Harvard Project on Climate Agreements

Carbon Taxes vs. Cap and Trade: Theory and Practice

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There is widespread agreement among economists – and a diverse set of other policy analysts – that, at least in the long run, an economy-wide carbon-pricing system will be an essential element of any national policy that can achieve meaningful reductions of CO_2 emissions cost-effectively in the United States and many other countries. There is less agreement, however, among economists and others in the policy community regarding the choice of a specific carbon-pricing policy instrument, with some supporting carbon taxes and others favoring cap and trade mechanisms.

Countries around the world – including nearly all of the industrialized countries and large emerging economies – have launched or are in the process of launching national policies aimed at reducing their emissions of GHGs. Of the 169 Parties to the Paris climate agreement that have submitted specific pledges (known as "Nationally Determined Contributions" or NDCs), more than half (88 to be exact) refer to the use of carbon pricing in their NDCs. To date, some 51 carbon-pricing policies have been implemented or are scheduled for implementation worldwide, including 26 carbon taxes and 25 emissions trading systems. Together, these carbon-pricing initiatives will cover about 20% of global GHG emissions, and many of these systems may eventually be linked with one another under the auspices of Article 6 of the Paris Agreement.

In the long term, economy-wide carbon pricing will be an essential element of any policy that can achieve meaningful reductions of CO_2 emissions cost-effectively in the United States, as well as in many other countries. The ubiquitous nature of energy generation and use – and the diversity of CO_2 sources in a modern economy – mean that conventional technology and performance standards would be infeasible and, in any event, excessively costly. The cost advantage of carbon pricing exists because of the flexibility that pricing provides and the incentive it fosters for all sources to control at the same marginal abatement cost, thereby achieving cost-effectiveness in aggregate. In addition, in the long term, pricing approaches can reduce abatement costs further by inducing carbon-friendly technological change.

But how do the two major approaches to carbon pricing compare on relevant dimensions, including efficiency, cost-effectiveness, and distributional equity? Of fourteen issues examined, some appear at first to be key differences, but most of these differences fade on closer inspection (and depend on specifics of design).

Beginning with similarities and symmetries, first, the two instruments are perfectly equivalent in regard to: incentives for emission reduction, as both can be set upstream on the carbon content of fuels; aggregate abatement costs, as both can be cost-effective and provide the same incentives for technological change; and their effects on competitiveness, as both can lessen such impacts via appropriate border adjustments. Second, carbon taxes and cap-and-trade are nearly equivalent in regard to possibilities for raising revenue. (Cap-and-trade can employ an auction.) Third, these instruments are similar in terms of: costs to regulated firms, because cap-and-trade can freely allocate allowances, and a tax system can provide inframarginal exemptions below a specified level of emissions; and distributional impacts, as they can be designed to be roughly equivalent.

Turning to differences and distinctions between the two carbon-pricing instruments, first, there are distinctions in terms of transaction costs, because volume discounts from brokers in a cap-and-trade system can violate the key property of the independence of costs and effectiveness of performance from the initial allocation of the allowances. Second, there are subtle differences in regard to: performance in the presence of uncertainty, as the Weitzman rule, which would seem to favor taxes because of the stock externality nature of the problem, can be overwhelmed by the correlation of benefits with costs, due to the persistence of technology shocks; and possibilities for linkage with other jurisdictions, since heterogeneous linkage is eminently possible.

Third, there are significant differences in regard to: carbon-price volatility, an issue only in cap-and-trade systems, although this can be somewhat ameliorated with price collars and banking of allowances; interactions with complementary policies, which is less of an issue with carbon taxes, which eliminate the so-called waterbed effect; market manipulation; and complexity and administrative requirements, which would seem to favor taxes, although whether a tax remains simple as it works its way through a legislature is an empirical question.

Among many findings from this survey and synthesis, one major conclusion stands out: The specific designs of carbon taxes and cap-and-trade systems may be more consequential than the choice between the two instruments. These two approaches to carbon pricing are perfectly or nearly equivalent in regard to some issues and attributes, while significantly different in regard to some others. But many of these differences fade with specific implementation choices, as elements of design foster greater symmetry. Indeed, what appears at first to be a dichotomous choice between two distinct policy instruments often turns out to be a choice of design elements along a policy continuum.

Full paper available at: https://www.belfercenter.org/publication/carbon-taxes-vs-cap-and-trade-theory-and-practice

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