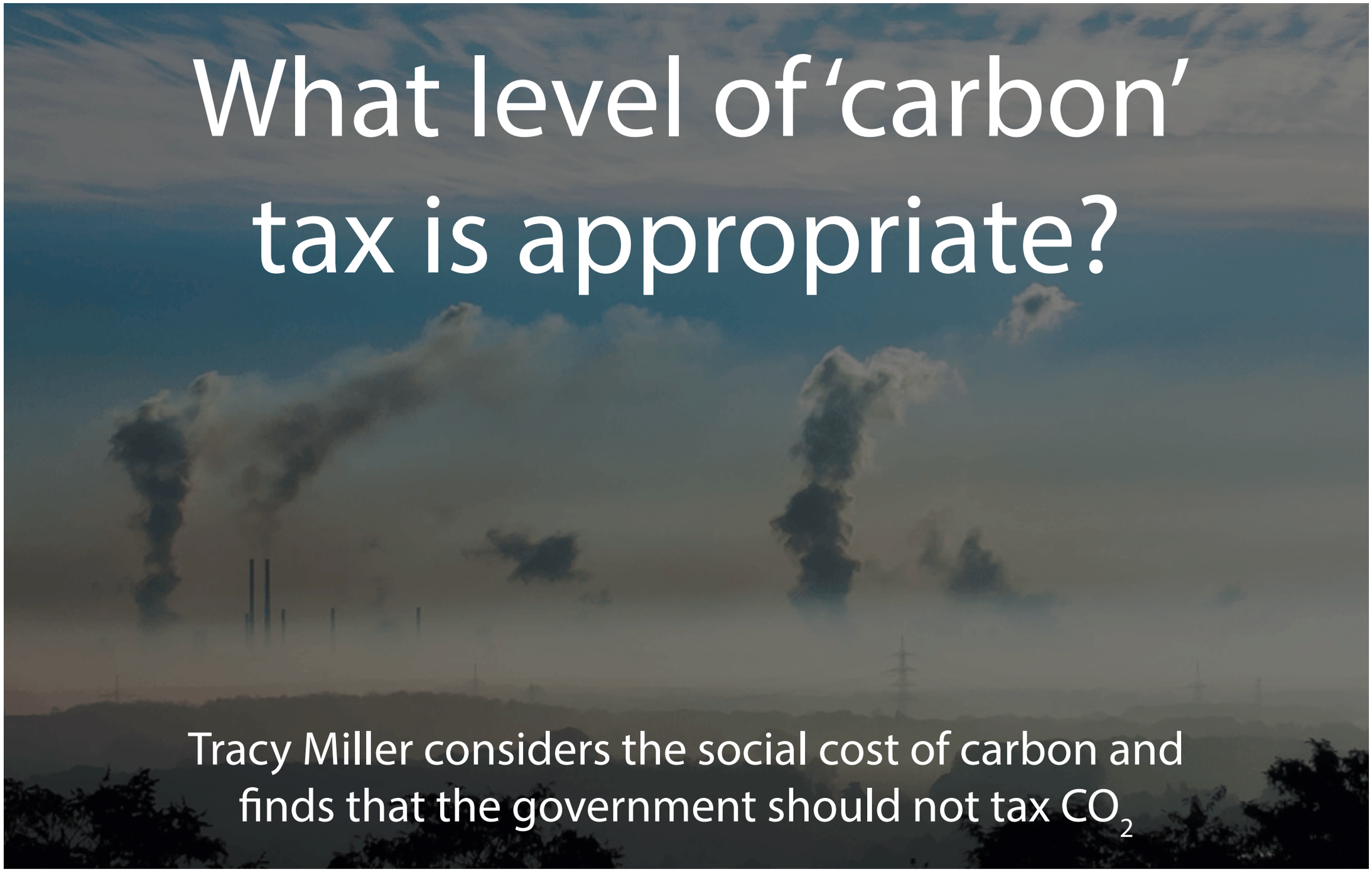
What level of 'carbon' tax is appropriate?



Tracy Miller considers the social cost of carbon and finds that the government should not tax CO_2

Recently Washington State Governor Jay Inslee proposed instituting a 'carbon tax' (a misleading phrase because carbon and carbon dioxide are very different beasts) of $20 per ton to fight climate change. The proposed rate aligns with a report published by the Brookings Institution in 2012 and falls within the range of the federal Environmental Protection Agency's (EPA) estimates of the 'social cost of carbon' (SCC).

Would it be wise?

Taxing CO_2 emissions would create an incentive to reduce them. There is widespread agreement that the tax rate should equal the cost of each ton of CO_2 emissions—what is meant by the 'social cost of carbon.'

But the EPA's Dynamic Integrated Climate-Economy (DICE) model, which it uses to estimate the SCC, overestimates the SCC, and there is a good chance it is actually negative. If that is so, then zero would be a more appropriate level.

The SCC is defined as the net present value of the future costs resulting from an additional ton of CO_2 in the atmosphere. Setting a tax at that level would give emitters an incentive to reduce emissions if the benefit of the activity that causes the emissions were less than the SCC. Transportation, electricity generation, and industrial production are some of the activities that result in CO_2 emissions.

To properly calculate the SCC, all the costs expected to result from each additional ton of CO_2 emissions must be added, and the benefits subtracted, for every year beginning with the present. Any cost or benefit that occurs in a future year should be discounted by an appropriate interest rate to account for time preference—the fact that people value benefits or costs less the further in the future they occur.

The accuracy of the estimate depends on two important factors: (1) the discount rate applied to estimated future costs and benefits, and (2) complex and controversial predictions of the environmental (especially global warming,

sea-level rise, frequency and intensity of severe weather events, and exposure to climate- and weather-related diseases) and economic effects of increased atmospheric CO_2 concentrations.

The EPA's estimates of the SCC use three discount rates, 2.5 percent, 3 percent, and 5 percent. The Office of Management and Budget, however, specifies that agencies should use discount rates of 3 percent and 7 percent as lower and upper bounds for regulatory analyses. Using a 7 percent discount rate instead of 3 percent lowers the baseline estimate of the SCC from the DICE model from almost $38 to less than $6 per metric ton.

High carbon taxes, which cannot be justified based on the evidence, would be especially harmful to the poor by raising the costs of energy for heat, air conditioning, transportation, and other goods and services they rely on

The EPA's DICE model crucially incorporates an estimate of 'equilibrium climate sensitivity' (how much average global surface temperature will rise in response to a doubling of atmospheric CO_2 concentration) that is significantly higher than empirical observations support. Using more up-to-date models based on empirical data, the estimated rise in average global surface temperature is considerably smaller. By implication, temperature-driven consequences like sea-level rise, severe weather, and diseases would also be reduced. Using the more up-to-date estimate lowers the net present value of the future costs of emissions by more than 30 percent.

The DICE model also seeks to predict how the results of increases in atmospheric CO_2 will affect economic output. Estimating this accurately requires adding the costs but also subtracting the benefits resulting from CO_2 emissions. A warmer climate itself will have some benefits, like reduced deaths from severe cold (which is ten times more deadly than severe heat). Warmer temperatures may also raise agricultural output by lengthening the growing season in cold climates.

Another major benefit of increased CO_2 in the atmosphere is enhanced plant growth. The EPA's FUND (Climate Framework for Uncertainty, Negotiation and Distribution) model takes account of potential regional benefits from the increased agricultural productivity associated with higher atmospheric levels of CO_2. Consequently, its estimates of the SCC are lower and likely more accurate than those of the DICE model.

However, like the DICE model, the FUND model leads to temperature-related cost estimates that are too high because they ignore recent empirical evidence that equilibrium climate sensitivity is smaller than assumed. Revised simulations of the FUND model using the more recent evidence yield a probability of between 26.8 and 66.1 percent of a negative SCC in 2020. A negative SCC means the benefits of increasing CO_2 concentrations exceed the costs.

Reducing CO_2 emissions would substantially raise costs of transportation, electricity, home heating, and industrial production. Since all of the estimates of the social cost of carbon are subject to considerable uncertainty, and a reasonable confidence interval for the SCC from the FUND model includes a zero net present value, the government should not tax CO_2.

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