Energy Saving Potential of Replacing the Old Refrigerator: Evidence from Comparative Case Study of Japanese Household[1]

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Abstract

This paper empirically analyzes the causal effect of the replacement of an old refrigerator using household data. We adopt the synthetic control method to capture this effect. Our dataset includes consumer behavior data to replace the old refrigerator, but the size of the treatment group (i.e., all households to replace the refrigerator in our dataset) is very small and may lead to less reliable regarding outcomes. Therefore, the method is suitable for our analysis. Furthermore, the result is intuitively an energy saving potential because it can be expressed as the difference in electricity consumption between the treatment group and its counterfactual. We show the replacement effect to be around 30 kWh per month and its reduction ratio around 49 percent. The energy saving is attained regardless of the choice of the larger refrigerator than previous one, which gives the impression of an increase in electricity, and our observations provide the possibility to enhance welfare. Our results show that some households attain the energy saving potential comparable to the engineering approach. One interpretation of it is that there is friction, which is market failure and consumer's behavioral bias, in energy efficient investment but there is the household which dwindles the energy efficiency gap at the aggregated level.

JEL classification numbers

C29; D12; Q40; Q48; Q54

Keywords

Energy Efficiency Gap; Effect of replacing appliances; Synthetic Control Method; Energy Saving Potential; Causal Inference

[1] The latest version is available at http://www.econ.aoyama.ac.jp/laboratory/.