The CO2 market failure: it’s free to emit but has costly consequences

There is now scientific consensus that humans affect the climate by emitting greenhouse gases into the atmosphere, and that this contributes to global warming. The most important greenhouse gas resulting from human activity is carbon dioxide (CO2), and it is generated as a by-product when fossil fuel is burnt. Even though it is clear that CO2 emissions contribute to global warming, there are still large uncertainties about both the exact magnitude of warming to expect and about the associated damages and costs. The United Nations climate panel (IPCC) predicts that the implied increase in temperature that would result from a doubling of the amount of carbon dioxide in the atmosphere (relative to the pre-industrial level) ranges from moderate to substantial. Similar estimates hold true for the economic costs that would result from different levels of warming.

Given that global warming constitutes a substantial risk, most policy makers now agree that that we need to limit the use of fossil fuels. Indeed, because there are large amounts of fossil fuels left, massive cuts in use are necessary.

Even if there seems to be formal agreement that emissions should be reduced, an important question that is not given enough attention is *how* this reduction should come about. To answer that question, it is important to understand that the main problem is that it is too cheap (basically free) to emit greenhouse gases into the atmosphere even though it generates costs. To be specific: we pay for the gasoline that we buy, but not for the climate related costs that are generated from the CO2-emissions that are emitted when we are driving. In addition, because carbon dioxide spreads very quickly in the atmosphere, the geographical location of a unit of emissions does not matter. A unit emitted has the same effect on the temperature increase irrespectively of whether it is emitted in London, Beijing, or somewhere else. If the markets are left unregulated, there will then simply be too much emission.

To correct this so called *market failure*, policy is needed. In fact, only a policy that globally increases the price of greenhouse gas emissions can be expected to reduce emissions at the scale and speed that is necessary. A straightforward way to implement such policy would be for countries to agree on a uniform CO2 tax. Contrary to what many might think, such tax would not need to imply any redistribution across countries: each country could tax CO2 locally and then also use the proceeds locally. Global quotas correctly set in combination with a well-functioning global-emissions-trading system would in all important aspects have identical effects as a global CO2 tax.

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The benefits of a global carbon tax are several. First, it works. Even a relatively modest tax will make coal and non-conventional oil stay in the ground to ensure that warming is contained. Second, unlike the alternatives, it works very efficiently: it minimises the costs of reducing emissions. This is key not because of a general need to save on costs, but because the probability of adopting the policy rises when it is cheaper. Adoption is the most important thing of all.

The fact that there is large uncertainty about the amount of warming that can be expected could lead some people to conclude that we should not take any action against climate change because it might not be so severe in the end. That conclusion is wrong. Given the large uncertainty about future temperature increase, any level of the CO2 tax that we implement today is likely to turn out to be wrong. Only later will we find out if the tax has been set too high or too low. But what does this uncertainty imply for the level of the tax that should be implemented?

In our research, we compare the welfare effects of a tax that is set based on worries about climate change that later turn out to be overly pessimistic, to a tax based on an optimistic view that turns out to vastly understate the climate challenge. The results show a sharp asymmetry: underestimating global warming is very costly to human welfare, whereas overestimating it is not very costly at all. The conclusion is that an ambitious climate policy is a sound insurance. It does not cost much if it turns out that we do not need it, but it is very good to have it if we do.

An argument against a CO2 tax is that it would be difficult to get support for such tax in many countries throughout the world. The problem is that basically all remaining options for mitigating global warming are highly hazardous – they may not manage to reduce emissions sufficiently or be so costly that they will not be adopted broadly enough. There is, for instance, currently much discussion and optimism about the possibility to promote green energy and to encourage the finance sector to make "green investments". Our results show that reliance on such efforts is highly risky. We will, of course, eventually need green energy, but if coal-based energy remains in use, all green energy does is increase energy use: it does not help the climate. One problem with promoting green energy instead of making coal more expensive is that it is difficult to substitute across different energy sources. As a result, to hope these efforts will work is, precisely, hazardous. In the end, whatever alternative policy that is chosen, it must have the same fundamental effects as the CO2 tax in order to be effective.

Generally, our results show that it does not have to be expensive to limit climate change to 2-2.5 degrees Celsius, but that conclusion hinges critically on the need to choose a cost efficient policy. Ill designed and uncoordinated climate policy may be excessively costly and ineffective.

Author's disclaimer: The opinions expressed in this article are the sole responsibility of the author and should not be interpreted as reflecting the views of Sveriges Riksbank.

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Notes:

- *This blog post is based on the article "On the Effectiveness of Climate Policies" by John Hassler, Per Krusell, Conny Olovsson, and Michael Reiter, presented at the European Economic Association's Annual Congress, August 2020.*
- *The post expresses the views of its author(s), not the position of LSE Business Review or the London School of Economics.*
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