



## When is carbon pricing progressive?

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### Key points:

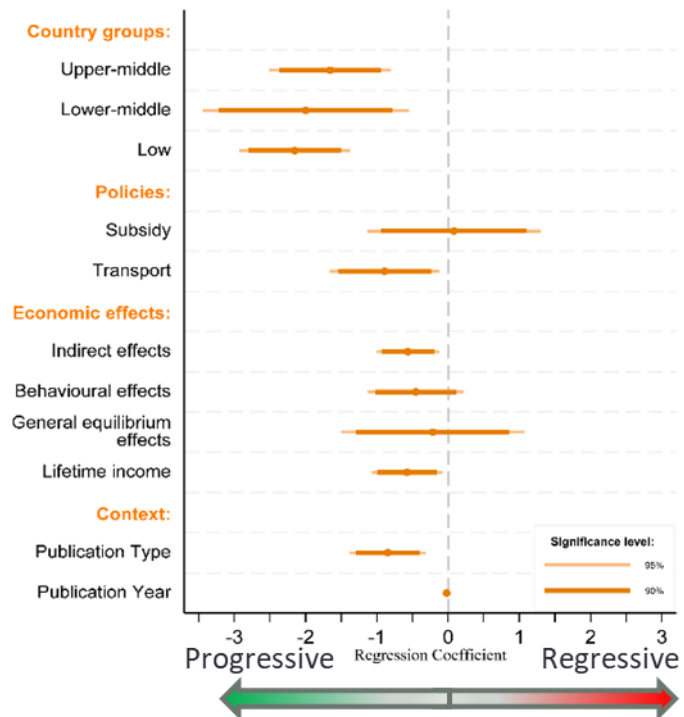
- Understanding distributional impacts of carbon pricing crucial to design socially acceptable climate change mitigation policies
- Meta-analysis of 53 empirical studies containing 183 effects in 39 countries
- Carbon pricing particularly likely to have progressive distributional outcomes in lower income countries and for transport sector policies

Carbon pricing is increasingly implemented to achieve the goals set by the Paris Agreement. In 2020, 22% of global greenhouse gas emissions were covered by carbon pricing schemes (World Bank, 2021). However, 90% of CO<sub>2</sub> emissions from energy use are priced below levels that economists would consider to be sufficient to achieve the international climate targets (Edenhofer et al., 2021). Still, pricing carbon - or removing fossil fuel subsidies alike - is often considered to be unpopular among citizens. Their introduction usually increases energy prices and has frequently been accompanied by public protests. This makes carbon pricing a politically sensitive topic and puts the question of distributional effects at the center.

A carbon price increases the price for products that directly emit CO<sub>2</sub>, such as gasoline or coal. It also affects the prices of all other products indirectly if their production involves CO<sub>2</sub>. Whether and how much a specific household is economically burdened by higher carbon prices depends on the composition of its product basket. Consumers may alter their consumption patterns in response to a carbon price, while long-term effects on the entire economy can as well be expected. The distributional impact usually describes whether the ratio between carbon costs and household income is higher for richer than for poorer households (progressive), for poorer than for richer households (regressive), or equal for both (proportional).

There exists a large academic literature covering the distributional impacts of carbon pricing, with studies often arriving at ambiguous results. To understand why these findings differ, a recent meta-analysis assesses the academic literature on distributional impacts of carbon pricing policies (Ohlendorf et al., 2021). In total, it identifies 53 studies containing 183 distributional effects in 39 countries. To understand whether the distributional impact differ by country, policy type and included economic effects, all studies are first coded according to pre-selected criteria and then econometrically analyzed. Hence, it determines quantitatively, which influencing factors increase or decrease the likelihood to obtain a specific distributional impact. The figure illustrates the main outcomes.

First, studies in lower-income countries are particularly likely to provide progressive outcomes, as large shares of the population do only have limited access to modern energy services and – related – energy consuming appliances. As a consequence, households with higher income are more affected by carbon pricing, which leads to a progressive outcome. In industrialized countries, carbon pricing is – by contrast – usually regressive. Most households consume electricity, heat and other products with embedded emissions, drive a car and have access to most appliance. Differences in households’ energy use are hence smaller, while richer households pay relatively less than poorer households when faced with a carbon price.



Second, the sectoral coverage of carbon pricing matters for distributional implications. Policies that exclusively focus on the transport sector are more likely progressive than others. Independent of specific country groups, richer people are more likely to own and drive cars.

Finally, considering behavioral and general equilibrium effects, or measuring effects on life-time incomes, usually makes study outcomes more progressive. Studies that focus on short-term effects can hence be considered to be an upper estimate regarding distributional effects.

Note that those results do not consider revenue recycling schemes, such as tax rebates or transfers. They might however be necessary even if distributional effects turn out to be progressive. A common finding in the literature is that horizontal effects, that is the variation within income groups, are much more pronounced than effects between income groups, usually studied in distributional analyses. For the political acceptability of policies, it is important to understand the hardship cases and react accordingly. Otherwise, the experience with carbon pricing and fossil fuel subsidy reforms in the past has shown that massive protests can make a reform politically infeasible.

Revenue recycling will in particular be relevant in low-income countries, where carbon prices might push households back into poverty. Independent of relative effects, absolute product prices can still increase significantly following a carbon price as shown by Dorband et al. (2019) based on a harmonized data set for 87 countries. In addition, unwanted effects on other development outcomes should be avoided. Those might for example arise if carbon pricing on cooking fuels, such as LPG, leads to people using more firewood or charcoal with related impacts on human health. Using existing transfer schemes and specific designs, e.g. not taxing cooking fuels for household consumption, could be a viable option to protect the poorest parts of the population.

In summary, we find that carbon pricing and fossil fuel subsidy removals are not necessarily regressive. Studies on low-income countries and policies focusing on the transport sector are particularly likely to provide progressive findings. Yet, unmanaged distributional impacts within income groups and small but powerful groups may still prevent that ambitious carbon prices are adopted and sustained.

## References:

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