[*HOUSING VS. APPLIANCES: CONSUMER RESPONSES TO ENERGY EFFICIENCY LABELING*]

Reid Dorsey-Palmateer, Western Washington University, 1-206-605-2676, dorseyr2@wwu.edu
Sharon Shewmake, Western Washington University, 1-206-605-4892, shewmas@wwu.edu
Phil Thompson, Western Washington University, thompsp5@wwu.edu

Overview

Using an online stated-choice experiment, this paper examines the impact of various energy efficiency labels on consumer choices for both housing and water heaters. Using a default label with annual energy costs and three alternate approaches (10-year energy costs, annual energy costs with red and green colors flagging relatively inefficient and efficient options, annual energy costs with GHG emissions information included), we test to see how these information differences impact efficiency decisions for both houses and water heaters, the extent to which the impacts of the label – defined in various ways – differ between houses and water heaters, and the extent to which these label design effects can differ across financially-related demographics for each of houses and water heaters. These results add to a growing literature examining how portrayal of energy costs on labels can impact decision-making.

Methods

The experiment was run using the Qualtrics platform. Participants were asked to make a choice between one of five houses and one of five water heaters and then, after each selection, were asked to justify their choice in an open-response format. The houses and water heaters only differed by up-front cost and expected energy use and participants were instructed to assume that the houses/water heaters were otherwise equally attractive. Additional energy efficiency in this online experiment was set to be relatively expensive; unless both the participant's discount rate is relatively low as well as the product lifespan is thought to be be relatively long, the lowest lifetime cost for both the house and water heater choice would be obtained via choosing the least energy-efficient option.

The information on the energy use of the house and water heater was portrayed to participants in one of four ways; each participant saw this information in the same randomly-assigned way for both the house and the water heater: (1) annual energy cost, (2) 10-year annual energy costs, (3) annual energy costs with the two houses/water heaters with the highest energy costs having their energy costs in red and the two houses/water heaters with the lowest energy costs having their energy costs in green, or (4) annual energy costs along with the associated amount of greenhouse gas emissions shown in terms of gallons of gasoline equivalent for easier comprehension. Four relatively basic finance-related questions were then asked to learn about the participant's understanding of this topic, as well as a series of questions used to estimate their implicit discount rate. The Qualtrics experiment concludes by asking a variety of demographic questions, as well as their real-life experience purchasing these types of products.

Ordered logistic regression under several specifications was then employed to assess the impacts of various factors on the likelihood of selecting a more efficient house or water heater. Finally, standard regression analysis was used to examine how the label type affected participants' decisions with regards to three product attributes of the selected item: annual energy cost, up-front cost, and the marginal payback period. Additionally, using these variables as the outcome variables of interest allowed water heater and house decisions to be run in the same regression, and potentially differential impact of the different label types on housing vs. water heater outcomes to be directly compared.

Results

After removing observations that did not pass various data quality screen, there were 1,130 remaining observations. There were no statistically significant differences in demographics and financial experience results across the four label types, as would be expected with random assignment.

When simply looking at the share of participants picking each item, selecting the highest efficiency house was easily the most common choice with almost 42% of participants doing so, and was much more common than selecting the highest efficiency water heater, which was chosen by 22.8% of respondents and furthermore was not even one of the top-two water heater choices. On the other hand, for the water heaters, the cheapest and least-energy efficient water heater was instead the most popular (28.6%).

Using the ordered logistic regression analysis, being presented the label design with 10-year energy costs instead of annual energy costs makes it more likely that a participant will select a less efficient item heaters for both houses and water heaters, in line with what is likely minimizing lifetime costs. Conversely, being shown the label design with GHG information in addition to the annual energy costs, instead of annual energy costs alone, makes it more likely that a more efficient item is selected. Meanwhile, while switching from the baseline label design to the colored design where the two most/least efficient items had their energy costs in red/green improved the market share of the least expensive green item (the second-most efficient item), the ordered logistic regression results show that viewing the colored label design instead of the baseline had overall no statistically significant effect on the efficiency of the selection of either house or water heater. Answering a larger share of the four finance questions correctly was associated with an increase in the efficiency of the house selected, though not water heaters. Using interaction terms, we also find that impact of the label shown on efficiency decisions can vary in statistically significant ways across participants with different levels of financial experience.

Using the standard regression analysis, the magnitudes of the various effects of being assigned different label types on the up-front cost and annual energy of the selected items were larger for houses than for water heaters, which is perhaps unsurprising as houses have larger variation in up-front and annual energy costs. The selection of water heaters was associated with a 9.9 year decrease in the marginal payback period, as compared to the selection of a house, indicating that participants tended to require a much quicker payback for additional investments in energy efficiency when choosing a water heater as compared to a home. However, while receiving the GHG label lead to a significant increase in the marginal payback period and receiving the 10-year energy label results in a significant reduction in the marginal payback period (both in comparison to the annual energy cost label), we did not find statistically significant differences in the magnitude of these effects between houses and water heaters.

Conclusions

In this paper, we have examined how different types of information for energy efficiency labeling impacts various outcomes for housing choices, how these impacts can differ by demographics related to financial sophistication, and how these results compare to a sample appliance (water heaters). More generally, we do find the impacts of these label designs vary across demographics and these differences are not the same between water heaters and housing. These results could be used to create more effective energy efficiency labels better tailored to the type of product in question, and noting that there will likely be conflicts between promoting socially-efficient levels of energy efficiency (accounting for pollution externalities) and minimizing the private lifetime costs of the item for the purchaser.