

On the Rebound?

An Econometric Analysis of the Effect of Energy Star Appliances on Residential Energy Consumption

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Honors A.B. Environmental Studies
May 2009

EXECUTIVE SUMMARY

Environmental issues such as climate change and greenhouse gas emissions become more urgent as global populations and energy consumption continue to rise. In the United States, the residential sector accounts for 17.2% of emissions; appliance use contributes significantly. Energy efficiency is often heralded as a cost-efficient means of reducing consumption, yet since increasing appliance efficiency lowers operating cost, households may react to these changes by increasing consumption—a phenomenon known as the “rebound effect.” If a rebound effect occurs, the full environmental benefits of increasing efficiency will not be realized.

This study analyzes the impact of the use of Energy Star air conditioners, clothes washers, dishwashers, and refrigerators on residential energy consumption between 2000 and 2006. At the household level, the study finds a negative effect of Energy Star refrigerators on annual energy consumption: this is unsurprising, assuming operation near maximum run hours with no change to capacity. In contrast, Energy Star air conditioners show a positive effect on household energy consumption. Trends in state level data are less clear due to uncertainty measuring appliance stock but are not necessarily inconsistent with household data. Although this study cannot conclusively point to a residential rebound effect, there is strong evidence that for air conditioners, increases in energy consumption may erode efficiency gains. Policy implications are substantial, as such increases hinder efforts to reduce greenhouse gas emissions, and the failure to understand this may delay reallocation of resources to meet emissions goals.