experiment (877 households) was concerned with making a choice among two refrigerators. Respondents were asked to imagine a situation in which they needed to replace a light bulb or a refrigerator and were presented with two choices that differed only in terms of their purchase price and their energy consumption. The displayed information was presented in the same way as it is currently presented in the EU energy label for light bulbs.
and refrigerators. Respondents were randomly assigned to one of two different treatments. In Treatment 1, the information on yearly energy consumption on the two appliances was displayed in terms of physical consumption units (kWh), whereas in Treatment 2, the information on electricity consumption was displayed in monetary terms (CHF).

The information collected from the survey and the experiments was analysed by estimating a series of (recursive) bivariate probit models ([8]) in order to simultaneously model two binary variables which represent the two stage decision process explaining first the adoption of a decision strategy and then the choice of the cost-efficient appliance, thereby allowing for a correlation between the two error terms. The decision strategy variable also appears as an explanatory variable in the equation for the appliance choice (hence the term ‘recursive’).

3. RESULTS AND CONCLUSIONS

We observe that displaying yearly energy consumption in monetary units rather than in physical units increases both the probability that consumers perform an investment analysis and that they identify the most cost-efficient appliances. Furthermore, we could show that individuals who possess energy-related knowledge and high cognitive abilities, captured by high levels of energy and investment literacy, were more likely to opt for optimization as the decision-making strategy which in turn positively influences the probability to identify the most cost-efficient appliance. It can therefore be concluded, that enhancing an individual's energy-related knowledge and the ability to make complex (investment) calculations seems to be one important prerequisite to empower consumers to make rational and informed energy-related choices. The main contribution of this paper is to relate the choice of the appliance in the two information treatments to the underlying decision strategy. This sheds light on the decision-making process underlying the choice of electric appliances.

From an energy policy point of view, the results suggest that an improvement in energy efficiency could be reached in two ways: first, with an obligation for the producers of electrical appliances to provide information on the future energy consumption of the product in monetary units; and second, by promoting educational training and providing decision support tools (e.g., an energy calculator to calculate and compare total lifetime operating costs of two or more appliances) at the point of sale to increase the level of energy-related investment literacy of the consumers.

REFERENCES

