Only inequality aversion or discounting can justify postponing mitigation

In RICE/NICE growth assumptions are such that future generations are substantially better off than current generations. The inequality aversion parameter η applies to inequality across space and time equally in the welfare function – equation (1). In so far as future generations are richer, high values of η discount the costs to the future relative to the present, just like the much debated discount rate.

When η = 0, the objective simply maximizes total (possibly discounted) consumption. In this case the relative affluence of the future over the present has no impact and only the relative magnitude of the damages and mitigation costs matter. Because the former are significantly greater than the latter (even in the unmodified RICE model), mitigation levels become optimal. This is especially true if the utility discount rate π is also zero (left panel in figure). At higher values of π (middle and right panels), the future damages are discounted and the consequent carbon tax rate is not quite as high; but still significantly higher than zero.

The descending line in these graphs (in blue) is the assumed “backstop” price curve; the carbon tax at which renewable energy is competitive and full mitigation is achieved.

In the left panel (π = 0), the carbon tax (in red) reaches the backstop price immediately in the middle panel (π = 1/2% per year) and right panel (π = 2% per year) the carbon tax reaches the backstop by about 2090 and 2360, respectively.

Conclusions/Future Work

• Lower discount rates imply higher welfare optimal carbon tax rates in all scenarios
• Under growth assumptions in the NICE model, zero inequality aversion and zero discounting leads to high carbon tax rates and implicitly rapid mitigation.
• Future intergenerational inequality aversion implies a lower price salient under weak mitigation policy (high discounting) and when damages fall more heavily on the poor; intergenerational inequalities dominate otherwise
• The distribution of climate damages may strongly influence the welfare optimal carbon tax rate The possibility of catastrophic climate damages has a larger effect on the tax rate when damages are proportional to income than when they fall on the poor (which requires strong mitigation anyway).
• Future work will include studying population, growth and the distribution of abatement costs

Acknowledgements: We gratefully acknowledge comments and advice by David Anthoff, Valentina Bousett, Ottmar Edenhofer, Emily Fischer, Tom Fussell, and Catherine Adam at Princeton and Tokyo. This work was partially supported by the Economic and Social Research Council (grant number ES/K007537/1) and the Climate Futures Initiative at Princeton University.

Selected References


