Make carbon pricing a priority

Estimates of the social cost of carbon vary extremely widely as a function of different ethical approaches. Faced with values between \$10 – \$1000 / tCO_2, and above, some perplexed policymakers have adopted "target-consistent" carbon pricing instead.

Cameron Hepburn

Carbon pricing is back in fashion. Global revenues from carbon pricing increased by 60% to US \$26 billion in 2015. There are now 40 national and 24 subnational carbon pricing initiatives, and carbon pricing is incorporated in 101 pledges under the Paris Agreement.[1] In 2017, the world's largest carbon trading system is planned in China,[1] the World Bank's High-Level Commission on Carbon Prices is expected to publish their key report mid-year, and the recently launched Climate Leadership Council is advancing a revenue-neutral \$40 / tCO_2 carbon tax in the USA.[2]

But what is the right carbon price? For decades, economists have laboured at pinning down the social cost of carbon, the additional damage caused from the emission of an extra tonne of CO_2, expressed as an equivalent loss of consumption today. Estimates vary widely as a function of model structure and assumptions, including ethical choices.

Writing in *Nature Climate Change,* Matthew Adler and colleagues[3] consider some of these ethical aspects. They use the RICE integrated assessment model[4], with an analysis at the regional level, to compare results between "utilitarian" and "prioritarian" ethics. The former simply adds up future utilities, or well-being, discounted to a present equivalent, while the latter places more weight to changes in well-being of worse off individuals and, in this paper, eschews discounting the future. The impact of the different ethical positions is analysed through four parameters and their respective central values: the degree of priority for regions with lower utility, γ=1 (γ=0 implies conventional utilitarianism); a subsistence level of consumption, c^{zero}=\$500 p.a.; the pure rate of time preference, ρ=1% (0% implies impartiality between generations); and the elasticity of marginal utility of consumption, η=1.

One striking finding is the importance of the choice of base region for converting the utility losses from climate change back into monetary values. For instance, if all climate damages were converted back to money at (wealthy) US income levels, the social cost of carbon (in 2015 prices) at central parameter values is around \$4,000 / tCO_2 for an undiscounted prioritarian but only \$300 / tCO_2 for a discounted utilitarian. Equivalent figures normalised to African incomes are \$60 / tCO_2 and \$20 / tCO_2 respectively. Ignoring regional differences, which is the common approach, leads to global values of approximately \$400 / tCO_2 and \$60 / tCO_2 respectively. In short, different choices in converting damages into monetary terms can shift the estimated social cost by at least an order of magnitude.

The analysis also shows that the social cost of carbon tends to fall as the priority for the poorest rises. While this finding is not novel, it may appear to contradict the idea that climate change is expected to "hit the poor hardest". This result can be explained by the assumption that future generations will be considerably richer, compared to the present. Prioritarianism places much greater weight on the interests of the current poor, reducing the social cost of carbon and delaying mitigation into the richer future.

Policy makers are forgiven for wanting simple guidance on the appropriate social cost of carbon, but simple and defensible guidance is not on offer. This paper presents wide ranges. For instance, for

conventional utilitarianism (γ=0) with ρ=1% and η=1, the social cost of carbon is around US \$60 / tCO_2. Values in \$10-100 / tCO_2 range occupy a good part of the ethical parameter space if little weight is placed on the future and a greater weight is placed on the current poor. By the same token, values of US \$500 /tCO_2 and above are also supported by tenable ethical choices.

This range of values is considerably higher than official US guidance[5] at around US \$40 / tCO_2 (in 2007 prices). Actual carbon prices tend to be even further below government guidance, at around US \$1-10 /tCO_2 globally, with the largest carbon trading system, the EU ETS, revealing prices at around €5-10 /tCO_2.[1] This difference between actual, official guidance, and ethical ideal suggests great scope for improvement in carbon pricing. Suggestions to broaden coverage and raise prices include using border carbon adjustments,[6] the creation of climate clubs with trade sanctions,[7] or a putative World Climate Assembly.[8] None of these mechanisms contemplate large transfers that currently appear politically impossible.

The wide range of estimates of the social cost of carbon was a factor in the UK government instead adopting a "target-consistent" carbon price – that is, a price consistent with achieving politically-agreed UK goals.[9] This has the merit of policy consistency. Analyses such as by Adler et al., in contrast, consider a philosophical and economic ideal. While this may seem politically unrealistic now, we have repeatedly seen, not least in 2016, what is unrealistic one day can become realistic the next.

Cameron Hepburn is Professor of Environmental Economics at the Smith School of Enterprise and the Environment and the Institute for New Economic Thinking at the University of Oxford and Professorial Research Fellow at the Grantham Research Institute at the London School of Economics and Political Science.

Email: cameron.hepburn@new.ox.ac.uk

---

[1] *State and Trends of Carbon Pricing 2016* (World Bank Group, Washington DC, October 2016)

[2] 'US Republican idea for tax on carbon makes climate sense' *Nature* **542**, 271–272 (16 February 2017), doi:10.1038/542271b.

[3] Adler, M., Anthoff, D., Bosetti, V. Gerner, G. Keller, K. & Treich, N. *Nature Clim. Change* **7,** 443-449 (2017).

[4] Nordhaus, W. D. Economic aspects of global warming in a post-Copenhagen environment. *PNAS*, **107**, 11721-11726 (2010).

[5] Interagency Working Group on Social Cost of Carbon (2015) Response to Comments: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (US Gov, Washington, DC).

[6] Helm, D., Hepburn, C., & Ruta, G. *Oxford Review of Economic Policy*, **28**, 368-394, (2012).

[7] Nordhaus, W. *Am. Econ. Rev.*, **105**, 1339-1370 (2015).

[8] Weitzman, M. L. Can negotiating a uniform carbon price help to internalize the global warming externality? *Journal of the Association of Environmental and Resource Economists*, **1**, 29-49 (2014).

[9] Dietz, S., & Fankhauser, S. *Oxford Review of Economic Policy*, **26**, 270-284 (2010). UK DECC, Carbon Valuation in the UK: A Revised Approach (2009).