Carbon pricing options - to tax or trade?

As argued in Economic and Social Survey 2020, carbon pricing is an integral part of climate action. However, while there is growing momentum, it remains a relatively new concept especially in developing countries. This policy brief compares carbon taxes and emission trading system, the two most common forms of explicit carbon pricing. It also highlights the key elements to consider in establishing them. For a broader discussion on carbon pricing needs and trends and potential impacts on industries and jobs, refer to the sister brief “Raising the level of ambition on carbon pricing in Asia and Pacific.”

To tax or trade?

Carbon pricing typically refers to carbon tax or emissions trading system (ETS). A carbon tax, as are environmental taxes in general, is a Pigouvian tax aimed at correcting for negative externalities and reaching socially efficient allocation of resources. On the other hand, carbon markets including ETS are based on the Coase theorem, which shows that clear property rights and low transaction costs could allow individuals to resolve problems through voluntary exchange.

The key distinction is that with a carbon tax the government sets the price and allows the market to determine the quantity of emissions, whereas with emissions trading the government sets the quantity of emissions and allows the market to determine the price. Some would argue that emissions trading is a better way to address climate change, not least because the Paris Agreement and the nationally determined contributions are based on emissions targets. Moreover, ETS offers potential economic efficiency gains by focusing on emission reductions in companies (or jurisdictions, upon carbon market linkages) with the lowest mitigation costs. However, others would be quick to point out that in practice, these benefits assume well-functioning markets, with prudent use of free allocation of allowances and a robust monitoring, reporting and verification (MRV) system in place. Moreover, ETS is highly susceptible to market price volatility, as experienced even in large markets such as the European Union ETS, which could undermine low-carbon investment and innovation.

Carbon taxes, on the other hand, provide a more stable price signal to investors, and often bring the additional benefit of significantly higher prices. The guaranteed return also incentivizes technology innovation in energy efficiency and renewable energy. Importantly, this price holds regardless of other climate and energy policies, making carbon taxes potentially the better choice where governments intend to provide multiple mitigation incentives. Under an ETS, an invention which reduces the cost of emission reduction could push down the price of permits, reducing investors’ returns. Carbon taxes also have the advantage of not requiring the operation of trading infrastructure, making them relatively easy to administer. For instance, they can be easily integrated into existing road fuel excise or into royalty regimes for extractive industries. This aspect can make them less of a strain on government capacities than an ETS. However, a fundamental weakness of carbon taxes is the uncertainty over reaching emissions targets.

As they have developed over time, both ETS and carbon tax initiatives have tried to address their respective weaknesses. For instance, market stability mechanisms (MSMs) in ETS serve to balance the predictability of the policy as mandated by the ETS cap with the flexibility to respond to unexpected shocks or changing circumstances by adjusting the supply of allowances. In particular, price floors and emission containment reserve (ECR) can help respond to low prices. In terms of reducing emissions uncertainty under a carbon tax, proposals include adjusting the carbon tax rate using a prespecified schedule: if actual emissions in a given year exceed a previously specified emissions target for that year, the tax rate would automatically adjust upward. Switzerland’s carbon tax includes such an adjustment mechanism, as do several recent proposals for a US carbon tax.

At the same time, countries could consider hybrid systems, which combine elements of both approaches. For instance, in California, distributors of natural gas and transportation fuels are required to obtain permits for the fuels they sell, which means that all users of these fuels, not just the large enterprises in sectors covered by the ETS, face a carbon price. Hybrid schemes could be a promising path, including for developing countries. A recent study suggests that in China, a hybrid system where the non-ETS sectors pay a carbon tax and share in the CO₂ reduction burden would achieve the same CO₂ goals with lower permit prices and GDP losses, compared to a strategy which relies solely on ETS. This could be a beneficial strategy given that ETS tends to focus on the heavy-emitting industries with high reduction potential, whereas carbon taxes can more easily target emissions in all sectors, including transportation. Currently, sectoral coverage of carbon pricing initiatives in Asia and Pacific vary widely (figure 1). Such hybrid schemes could also enhance political feasibility, as ETS seems to be more readily acceptable by the public compared to carbon taxes.

The remainder of the policy brief discusses the key elements to consider in setting up a carbon tax and ETS. There are some important common elements, such as in defining the carbon tax base and the ETS scope, but as noted earlier ETS is clearly administratively more complex.

Setting up a carbon tax

As with taxes in general, defining the tax base and tax rate are important for carbon taxes. The tax base affects the degree of emission reductions that can be achieved, the amount of revenue that can be raised, and the industries and groups that will be affected by the tax. A basic distinction can be drawn between so-called upstream taxes on the production, import, and sale of fossil fuels, and those on direct emissions such as those from electricity generation, industrial processes, and waste disposal. The former is the most straightforward, since most jurisdictions can “piggyback” on existing systems for administering excise
Policy makers have to choose the basis for setting the original carbon tax rate, for instance, a certain level of emission mitigation or revenue targets. Jurisdictions can also develop benchmarking according to tax rates in jurisdictions with similar circumstances or competing industries. Several options are available to determine how the rate will develop over time, including an agreed trajectory, a rate adjustment formula, and periodic review by experts or other stakeholders. Most jurisdictions have started with a relatively low rate and increased it over time, so as to gain support for the tax and provide industries and consumers time to adapt their behavior to the price signal.

Other key elements include setting up a set of criteria to determine whether specific sectors, companies, or population groups qualify for special support measures. This could be due to carbon leakage or distributional concerns. For instance, most jurisdictions have focused on the emissions intensity of a given economic activity and the exposure of the sector to international trade. Eligibility for distributional reasons will in many cases be linked to existing categories within the welfare system. Commonly used measures include exemptions, rebates, and offsets, and subsidies. Compared to general exemptions, linking support measures to other factors such as outputs or the adoption of clean technologies are often more environmentally effective approaches. Addressing leakages may require border measures to extend the tax to imports and/or rebate it for exports; and reciprocal carbon price floor arrangements that reduce or eliminate the price differential with competing jurisdictions.

Another key element is the revenue use. For political feasibility, revenue neutrality can be achieved by returning revenues to households and businesses through direct rebates or by using the revenue to reduce other taxes such as labor or corporate taxes. Where governments decide to use revenue to increase spending, they may direct it toward the general budget or earmark it for specific purposes such as supporting environmental programs or increasing welfare support. Other jurisdictions may use the funds for reducing the deficit or paying off national debt. In any case, it is important to have clear communication on how the revenue is being used. Timing matters too—governments can help consolidate support by committing to providing certain benefits upfront and clearly linking their continuation to the revenue generated through the carbon tax.

Finally, throughout the process, economic modeling can be used to provide insights into the potential impacts of a carbon tax and of different design options on various policy goals.

In determining the scope of the ETS (i.e. geographic area, sectors, emissions sources, and GHGs to be regulated), key considerations include the ability and cost of monitoring and regulating across emissions sources and at different points in the supply chain. As shown in figure 1, almost all systems cover at least the power and industrial sectors. A phased approach can be useful to allow time to build the capacity to include smaller or more complex sectors; this seems to be the approach China is taking for its national ETS. While some jurisdictions have placed the point of regulation for emissions from fuel combustion upstream to reduce administrative costs, others have opted for downstream options for alignment with existing regulatory or reporting systems, or for hybrid options because energy prices are regulated and carbon price signals otherwise would not be passed through the supply chain (e.g., Korean ETS and pilot ETSSs in China).

The emissions cap sets a limit on the number of allowances issued over a specified time period. All else equal, the lower the cap, the higher the carbon price will be, and the objectives of the cap will be the incentive to reduce emissions. A cap is only as good as the underlying data and assumptions. Cap setting will benefit from early data collection and greater reliance on historical data as compared to counterfactual projections. While most jurisdictions have chosen absolute caps to facilitate alignment between caps and targets, they have also built in some flexibility over allowance supply to contain costs. In practice, partly because of a concern about high prices, initial caps in many existing ETSSs have been set at levels that (in conjunction with other design features) have resulted in prices significantly lower than expected, which can cause its own set of problems. A long-term cap trajectory should be combined with transparent, rules-based processes for possible modifications to the cap and advance notice of future changes.

Once this is done, the government can distribute allowances through free allocation, auctioning, or some combination of the two. Because large amounts of resources are at stake, allocation decisions can become highly contentious and a key focus of stakeholder attention and political discussion. The objectives of allocation (e.g., managing the transition into the ETS, preserving incentives for cost-effective abatement) should be transparently stated upfront. Decisions on entities’ individual allocation should be made separately from decisions on the cap. Auctioning has typically been introduced on a limited scale initially, but with the intention to let it gradually displace free allocation. Allocation methods can vary across sectors; for example, the power sector is a typical candidate for auctioning as it is often less prone to carbon leakage than other ETSS sectors, while manufacturing sectors have typically received some form of free allocation, at least in initial years. Auctioning generates government revenue, which can pay for cuts in distortionary taxes, support spending on public programs (including other forms of climate action), or be returned to households directly.

To allow covered entities to meet compliance obligations under the cap at a lower cost, the government can consider allowing the use of offset credits, generated from uncovered sources and sectors in the ETSS. For a given cap, accepting offsets will lower prices, if there is eligible low-cost abatement potential available outside the system. The quality of MRV of offsets needs to match that of the ETS to ensure environmental equivalence of offsets and allowances; but this can be challenging because, unlike ETSS allowances issued in relation to a cap, offsets are credited relative to BAU, using benchmarks or counterfactual baselines. Another aspect is whether to allow international offsets, similar to the Kyoto Protocol’s Clean Development Mechanism (CDM) and Joint Implementation (JI). In any case, most ETSSs accept only some types of offsets and limit how many can be used.

Source: Based on World Bank, State and trends of carbon pricing, 2019. Note: Japan and Singapore have carbon taxes; other countries shown here have emissions trade system.

taxes. The latter may require more administration and building additional capacities for MRV, but may also allow for targeting a broader scope of emissions.

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Another element is to set timeframes for the reporting and compliance period. While longer compliance periods can offer companies greater flexibility around the timing of investments in emissions abatement, potentially lowering costs significantly, excessively long periods can create incentives to delay action. Borrowing is effectively equivalent to longer compliance periods and raises similar considerations. Many existing ETSs allow for allowance “banking” (carry over), which encourage earlier reductions and helps smoothen allowance prices across compliance periods.

As noted earlier, addressing price volatility is a major concern in ETS which requires market stability design features, such as a price floor, ceiling, or allowances reserves. Just as in many commodity markets, it may be hard to predict longer-term ETS prices accurately. Persistently low prices in an ETS could arise because mitigation turns out to be easier than expected, because other climate and energy policies also contribute to lower emissions and therefore reduced demand for allowances, or because of a recession that lowers economic activity and thus emissions; the reverse could be true for high prices. Prior to ETS implementation, the concerns of policy makers have typically focused on the possibility of high prices, but once in operation low prices have often become a greater source of concern. Allowance reserves and introducing a price floor at auction can help secure the value of mitigation investments by ETS participants and offsets providers.

A rigorous approach to enforcement of participants’ obligations must be defined. This includes technical, legal, and administrative considerations around the monitoring, reporting, and verification (MRV) of emissions, penalties for noncompliance, and oversight of the market to address risks of fraud and manipulation. An initial stand-alone period of MRV or a pilot phase can enable capacity building before implementing a full-scale ETS, as done in Thailand for instance. It can be costly to monitor emissions with high levels of accuracy and precision; lower-cost approaches such as using default emissions factors can provide unbiased estimates for predictable sources of emissions. At the same time, continuous engagement with stakeholders to understand their concerns is critical to avoid policy misalignment and ensure public support.

Finally, allowing regulated entities to use the units issued under an ETS in another jurisdiction, or “linking”, broadens flexibility as to where emission reductions can take place, can also improve market liquidity, help address leakage and competitiveness concerns, and facilitate international cooperation. However, key design features need to be harmonized to ensure environmental integrity and price stability when linking. Some existing small systems were designed from the outset to link to other markets or join another ETS.

Implementing carbon pricing requires a lot of time and effort. This policy brief highlighted some stylized facts and main lessons learnt on carbon taxes and emissions trading systems. In Asia and Pacific, ETS seems to be the preferred option so far. But as shown here, countries could also consider carbon taxes, which are administratively simpler, or hybrid systems which combine elements of both approaches.

Endnotes