












CLIMATE POLICY

Protecting the poor with a carbon tax and equal per capita dividend

We find that if all countries adopt the necessary uniform global carbon tax and then return the revenues to their citizens on an equal per capita basis, it will be possible to meet a 2 °C target while also increasing wellbeing, reducing inequality and alleviating poverty. These results indicate that it is possible for a society to implement strong climate action without compromising goals for equity and development.

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The policy problem

One key challenge in identifying equitable climate policies is achieving aggressive mitigation without overburdening already disadvantaged populations, for example through increases in energy and food prices or job losses. Some argue that these costs justify less dramatic emission reductions than those needed to meet the Paris Agreement temperature targets. Decision makers therefore face the challenge of preventing runaway climate change while also supporting society's equity goals. Carbon taxes represent one salient policy option to reduce emissions. Although some express scepticism, others argue that the approach is economically efficient and — most importantly here — raises revenues that can be used to counteract the potential harms from high mitigation costs. The question of whether a carbon tax can be designed in a way that reduces global emissions while also protecting the poor and achieving equity goals has considerable relevance for how society's decarbonization efforts unfold.

The findings

We find that a 2 °C target can be met while simultaneously increasing wellbeing, reducing inequality and alleviating poverty if each country or region imposes a substantial carbon tax and refunds the revenues to its citizens on an equal per capita basis (Fig. 1). Furthermore, the benefits are often large, particularly for those at the lower end of the income distribution. The overall benefits to society are even greater if total carbon tax revenues are returned on an equal per capita basis globally, which directs more of the revenues towards the poorest populations in the world (rather than the poorest within each country or region). We also find that the optimal

Messages for policy

- The revenues from a carbon tax capable of achieving a 2 °C target will be large enough to fund substantial policies that can promote equity and protect vulnerable populations.
- An equal per capita redistribution of carbon tax revenues within countries — a relatively straightforward policy to implement — can increase wellbeing, reduce inequality and alleviate poverty.
- These benefits occur in countries at all levels of development, primarily accrue to individuals at the bottom of the income distribution, and are even greater with global equal per capita redistribution.
- Large benefits will occur even if some revenues are lost to administrative costs or are saved to fund other programs, and they can make the poorest citizens net beneficiaries this decade.
- Given an equal per capita refund, the optimal timing of global greenhouse gas mitigation is characterized by rapid initial reductions, followed by a slower climb towards net zero emissions.

decarbonization trajectory is characterized by rapid reductions in emissions initially — which limits runaway climate change and allocates substantial revenues to the current poor — followed by

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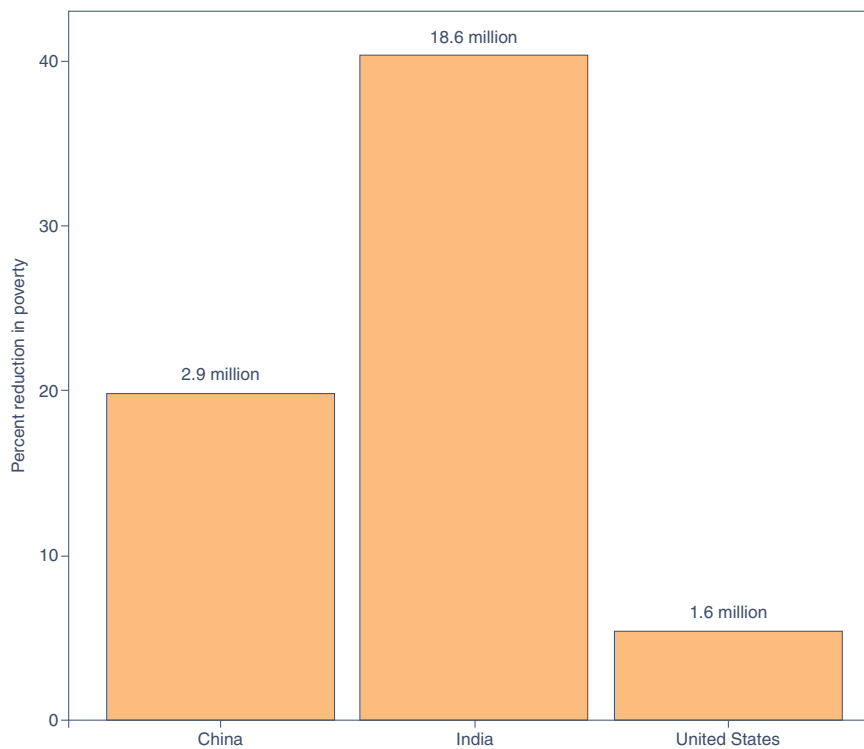


Fig. 1 | Poverty reduction with an equal per capita refund of carbon tax revenues. Estimated percent reduction in poverty in 2030 in a 2 °C scenario with an equal per capita redistribution of carbon tax revenues as compared to a scenario without any climate policy (that is, no carbon tax). The number of people that would not be in poverty is shown above the bars. Poverty lines differ by country.

a slower climb towards net zero emissions, which preserves some tax revenues for future generations.

The study

Our results build on an extensive economics literature that focuses on single nations or regions. To bring this literature together into a global analysis, we begin with a global cost–benefit climate policy model known as NICE (the nested inequalities climate–economy model), which divides the world into 12 regions and further divides each region into 5 income groups. We then add a new component to the model — calibrated to the literature — that quantifies how both the costs of a carbon tax and the benefits from an equal per capita refund of the revenues impact different income groups in different nations. We do this for a 2 °C scenario, as well as a scenario without a temperature constraint in which the model maximizes wellbeing through time via a uniform global carbon price. We evaluate the benefits of the revenue redistribution in terms of improvements in wellbeing, changes to inequality and reductions in poverty. □

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Further reading

Stern, T. *Fuel Taxes and the Poor: the Distributional Effects of Gasoline Taxation and their Implications for Climate Policy* (Routledge, 2012).

A volume compiling studies from around the world that together challenge the conventional wisdom that gasoline taxation, an important and much debated instrument of climate policy, has a disproportionately detrimental effect on poor people.

Klenert, D. et al. Making carbon pricing work for citizens. *Nat. Clim. Change* 8, 669–677 (2018).

A study that synthesizes findings on the optimal use of carbon revenues from both traditional economic analyses and studies in behavioural and political science that are focused on public acceptability.

Carattini, S., Kallbekken, S. & Orlov, A. How to win public support for a global carbon tax. *Nature* 565, 289–291 (2019).

An article describing evidence indicating that charges on emissions could be popular if revenues are given back to citizens.

Dennig, F., Budolfson, M. B., Fleurbaey, M., Siebert, A. & Socolow, R. H. Inequality, climate impacts on the future poor, and carbon prices. *Proc. Natl Acad. Sci. USA* 112, 15827–15832 (2015).

An article that introduces sub-regional inequality into optimal climate policy models and finds that, when future damage particularly effects the poor, a considerably greater global mitigation effort is needed.

Economists' Statement on Carbon Dividends (Climate Leadership Council, 2021); <https://clcouncil.org/economists-statement/>

A statement — signed by over 3600 economists, including 28 Nobel laureates — that describes five policy recommendations to address global climate change, including the use of a carbon tax whereby all revenue is returned directly to citizens through equal per capita rebates.

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Competing interests

The authors declare no competing interests.