

Setting a price for carbon for implementing a carbon tax or a cap and trade system for controlling carbon dioxide emissions

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Abstract

Carbon tax and cap and trade are two main policy tools for market-based mechanisms aimed at curbing carbon dioxide emissions. But, their implementation requires a careful calibration of the price of carbon, on which a carbon tax is levied, or which helps price carbon credits in an emissions trading system. Hence, setting a price on carbon, tuned to the fundamentals of the local economy, is a profound question in environmental economics, important for benchmarking the price of many goods and services dependent on fossil fuel energy for material input or function. One approach to setting a price on carbon is to progressively increase the price of carbon through regulatory statute from an initial low price. This would help industries and the economy to gradually adapt to a marketplace where there is an additional regulatory price on carbon in addition to a material and services price. On the other hand, a one-off approach at setting the final price of carbon in the economy may deliver a severe demand and supply shock, which may have repercussions beyond businesses needing to factor the price of carbon in their economic calculus. Thus, whether a progressive price increase in carbon or setting the final price, pricing carbon is a delicate economic issue with significant implications for the functioning of an economy choosing either the carbon tax or cap and trade system for regulating carbon dioxide emissions.

Keywords: carbon tax, cap and trade, emissions trading system, emissions quota, carbon price, climate change, carbon budget, carbon inventory, carbon dioxide, climate change, market-based mechanisms,

Subject areas: coupled natural and human systems, ecosystem science, environmental impacts,

Canada has instituted a price on carbon of \$10 Canadian dollars per tonne of carbon dioxide, which would rise by \$10 per year to reach a set price of \$50 by 2022. In doing so, Canada has set a price on carbon, the necessary first step to implementing a carbon tax or a cap and trade emissions trading system for controlling the amount of carbon dioxide emitted at the national level.

But, what effect would a price on carbon have on the implementation of a carbon tax or institution of a cap and trade system? More importantly, how should a price be placed on carbon? Should it be done on a one-off basis or as part of a gradual and incremental process?

By setting an initial low price on carbon and progressively increasing it to a higher level, Canada is adopting a gradual approach to introducing a carbon price on its industries, power generation sector, and the general public. The latter, due to the effect of a carbon price inevitably feeding into daily business practices and are passed on, partially, to the population. Using a gradual approach enables Canadian industries to adjust to a new measure of pricing carbon into their cost equation and gradually adopting best administrative and hardware changes to reduce carbon emissions, which reduces potential disruptions that a carbon price would bring to industries that historically have high carbon dioxide emissions levels such as the power industry and heavy manufacturing.

To implement either a carbon tax or a cap and trade emissions trading system, setting a price on carbon is the necessary first step because without a price, there is no economic incentive for industries to reduce carbon emissions. In terms of carbon tax, a price on carbon represents a guideline for how carbon emissions should be fairly priced before a detailed implementation and regulatory framework of a carbon tax system are put in place, where some industries may enjoy credits for a period of time compared to others, given the lack of methods for accounting and controlling carbon dioxide emissions from some industries. Examples could be the aviation and shipping industries, where engine hardware and fuel requirements, the distributed nature of their emissions, and tight regulatory requirement for type of fuel use (i.e., aviation industry) presents significant challenges to the implementation of a fair carbon tax.

On the other hand, a cap and trade emissions trading system requires a price on carbon for it to function, as well as provide a means to incentivize a progressive reduction in carbon emissions and serving as a base price for which to quantify a value for a given amount of carbon dioxide emissions. For example, a low price of carbon provides the initial impetus for industries to reduce carbon emissions below their emission quota, which is based on the type of industry, capability of reducing emissions based on current best available technology, and amount of industrial output. By progressively increasing the price of carbon, regulatory authorities nudge industrial players to improve their practices and workflow to help, at the national level, achieve stated and agreed emission reduction goals, stipulated, for example, at the Paris Conference of Parties agreement on measures to mitigate climate change.

Without a price on carbon, industries would not be able to agree on a price on carbon credits in a centralized exchange as there would be no mutually agreeable base price on carbon for trading to take place, where industries more capable of reducing carbon emissions with less cost gain emissions credits that could be sold, at a price, to other companies not capable, at present, to reduce carbon dioxide emissions cost-effectively.

Collectively, setting a price on carbon is crucially important to implementing either a carbon tax or an emissions trading system based on cap and trade where a quota is placed on the amount of carbon dioxide that could be emitted without penalty. In general, a carbon tax is a blunt instrument where emissions above a threshold would be taxed on a per tonne of carbon dioxide basis; thus, providing incentives for industries to reduce emissions. On the other hand, a cap and trade system utilizes market mechanisms to help industries unable to rapidly adapt to a low carbon economy to purchase, at a market price, emission credits to offset any emissions above a regulatory quota. Although incurring a financial penalty and adding to cost of production, carbon emission credits purchased on an open exchange have the unfortunate negative effect of enabling industries to continue operating with existing pollutive equipment. Whether a carbon tax or a cap and trade system is more effective in reducing carbon emissions remains an open question in the environmental economics research field. Besides economics, local nuances in regulatory tools for industries to comply to safety, health and environment statutes, are other considerations that influence whether a carbon tax or an emission trading system would be more suitable for the local economy.

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