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The Regressivity of a UK Uniform Carbon Tax and Potential Policy Solutions

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ABSTRACT

This paper examines the distributional impacts of introducing a uniform, economy-wide 'carbon tax' on household consumption in the United Kingdom and evaluates whether the tax is inherently regressive. It also investigates whether revenue recycling via a personal carbon allowance (PCA), or 'carbon dividend', can mitigate or reverse regressivity. The analysis is situated in the context of the UK's legally binding commitment to net zero greenhouse gas emissions by 2050, which requires significant reductions from household energy use, transport, and wider consumption. Using 2022–23 data from the UK Living Costs and Food Survey, matched to COICOP-level carbon intensity estimates from the Department for Environment, Food & Rural Affairs, the study constructs a detailed simulation model of household "carbon tax burdens." The model applies a flat carbon price of varying amounts per tonne of CO_2 equivalent across more than 600 expenditure categories. Household size and composition are adjusted using the OECD-modified equivalence scale, allowing comparisons across income deciles. Sample results suggest that a uniform carbon tax would be regressive without compensation, since low-income households devote a higher share of income to energy and transport, which are both carbon-intensive and relatively inelastic. Revenue recycling through a PCA could offset these effects, with lower-income households becoming net beneficiaries while higher-income groups remain net contributors. However, a subset of low-income households may still lose out due to high energy needs, rural location, or reliance on private transport. Identifying these groups is essential for designing complementary policies that ensure fairness alongside decarbonisation.

Keywords: carbon emissions, COICOP emission factors, personal carbon allowance, redistribution, UK households