An Examination of How Energy Efficiency Incentives Are Distributed Across Income Groups

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Executive summary

Increasing energy efficiency has been a prominent public policy goal in recent years. A variety of policies that target energy efficiency have been enacted or strengthened to this end. Standards, such as building energy codes, have been used to set minimum allowable efficiency levels. Taxes, including energy taxes or carbon taxes, have been used to indirectly encourage investment in energy efficiency by raising energy prices. Energy efficiency incentives, which typically offer subsidies for high-efficiency goods through rebates or tax credits, have been used to subsidize the costs of energy efficiency investments. Labeling programs, such as Energy Star, have been used to help households identify high-efficiency products.

Partly because of these policies, energy efficiency has been linked to major economic and environmental changes. Globally, about $250 billion were invested in energy efficiency in 2017. This investment has spurred job growth in certain sectors. For example, in the United States alone, energy efficiency has been linked to the creation of 2.5 million jobs. From an environmental perspective, simulations indicate that policies that aggressively support investment in energy efficiency could lead to an 1,830 MMT carbon dioxide decrease in U.S. greenhouse gas emissions by 2050.

As energy efficiency policies have become more prominent, researchers have increasingly sought to carefully evaluate these policies. Many evaluations have focused on effectiveness and efficiency. While effectiveness and efficiency are important factors, they may mask variation in the distributional effects of policies. Distributional effects are important because, as modeled in optimal tax theory, policies that lead to a more equal distribution of resources will enhance social welfare, holding all else equal. Additionally, distributional effects are often an important factor in determining whether enacting or retaining policies is politically feasible. Perhaps because of political factors, the effect of conservation programs on low-income households is often of direct interest to utility managers and policymakers.

This paper investigates an important component related to the distributional effects of energy efficiency policies: how energy efficiency incentives are distributed across income groups. Energy efficiency incentives are a large and growing component of energy policy. By 2025, spending on incentives for energy efficiency is expected to be about $10 billion annually in the United States, doubling relative to 2010 levels. Despite the amount of funding going toward

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energy efficiency incentives, the distributional effects of energy efficiency incentives have been the subject of little research.

The analysis is based on a uniquely well-suited version the Residential Energy Consumption Survey (RECS) that includes a large set of detailed questions related to energy efficiency incentives. Using a variety of empirical techniques, the paper evaluates how the probability of receiving an incentive relates to household income across three different types of subsidies (manufacturer or retailer rebates, utility rebates, and tax credits) and eight different types of equipment (refrigerators, dishwashers, clotheswashers, space heaters, central air-conditioners, light bulbs, windows, and insulation).

The results indicate that almost all forms of incentives are concentrated in higher-income households, but there is substantial heterogeneity in the magnitude. Tax credits are the most concentrated type of subsidy and utility rebates are the least concentrated. Incentives for appliances that are not always present in residences, such as dishwashers and clotheswashers, are more concentrated than are incentives for equipment that tends to be universally-owned, such as refrigerators. The levels of concentration that are estimated are substantial. For example, regression models indicate that a household with an income of $80,000 is three times more likely than a household with an income of $20,000 to receive an incentive. The concentration of incentives in higher-income households is driven by differential rates across income groups in equipment presence and turnover, willingness to purchase Energy Star models, and homeownership. Utility rebates are no longer concentrated in higher-income households after controlling for the factors, but manufacturer / retailer rebates and tax credits remain concentrated.

The main implication of the results in this paper for policymakers is that incentives are more likely to go to lower-income households if policies are structured such that the incentives are provided through utility rebates and such that the incentives avoid appliances that are more likely to be owned by higher-income households. Optimal policy design will require consideration of a broader set of factors; such as cost-effectiveness, free-ridership, producer price responses, and effects on innovation, but distributional differences in who receives incentives are an important factor as policymakers evaluate policy options and the associated trade-offs across multiple different criteria.

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