Managing the Environmental and Cost Uncertainties in Pricing Carbon

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Pricing greenhouse gas emissions — either through a carbon tax or a cap-and-trade program — has emerged as a common strategy to mitigate climate change. In 2019, the World Bank estimated that 28 cap-and-trade programs and 29 carbon taxes covering about one-fifth of global greenhouse gas emissions are in place or scheduled for implementation around the world.

Cap-and-trade and pollution taxes share an important characteristic: they each provide businesses the discretion to explore, identify, and exploit the lowest-cost ways of reducing pollution. In contrast to regulatory approaches that prescribe a specific technology or source-specific level of performance, these so-called market-based instruments provide the incentives to drive emission abatement where it is cheapest to do so throughout the economy. As a result, cap-and-trade and pollution taxes can minimize the costs of any given emission reduction. They also provide strong incentives for innovation, as businesses look for ways of reducing their costs.

Hybrid approaches drawing from tax and cap-and-trade may bridge political divides

Cap-and-trade and taxes differ, however, in terms of providing certainty over emissions and prices. Cap-and-trade ensures emissions certainty, but at the expense of uncertainty over the price of emission allowances and, thus, business costs. A pollution tax ensures price certainty, but at the expense of uncertainty over emissions and, thus, environmental benefits. The business community has long expressed concerns about cost uncertainty in environmental and climate change policy, while the environmental community has long expressed concerns about the uncertainty in environmental outcomes under tax approaches.

Academic research, dating back to pioneering studies by my late colleague Marty Weitzman, provides insights on how to weigh and evaluate these uncertainties as well as how to take the best of both worlds in designing hybrid approaches to pollution pricing. Policy practice has built on these insights.

For example, a cap-and-trade program could include so-called collars — a price floor and a price ceiling — that would ensure that allowance costs don't go too low or too high. Carbon dioxide cap-and-trade programs in California and the Regional Greenhouse Gas Initiative in the Northeast and Mid-Atlantic states each have a reserve price — the minimum a business can bid — in its respective auctions. This creates a price floor for allowances.

In addition, both programs have mechanisms that increase the supply of emission allowances in the event that prices reach a predetermined level, thereby creating a ceiling. If allowance prices are neither too low nor too high, then these programs operate like standard cap-and-trade programs. But if allowance prices are unexpected, then the floor and ceilings turn a program effectively into a tax. The ceiling provides assurance that costs won't be unexpectedly excessive for businesses, and the floor provides assurance for innovators and entrepreneurs that there will be continued demand for their low-carbon inventions.

In the case of a carbon tax, the rate could be designed to automatically adjust based on whether the economy's emissions meet pre-specified goals or benchmarks. Gib Metcalf of Tufts University first proposed this approach to reducing the uncertainty about emission outcomes more than a decade ago. If emissions under the tax meet or beat the benchmark, then the tax continues as initially designed and provides certainty to businesses. But, if emissions fail to meet the benchmark, then the tax rate is ratcheted up to increase the incentive for emission abatement going forward. Switzerland has implemented such a benchmarking approach to its carbon tax, and it increased its tax rate 40 percent in 2016 when it failed to meet its emission goal.

Such hybrid approaches may help bridge the divide among the environmental and business communities and address the political challenges of securing a broad, durable coalition to support climate change policy. Designing policies that enable automatic adjustments can provide predictability valued by these key stakeholders and balance their interests in managing emissions and cost uncertainties.

An effective, long-term climate change policy would also adapt to new information about climate science, the economics of emission mitigation, and progress by other countries in addressing climate change. For example, if new climate science suggests the need to increase emissions abatement, then neither the status quo benchmarks used in a carbon tax nor the existing caps in cap-and-trade would be sufficient. Institutionalizing an "act-learn-act approach" to climate policy — to update carbon tax or cap-and-trade design — could improve the political viability of a domestic emission mitigation program and promote its adaptability to changing environmental, economic, and international conditions.