Quantifying the Distributional Impact of Energy Efficiency Measures

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Energy efficiency programmes often pursue two objectives simultaneously: reducing emissions and combating fuel poverty. As a result questions of distribution and equity are becoming increasingly important both for academics and policymakers. Quantifying where the costs and benefits fall can provide greater insight into the equity and cost-effectiveness of government policies, and improve our understanding of household investment decisions.

We exploit a large database of home energy efficiency upgrades and metered energy consumption to provide new evidence of the distributional impact of energy efficiency measures. The analysis focuses on measures installed through the UK Supplier Obligations, the principal policy instrument for delivering energy efficiency measures in the UK and widely used in other European countries. The research draws on the National Energy Efficiency framework Database (NEED), which holds information on metered gas and electricity consumption for over four million households and a period of eight years.

We employ a range of statistical and econometric tools to answer the following questions: (i) how much savings do key energy efficiency measures actually deliver? (ii) do savings vary by level of household deprivation and (predicted) income? (iii) do the observed differences persist over time (iv) can our findings be explained by differences in baseline consumption? And finally, (v) What do our results imply for the relative cost-effectiveness of measures?

Results suggest that savings vary considerably by measure installed and level of household deprivation. These difference persist over time, and there is some evidence of an erosion of savings over time for loft insulation and heating system replacement. Differential baseline energy consumption is a factor but only partially explains the results. The measure are still largely cost-effective but much less so than previous ex-ante evaluations would suggest.

Overall, our results provide new evidence on the distribution of savings realised across households and over time. At an individual household level, the private benefits of energy efficiency measures need to be reconsidered, with a greater focus on the non-financial benefits. The total welfare gains from upgrades to more deprived households may be considered greater if those households place more importance on increased internal temperatures and any resultant improvements to health and wellbeing than on energy and cost savings. At a societal level a greater focus on reducing carbon emissions, as opposed to cost-savings, is required.

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