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Who Benefited from Relief? Distributional and Justice Impacts of Germany's 2022/23 Energy Crisis Policies

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Motivation

The war between Russia and Ukraine in early 2022 caused a severe shock to European energy markets, with gas, electricity, and fuel prices reaching historic highs. The most immediate effects were felt by households, as millions of German households faced sharp increases in energy costs that often exceeded their financial capacity. In response, the German government introduced three relief packages, combining universal transfers, targeted support, and temporary price interventions. However, their effectiveness in protecting low-income and energy-poor households is disputed. It is conceivable that universal measures disproportionately benefited higher-income groups, that targeted instruments experienced low take-up and implementation delays, and that price interventions may have dampened incentives for energy conservation and decarbonization.
This paper evaluates the 2022/23 relief packages using a behaviorally informed microsimulation and asks: i) To what extent did the implemented relief measures prevent increases in income poverty and energy poverty? ii) How were the fiscal benefits distributed across the income spectrum? iii) What role did behavioral responses to energy prices play in mitigating hardship and emissions? iv) How effective were individual policy instruments, and what trade-offs emerged between social protection and environmental objectives?

Methods

The simulation framework employed in this study is designed to estimate the distributive, behavioral, and fiscal impacts of selected energy relief measures under real-world eligibility conditions and price shocks. The model builds on prior microsimulation approaches but incorporates behaviorally adjusted energy demand and poverty-sensitive metrics. Rather than relying on a single integrated panel, the approach uses harmonized information from three complementary sources (EVS, SOEP, and MOP) to simulate household responses across income and consumption dimensions.
We incorporate price increases between 2021, 2022 and 2023 for the main energy types, as depicted in Figure 1.

Behavioral changes in energy consumption are modeled using price and income elasticities differentiated by income group. These elasticities were empirically estimated using pooled microdata and panel regressions by Priesmann and Praktiknjo (2025).
Each household is simulated under four scenarios: Baseline (2021 prices, no policies or behavioral response), Price Shock (2022/23 prices, no relief or behavior), Price Shock + Policy (2022/23 prices with relief, no behavior), and Price Shock + Policy + Behavior (2022/23 prices with relief and behavioral adjustments).
After running the simulations, we calculate several key outcomes: income and energy poverty status, benefit receipt along with net fiscal transfers, behavioral energy savings, distributional indicators such as the Gini coefficient, and environmental impacts measured by CO_2 emissions using standard emission factors. All results are weighted using survey expansion factors to ensure representativeness of the German population.

Results

Table 1 shows that the 2022–23 energy price shock caused a modest rise in poverty, with the poverty rate increasing from 20.92% in 2021 to 21.23% in 2023 and energy poverty from 7.57% to 9.83%. Compensatory policies (Price Shock + Policy and Price Shock + Policy + Behavior scenarios) partly offset these effects, reducing

the 2023 poverty rate to 21.01% and energy poverty to 8.42%. The poverty gap remains largely unchanged in 2022 but declines noticeably in 2023 when policies are applied.

The simulation results confirm the regressive structure of the 2022 fuel tax rebate in absolute terms, while revealing a more nuanced pattern in relative terms. As shown in the left side of Figure 2, absolute benefits increase monotonically with income, reflecting higher car ownership and mileage among high-income households. Measured relative to disposable income, benefits follow a hump-shaped pattern: they peak in the lower-middle deciles and decline toward the top, indicating a middle-biased incidence. Incorporating behavioral responses reduces benefit levels across all deciles but leaves the distributional pattern unchanged.
Overall, the fuel tax rebate provides relatively higher support to low- and middle-income households than to the rich, yet remains poorly targeted at the poorest households in both absolute and relative terms.

The simulated distributional effects of the 2023 gas price cap are highly uniform across behavioral assumptions (Figure 2, right side). Absolute and relative relief is nearly identical for all but the lowest income decile, as the policy subsidizes 80% of 2021 heat consumption at a capped price of 12 ct/kWh, independent of actual 2023 usage.
Effectively, the gas price cap acts as a lump-sum transfer tied to historical consumption. It provides relatively higher support to low-income households but offers limited incentives for energy savings within the subsidized share, while encouraging reductions only beyond the 80% threshold. Consequently, its environmental impact is modest, and more dynamic, consumption-linked designs could better align social protection with energy-saving incentives.

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