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# Keep climate policy focused on the social cost of carbon

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## Abstract

In the context of climate change, the application of cost-benefit analysis to inform mitigation policies can help to achieve the best outcomes and avoid the worst: spending trillions of dollars but failing to get the job done (1). The costs of a climate policy are the abatement costs of reducing emissions of carbon dioxide (CO<sub>2</sub>) (or other greenhouse gases). The standard measure of the benefits of a climate policy is the social cost of carbon (SCC), which measures the avoided economic damages associated with a metric ton of CO<sub>2</sub> emissions. Recently, however, there have been calls for an alternative approach to policy evaluation that ignores the benefits of avoided climate damages and instead focuses only on minimizing the compliance costs of a given, politically determined climate objective (2, 3). We argue here that a shift from use of the SCC and cost-benefit analysis to an alternative approach for evaluating policy that focuses on costs alone would be misguided. Rather than advocate for alternative approaches, now is the time to support efforts to update the SCC and its application to official climate policy evaluation.

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OCT. 8, 2021

### Broader frameworks are necessary for climate mitigation policies

ALOK BHARGAVA Professor of Public Policy, University of Maryland

In their article on climate policies, Aldy et al. (1) assert that the focus should be on social costs of carbon and that a “proposed shift away from SCC is ill advised”. The authors dismiss approaches based on cost-effectiveness analyses as being “misguided”. These blunt and seemingly superficial statements presumably stem from an emphasis on “macro” approaches (2) for modeling the effects of atmospheric greenhouse gases concentrations for *average* global surface and “deep-ocean” temperatures. By contrast, “micro” analyses underlying cost-effective policies will generally entail the use of *in situ* and remote sensing longitudinal data for analyzing the interrelationships between climate indicators such as GHG concentrations, ambient temperatures, ocean acidification, deoxygenation and current velocities, melting of sea and polar ice, and increased salinity and floods in coastal regions (3). From a

broader analytical standpoint, the two approaches may be complementary especially since the assessment of long-term benefits of climate mitigation policies is complex.

First, a high proportion of CO<sub>2</sub> is ultimately absorbed by oceans thereby decreasing pH levels which, together with higher water temperatures, reduce dissolved oxygen levels (3). While SCC can cover ocean acidification, the emphasis on reducing GHG emissions (4) is inadequate for halting increases in temperatures because dumping pollutants in oceans (5) and lower pH levels can accelerate the melting of sea ice (6) and instigate feedback loops (7). Furthermore, GHG have different diffusion rates, potentials, solubility, and lifespans that are difficult to incorporate into SCC. While CH<sub>4</sub> may quickly diffuse into the atmosphere due to lower molecular weight, CO<sub>2</sub> emission from densely populated coastal regions are likely to be absorbed by the oceans. Thus, imputing SCC will need to account for carbon storage in the oceans which is difficult especially at lower depths.

Second, for the assessment of SCC, it is important to analyze factors such as the effects of agriculture for CH<sub>4</sub> and N<sub>2</sub>O concentrations at weather stations (8). Moreover, CH<sub>4</sub> released from ocean floors partly dissolves in the water and the rest escapes into the atmosphere. While CH<sub>4</sub> has a shorter lifespan than CO<sub>2</sub>, its warming potential is 23 times higher. Similarly, glacier and polar ice thicknesses are affected by aerosols from pollution and by the interplay between ice thicknesses and CO<sub>2</sub> and CH<sub>4</sub> releases from microbial activity (9, 10). Because glacier and sea ice thicknesses are important for maintaining water supplies and for earth's radiation budget, addressing such factors requires broader frameworks than a focus on SCC. Further, the effects of increased sea surface temperatures for zonal and meridional velocities of ocean currents (11) can take decades to materialize and may differentially affect warming patterns in the continents due velocity changes in the Atlantic Meridional Overturning Circulation (12). Lastly, even with better estimates of SCC, carbon taxes have been difficult to implement (13).

In summary, it is important to conduct elaborate studies on different dimensions of climate dynamics and incorporate the findings in evidence-based policies. While SCC is a useful measure, interventions preserving ocean health and those for maintaining polar ice and sea ice thicknesses are urgent and cannot be exclusively based on SCC. Moreover, many countries may be unwilling to pay carbon taxes and the redistribution of proceeds is unlikely to prevent inexorable increases in sea levels in the current economic and political environments. Rather than discussing the relative merits of cost-benefit versus cost-effectiveness approaches for climate mitigation policies, it would seem more important to persuade sparsely populated countries to admit larger numbers of climate migrants (14, 15).

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