

Achieving Fair and Effective Emission Reductions: The Impact of Rebound Effects on Emissions of UK Households

Topic: Consumption-Based Accounts of Household Types

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To limit global warming to 1.5 degrees Celsius, urgent and radical reductions in greenhouse gas emissions are needed. Recent years have seen an increased interest in demand-side mitigation approaches as a means to reduce global greenhouse gas emissions and to meet national and international climate targets. Understanding consumption-based emissions can contribute to designing policy aimed at reducing greenhouse gas emissions globally. Indeed, research shows the need for population-targeted policy, to ensure effectiveness and to avoid further increasing social inequalities. For instance, although higher income is frequently seen as a key driver for higher consumption-based emissions, economic emission reduction policies, such as carbon taxes, often disproportionately affect lower income households. In addition, existing research showcases the need to pay attention to rebound effects, as emission reductions in one area of consumption can be tied to increases in other areas. To address assess how product-level emissions from different social cohorts are impacted by external shocks, this research studies emission changes following the 2007/08 economic crisis and the 2020 COVID-19 lockdowns. The recent release of 2020 data makes such an analysis possible for the first time. This analysis allows us to investigate the impacts of income changes and other restrictions on the emission patterns of different households, to compare levels of carbon inequality before and after these events, as well as the differences in rebound effects. Although these events disrupted wellbeing and increased inequalities and, therefore, do not provide a suitable blueprint for climate policy, they highlight the drastic impact behaviour change can have on emissions and can provide a lesson for how climate policy can be more just and effective.

To estimate subnational consumption-based greenhouse gas emissions we use data from the UK's multi-regional input-output model, as well as from the Living Costs and Food Survey, an annual household expenditure survey conducted by the UK's Office for National Statistics. The Living Costs and Food Survey surveys 4,000 to 6,000 UK households each year. In addition to full, product-level expenditure profiles, this survey contains additional demographic information, including the income, age, and gender of each household member.

To date, we find significant ($p < 0.05$) differences in the relationships between income and emissions of some age and income groups, as well as substantial descriptive differences between how age and income groups are impacted at a product-level. For instance, younger age groups show larger rebound effects of flight emissions, while older age groups show increased home energy emissions with reductions in other categories. Further analysis will investigate these differences statistically.

Importantly, our preliminary analysis also shows that despite existing levels of carbon inequality, particularly across income groups, substantial emission reductions are needed for all social cohorts assessed to meet global climate targets. However, to avoid further increasing existing inequalities and to reduce the impact of rebound effects we propose interventions targeted at specific social cohorts. While an income reduction may reduce emissions of high-income households, increased access to high quality housing and public services may help reduce emissions of low-income households, whose emissions are already decoupled from income.