

CAN LOSS AVERSION EXPLAIN THE ENERGY EFFICIENCY GAP? A STATED CHOICE EXPERIMENT

Thilo K.G. Haverkamp, University of Kassel, +49 561 804-3866, thilo.haverkamp@uni-kassel.de
Andreas Ziegler, University of Kassel, +49 561 804-3038, andreas.ziegler@uni-kassel.de

Overview

Although energy-efficient technologies and products offer considerable financial and environmental benefits, they are often not adopted. This phenomenon is known as the energy paradox or energy efficiency gap (e.g., Gerarden et al., 2015, 2017). In the literature, possible explanations such as market failure, model and measurement, or behavioral aspects are discussed (e.g., Alcott and Greenstone, 2012, Gillingham and Palmer, 2014, Gerarden et al., 2015, 2017). While most previous studies focus on the two former explanations, only recently the role of behavioral explanations such as loss aversion is empirically examined (e.g., Heutel, 2019; Schleich et al., 2019). Loss aversion is a central element of prospect theory and describes the tendency that losses matter more than gains (e.g., Kahneman and Tversky, 1979). Several theoretical studies in the field of energy efficiency identify loss aversion as a potential explanation for the energy efficiency gap (e.g., Greene, 2011, Osberghaus, 2017). However, the results of empirical analyses are mixed. For example, while Heutel (2019) reveals a negative correlation between loss aversion and the adoption rate for energy-efficient technologies, Schleich et al. (2019) report no significant correlations in some of their model specifications. Our study empirically analyzes the role of loss aversion for the case of energetic modernizations in apartments or houses in Germany. We specifically examine tenants who account for about 58% of all households in Germany.

Methods

Our empirical analysis is based on a stated choice experiment which will be implemented in a large-scale computer-based survey among about 1100 residents in March 2022. The sample will be stratified in terms of age, gender, education, and place of residence (with respect to 16 federal states) so that it will be widely representative for these criteria. Due to the focus of the survey, only adults who live in a rented apartment or house and are solely responsible or responsible together with a partner for the purchase of major household items or services (e.g., vehicles, furniture, electricity contracts) will be included. The main part of the survey will be the experimental part. The respondents will be asked to imagine that their landlords are thinking about the energetic modernization of their current apartment or the corresponding building. They will be asked to repeatedly choose among three alternatives, i.e. two energetic modernization packages and the status quo.

The three alternatives will be described by the following six attributes, respectively: Annual CO₂ emissions for the generation of heat after completion of the (possible) measures, duration of the implementation of the (possible) measure, living comfort during the implementation of the (possible) measures, living comfort after the implementation of the (possible) measures, monthly incidental costs, and monthly cold rent. Based on the answers of the respondents to previous questions in the survey, the annual CO₂ emissions for the generation of heat, the monthly incidental costs, and the monthly cold rent will be personalized. The participants of the survey will face ten different choice sets, each containing the choice among the three alternatives. Typically, the validity of a stated choice experiment may suffer from the hypothetical nature of the choices. We try to address this potential hypothetical bias in three ways. First, we will use cheap talk scripts, which have been proven to reduce or even eliminate this hypothetical bias (e.g., Cummings and Taylor, 1999, List, 2001). Second, we will include the status quo option to make the choice situation more realistic. Third, we will make the respondents aware that the results of our study will be used to consult political decision makers regarding measures for the promotion of energetic modernization measures.

The participants of the stated choice experiment will be randomly assigned to two treatment groups with different goal framings (e.g., Levin et al., 1998). In the first treatment group “positive goal frame”, the monetary changes for energetic modernizations will be illustrated in absolute changes compared to the status quo. Consequently, the desirable monetary outcome of an energetic modernization (i.e. lower monthly incidental costs) will be coded as a gain, whereas the undesirable monetary outcome (i.e. higher monthly cold rent) will be coded as a loss compared to the status quo. In the second treatment group “negative goal frame”, the monetary changes for energetic modernizations will be illustrated in absolute changes compared to an energetic modernization alternative. Consequently, the desirable monetary outcome of an energetic modernization will be coded as a loss, whereas the undesirable monetary outcome will be coded as a gain compared to the status quo.

For the estimation of the unknown parameters and thus the unknown effects of the six attributes and the treatments on the choice among the two energetic modernization packages and the status quo, we will use flexible mixed logit models. Technically, the treatment effects can be estimated by interacting a treatment dummy variable with the status quo alternative or with some attributes.

Expected results

In line with previous studies, we expect that the reduction of annual CO₂ emissions for the generation of heat after completion of the measures and the improvement of the living comfort after completion of the measures have a positive effect on the choice of an energetic modernization measure. Furthermore, we hypothesize that the duration of the implementation of the measures and the deterioration of the living comfort during the implementation of the measures have a negative effect on the choice of an energetic modernization measure.

Based on the assumption that losses matter more than gains, we particularly expect that the respondents have a lower average preference for the status quo alternative in the treatment group “negative goal frame” than in the treatment group “positive goal frame”. Furthermore, we hypothesize that the respondents have a stronger average negative preference for monthly incidental costs in the treatment group “negative goal frame” than in the treatment group “positive goal frame” as well as a stronger average negative preference for the monthly cold rent in the treatment group “positive goal frame” than in the treatment group “negative goal frame”.

Preliminary conclusions

Due to our experimental approach, we will be able to analyze causal effects of loss aversion. From these findings several policy implications could be drawn. For example, if the results coincide with our expectations, landlords could be encouraged to present the outcome of (possible) energetic modernization measures in a way that the desirable outcome is coded as a loss, whereas the undesirable outcome is coded as a gain in order to reduce the energy efficiency gap.

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