BEHAVIORAL ANOMALIES AND ENERGY-RELATED INDIVIDUAL CHOICES: THE ROLE OF STATUS-QUO BIAS

Julia Blasch, Vrije Universiteit Amsterdam, +31 20 59 89546, julia.blasch@vu.nl
Claudio Daminato, ETH Zurich, +41 44 632 73 50, dclaudio@ethz.ch

Overview

The literature on the energy efficiency gap (Sanstad and Howarth, 1994; Howarth and Sanstad, 1995; Allcott and Greenstone, 2012; Gillingham and Palmer, 2014) provides various explanations for under-investment in energy efficiency. Regarding energy efficiency in residential households, numerous market and behavioral failures as well as behavioral anomalies may impede energy efficiency investments. One of these explanations is that individuals are biased towards the status quo (Schleich et al., 2016; Frederiks et al., 2015; Schubert and Stadelmann, 2015; Broberg and Kazukauskas, 2015). This means they have the tendency to either maintain their current situation (i.e. keeping their current stock of appliances or current level of home insulation) or to replace their current equipment by products that they have purchased previously, without considering more energy-efficient options. This phenomenon is more generally known as the status-quo bias and is defined as an individual's tendency to "[do] nothing or [maintain] one's current or previous decision" (Samuelson and Zeckhauser, 1988, p.7). While the relation between status-quo bias and energy efficiency has thus far mainly been discussed as a theoretical concept (Schleich et al., 2016; Frederiks et al., 2015; Schubert and Stadelmann, 2015; Broberg and Kazukauskas, 2015), empirical evidence for the link between the status-quo bias and residential electricity consumption is lacking. Some of the existing studies investigate the influence of related concepts, such as loss aversion, risk aversion and time discounting, on the choice of energy-efficient appliances and energy-efficient renovations (e.g. Farsi (2010), Qiu et al. (2014), Heutel (2017), Schleich et al. (2018)). Yet, apart from the recent work of Martin-Bonnel de Longchamp et al. (2018) on the role of the status-quo bias for the energy performance gap in low-energy buildings, we are not aware of a study that explored the role of the status-quo bias for energy efficiency investment decisions and consumption of energy services empirically. With this study we want to contribute to filling this research gap.

Methods

Our paper aims to capture the relationship between the level of status-quo bias of the household head and both the age of the appliances stock as well as the (over-)consumption of energy services, while controlling for energy-related financial literacy as defined in Blasch et al. (2018) and a proxy for time preferences. Our analysis is based on a large household survey conducted in three European countries: Switzerland, the Netherlands and Italy. The data contain detailed information on households' socio-economic characteristics, dwelling characteristics and the respondent's energy-related knowledge. Most importantly, the survey jointly collects unique information on the age of the major home appliances and the intensity of their usage (e.g., the number of times per week the washing machine is typically utilized). Finally, the data that we use also include yearly electricity consumption and a measure of status-quo bias of the household head. Our measure of status-quo bias is based on six survey items, taken from the Loss Aversion Questionnaire (LAQ) developed by De Baets and Buelens (2012). From their questionnaire, we selected six items which specifically capture an individual's tendency to stick to the status quo, combined with items that capture loss aversion more broadly. The investigation of the link between the presence of status-quo bias and individuals' energy-related choices is performed using econometric methods. In our analysis, we use two outcome variables as a proxy for households owning old appliances: (i) a binary indicator that takes the value 1 if the household owns at least one appliance that is more than 10 years old; (ii) an ordinal indicator that counts the number of appliances that are more than 10 years old. We then estimate a probit model in which the dependent variable is a binary indicator that takes the value 1 if the household owns at least one appliance that is more than 10 years old and an ordered probit model for the number of appliances that are more than 10 years old. We control for a rich set of individual and household characteristics. This includes individual characteristics that we found to be associated with our measure of status-quo bias and that are potentially correlated with the age of a household's appliances, such as the respondent's education, age and age squared, employment status (working/non-working) and total household income. Then, because we aim at disentangling the role of bias towards the status quo on the (lack-of) replacement of old appliances from other behavioral failures that have been considered as potential causes for under-investment in energy-efficient appliances, we control for the level of energy-related knowledge and skills to perform an investment calculation. In particular,

we include the energy-related financial literacy index, as defined by Blasch et al. (2018). Due to the suggested indirect relation between time discounting and loss aversion, we also control for the households' saving rate that, after conditioning on household income, we take as a proxy for time preferences.

Results

We find that our measure of status-quo bias is an important predictor of both the age of home appliances and the level of consumption of energy services of a household. If an individual is status-quo biased the probability that the individual's household owns at least one appliance that is more than 10 years old increases by 3.7 percentage points. Furthermore, our estimates imply that the importance of status-quo bias in explaining the presence of old appliances in the household grows with the number of old appliances in the residence. The magnitude of our estimates for the marginal effect of status-quo bias on the probability to own an old appliance becomes particularly relevant in light of the fact that the majority of households in our sample seem to replace their appliances only when they are defective. Also the consumption of energy services of a household increases by 5.7 percent when the household head is status-quo biased. The tendency of status-quo biased individuals to own older (less efficient) appliances and to use their appliances more is also reflected in the total electricity consumption of the households, which is found to be around 5.7% higher than the consumption of households in which the household head is not status-quo biased.

Conclusions

Our results provide evidence that the status-quo bias is an important determinant of the level of energy consumption of European households. They inform behavioral models of consumer behavior about the channels through which the status-quo bias operates and have important policy implications. Given that the status-quo bias expresses a preference to stay with the current situation, rather than a lack-of knowledge or cognitive ability, it is more difficult to address with policy measures than other behavioral anomalies. It may hence constitute a severe limit to policy-makers' opportunities to narrow the energy efficiency gap.

References

Allcott, H. and Greenstone, M. (2012). Is there an energy efficiency gap? Journal of Economic Perspectives, 26(1):3–28.

Blasch, J., Boogen, N., Daminato, C., and Filippini, M. (2018). Empower the consumer! Energy-related financial literacy and its socioeconomic determinants. CER-ETH Economics Working Paper Series 18/289.

Broberg, T. and Kazukauskas, A. (2015). Inefficiencies in Residential Use of Energy - A Critical Overview of Literature and Energy Efficiency Policies in the EU. International Review of Environmental and Resource Economics, 8(2):225–279.

De Baets, S. and Buelens, M. (2012). Development of the Loss Aversion Questionnaire. Vlerick Business School Working Paper, October 2012.

Farsi, M. (2010). Risk aversion and willingness to pay for energy efficient systems in rental apartments. Energy Policy, 38(6):3078–3088.

Frederiks, E. R., Stenner, K., and Hobman, E. V. (2015). Household energy use: Applying behavioural economics to understand consumer decision-making and behaviour. Renewable and Sustainable Energy Reviews, 41.

Gillingham, K. and Palmer, K. (2014). Bridging the Energy Efficiency Gap: Policy Insights from Economic Theory and Empirical Evidence. Review of Environmental Economics and Policy, 8(1):18–38.

Heutel, G. (2017). Prospect theory and energy efficiency. NBER Working Paper Series No. 23692.

Howarth, R. B. and Sanstad, A. H. (1995). Discount rates and energy efficiency. Contemporary Economic Policy, 13:101–109.

Martin-Bonnel de Longchamp, L., Lampach, N., and Parisot, L. (2018). How Cognitive Biases Affect the Energy Performance Gap in Low Energy Buildings. Working Paper BETA, CNRS and University of Strasbourg.

Qiu, Y., Colson, G., and Grebitus, C. (2014). Risk preferences and purchase of energy-efficient technologies in the residential sector. Ecological Economics, 107:216–229.

Samuelson, W. and Zeckhauser, R. (1988). Status Quo Bias in Decision Making. Journal of Risk and Uncertainty, 1(1):7–59.

Sanstad, A. H. and Howarth, R. B. (1994). Consumer rationality and energy efficiency. Proceedings of the ACEEE 1994 Summer Study on Energy Efficiency in Buildings, pages 175– 183.

Schleich, J., Gassmann, X., Faure, C., and Meissner, T. (2016). Making the implicit explicit: A look inside the implicit discount rate. Energy Policy, 97:321–331.

Schleich, J., Gassmann, X., Meissner, T., and Faure, C. (2018). A lage-scale test of the effects of time discounting, risk aversion, loss aversion and present bias on household adoption of energy efficient technologies. Working Paper Sustainability and Innovation, No. S04/2018.

Schubert, R. and Stadelmann, M. (2015). Energy-Using Durables - Why Consumers Refrain from Economically Optimal Choices. Frontiers in Energy Research, 3(February):1–13.