To the Window, to the Wall: Evaluating Thermal Retrofit Efficacy in the Residential Sector

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Reducing power consumption for domestic heating is important from a financial and ecological perspective. One way is to increase the energy efficiency of dwellings by thermal retrofit to reduce energy input, while maintaining the same level of thermal comfort. However, the literature on the efficacy of thermal retrofits is inconclusive, mainly due to data limitations, differing study designs, and measures analyzed. Many studies are evaluations of publicly funded programs and do not observe energy consumption over time. Additionally, many studies suffer from a self-selection bias and are often unable to account for socio-demographic household characteristics.

Using representative German household survey data (GSOEP) for the years 2013-2019, this paper adds a contribution by analyzing the price adjusted yearly expenditure for room heating and warm water. Methodologically, this study employs a staggered difference-in-differences approach using dynamic treatment periods. The considered measures of thermal retrofitting are the installation of wall insulation and double-glazed windows. This approach allows to observe the yearly change in household heating expenditure and to identify the time of installation as a treatment period. The control group comprises households that have not undergone the considered measures of thermal retrofitting or had already implemented such measures before.

The data used in this analysis contains information on the dwelling, such as the type of dwelling, size, and the primary type of energy used for heating. Unlike previous studies, which often only rely on dwelling characteristics, the data used contains socio-demographic household information, like household composition, income, and tenancy status.

First results indicate that retrofits on average have no significant immediate and medium run effect on the heating expenditure of private households in the years following installation. This might suggest that behavioral changes of households diminish energy savings (rebound effect).

Keywords:

Heating; Thermal Retrofit; Energy Consumption; Difference-in-Differences Analysis

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