

# Belt and Suspenders and More: The Incremental Impact of Energy Efficiency Subsidies in the Presence of Existing Policy Instruments



RESEARCH BY: SÉBASTIEN HOUE (UNIVERSITY OF MARYLAND) AND JOSEPH ALDY (HARVARD UNIVERSITY)  
E2E WORKING PAPER WP-014, OCTOBER 2014

## INTRODUCTION

Over the past 40 years, policymakers have implemented an array of instruments – regulatory mandates, information campaigns, and technology subsidies – to promote energy efficiency. Given scarce resources and the existing overlay of policy instruments, what is the incremental impact of energy efficiency subsidies on energy consumption?

This paper evaluates the impact of appliance subsidies provided under the “Cash for Appliances” program in light of existing standards and information disclosures. Energy savings are estimated for the three major appliance

categories that attracted the most funds: refrigerators, clothes washers, and dishwashers. Only appliances with an EnergyStar (ES) or stricter certification were eligible for the rebates.

For all three appliance categories, the impact of the appliance rebates on electricity consumption tended to be quite small. These modest savings reflect several factors. First, consumers substituted over time to take advantage of the rebates by either accelerating or delaying their purchase of an energy-efficient appliance – implying that they would have made the purchase regardless.

## GOAL

To assess the incremental impact of energy efficiency subsidies in light of existing regulatory and informational energy efficiency policies.

## RESEARCH RESULTS

- **Paper Overview:** The authors assess the impact of the State Energy Efficient Appliance Rebate Program (SEEARP) on energy consumption. The program details differed by state, which allowed for empirical estimation using a difference-in-differences strategy.
- **Paper Results:** Estimates reveal that the rebate program had a substantially lower cost-effectiveness than previously thought. This is a result of several factors, including consumers delaying purchases, freeriding, and purchasing larger, greater total energy-using appliances that qualify for the rebate.
- **Policy Lessons:** The presence of pre-existing policies can undermine the cost-effectiveness of a new policy. In particular, pre-existing energy efficiency appliance standards can undermine the cost effectiveness of additional energy efficiency appliance subsidies.



Second, the authors estimated free-riding rates of 73% to 92% across all three appliance categories. Free-riders are assumed to not to contribute to energy savings. The authors were able to distinguish between “switchers” – consumers who substituted away from a non-ES product and purchased an ES product because of the rebate – and “free-riders,” consumers who bought an ES product with a rebate but would have done so even without a rebate. The authors found that the proportion of switchers tended to be small relative to the proportion of free-riders.

Third, the reliance on EnergyStar certification, which itself relies on attribute-based minimum standards, appeared to undermine the energy-saving objective of the rebate programs. The ES requirement and minimum efficiency standards define energy efficiency as a function of size, style, and other features. As a result, the rebates for ES products act as an implicit subsidy for some attributes. In

addition, they found that the generous rebates induced a small income effect that led some consumers to purchase larger appliances.

This analysis illustrates the potential for the presence of multiple pre-existing policies to undermine the cost-effectiveness of a new policy. At the average rebate amount offered for all three appliance categories, the dollar amount spent for each kWh saved was \$1.46 for refrigerators, \$0.44 for clothes washers, and \$0.61 for dishwashers. This is an order of magnitude higher than the usual \$0.06 per kWh saved estimated for utility-sponsored energy efficiency programs. Policy design that fails to account for this complicated policy space may risk higher costs and/or lower efficacy.

*Figures 1-3 below show estimates of the percentage change in electricity consumption relative to consumption prior to the announcement of the “Cash for Appliances” program in each state. The black line reflects the change in energy consumption during the rebate period only. The red line presents the percent change in the rebate period plus time between the announcement of the program and the rebate period, as well as 2 weeks after the end of the rebate period. The lower percentage change in the red line reflects the fact that consumers offset the decline in energy consumption during the rebate period with an increase in energy consumption just before and after the rebate period.*

### Results: Impact of Rebates on kWh/year Purchased by State

Figure 1: Refrigerators



(a) Refrigerators



Figure 2: Clothes Washers



(b) Clothes Washers

Figure 3: Dishwashers



(c) Dishwashers

ABOUT US: THE E2E PROJECT'S MISSION AND STRATEGY

Supported by a generous grant from The Alfred P. Sloan Foundation, the E2e Project is a joint initiative of the Energy Institute at the University of California at Berkeley's Haas School of Business, the Energy Policy Institute at Chicago at the University of Chicago, and the Center for Energy and Environmental Policy Research at the Massachusetts Institute of Technology. E2e unites top researchers in economics, engineering and other fields and uses transparent and state-of-the-art analytical techniques. Our mission is to solve one of the most perplexing energy puzzles of our time—the efficiency gap. Infusing the creation of knowledge with a commitment to non-partisan outreach, E2e aims to create a cheaper and greener future. (<http://e2e.haas.berkeley.edu/>)

