policy brief

NICHOLAS INSTITUTE FOR ENVIRONMENTAL POLICY SOLUTIONS
DUKE UNIVERSITY

NI PB 11-06 | August 2011 | nicholasinstitute.duke.edu

Seeding the Market

Auctioned Put Options for Certified Emission Reductions

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This policy brief lays out arguments for the auctioned put option as a pay-for-performance mechanism that would allow governments or philanthropic organizations to support and catalyze markets for greenhouse gas emission reductions. The existing offset market, with its detailed methodologies for calculating emission reductions, offers tools that could be borrowed by such a mechanism. Auctioned put options could target a subset of Clean Development Mechanism (CDM) projects—segregated by type of project or country of origin—or an entirely different set of activities, such as REDD+.[1] The key element is that there must be standardized rules (or the promise of rules) detailing how emission reductions get counted and certified.

This idea has been discussed previously as part of a domestic emissions trading program where governments want to commit themselves to a minimum domestic price (Grubb and Newbery; Ismer and Neuhoff 2006). Here, the focus is on the auctioned put option as a public finance mechanism to catalyze developing country investment when an emission trading program might or might not be implemented.

Why?

There are several reasons for considering some kind of market-based, pay-for-performance mechanism to mitigate developing country emissions. While carbon markets provided an initial impetus to the CDM, that market is struggling. The World Bank reported that primary markets for CDM credits declined 44% in 2010 (to $1.5 billion) on top of a nearly 60% decline in 2009 (Linacre, Kossoy, and Ambrosi 2011). This is no doubt tied to the absence of federal emissions trading in the U.S. as well as uncertainty in the E.U. (Carbon Market Europe 2011). These markets could therefore use public support. One could imagine a mechanism targeted broadly at the CDM, but it probably makes more sense to focus on underserved regions or the most desirable types of projects. The E.U., for example, is phasing out industrial gas projects and focusing on projects only in the poorest countries (Allen 2011; Twidale 2011). Alternatively, one could focus on REDD+ credits, which are an important area of interest for future emissions trading but are currently excluded from virtually all trading systems.

At the same time arguments are emerging for public finance to support emission markets on the demand side, public-sector fiscal constraints and an increasing focus on results are creating supply-side pressure. Pay-for-performance mechanisms allow governments to identify tangible benefits—delivered emission reductions—for their scarce fiscal resources. In contrast, public expenditures for mitigation projects on the front end at best provide only estimates of eventual outcomes. While a rigorous economic analysis of various alternatives for public spending to mitigate climate change requires considering both additional emissions reduced per public and private dollar spent (Mason and Plantinga 2011), this pressure and appeal argue for at least considering this kind of mechanism.

Along these same lines, mechanisms that only pay out if prices are low are interesting because they do not necessarily cost the government money. By reducing uncertainty for the private sector, they can still be very effective at catalyzing investment if uncertainty is the main obstacle. Yet they avoid what some might view as undesirable government purchasing and intervention when market forces have taken over, and they allow budget resources that have been set aside for emission reductions to be used for other purposes. In tight fiscal circumstances—and if there are also concerns about emission prices being too high—this can be an appealing selling point. Of course, for those seeking maximal emission reductions regardless of cost, there may be a desire to see the government purchase emission reductions even if future prices are high (and pushed higher by government purchases).

1. *REDD+* goes beyond REDD (reduced emissions from deforestation and degradation) to include conservation, sustainable forest management, and enhancement of forest carbon stocks.

What?

The proposed mechanism is simply an auction by a government (or perhaps a group of governments acting through an international organization) where it sells contracts stipulating that it (the government) will be willing to buy a specified volume of certified emission reductions at a fixed price (the strike price) on or before a fixed date (the maturity). This is a standard put option. Purchasers of the contracts—likely project developers and investors seeking to put together a particular package of financing—will have a price guarantee for the volume of contracts they buy in the auction, but they do not get those guarantees for free.

The auction provides an important rationing mechanism, allocating the options to those participants willing to pay the most—presumably because they believe they can generate emission reductions at the lowest cost. Therefore, they can afford to spend more of the difference between the guaranteed price and their costs on buying options. Instead of an auction, the government could give away the options for free, but it is unclear how they would decide who would get them. Further, any effort at free distribution would be at risk of unintended strategic behavior and gaming as the recipients look for ways to get an otherwise valuable asset for free. An auction, particularly a second-price auction, has been shown to virtually eliminate the opportunity for gaming (Milgrom 2004).

Once the options are distributed and the holders of the options begin to generate emission reductions, they still have to decide whether to use them. If future market prices are low, then the options will be executed and the government is on the hook to purchase the total number of tons covered by the options at the strike price—this defines the government's liability. Depending on national budget rules, that liability would need to be fully or partially appropriated in advance. However, if future market prices are high, option holders will prefer to sell to the market rather than use the options to sell to the government at a lower price. If the maturity date passes without the options being exercised, the government has no further obligation.

An interesting feature is that the auction mechanism generates an initial inflow of revenue that could go back to the treasury or be used to underwrite a slightly larger program. For example, suppose the government had $200 million allocated for the program, and initially plans to auction options for 40 million tons with a strike price of $5 per ton. Here, they have scaled the number of options and the strike price so the potential liability equals $200 million if they end up buying all 40 million tons at the stipulated $5 strike price. Now, suppose the auction is on course to raise $40 million because market participants are bidding $1 for each of the $5 put options—these private sector investors would do this because they believe the true cost of generating offsets is less than $4, so they can still make money buying the options for $1 and selling the generated offsets for $5. One possibility is for the government to simply pocket $40 million from the auction.

Alternatively, the government could use this revenue to sell another 10 million options. That is, the government could now raise a total of $50 million (from auctioning the 40 million original options, plus 10 million additional options, all sold for $1 each), but this would exactly equal the additional liability of the additional 10 million options. Intuitively, the revenue has simply been plowed back into guarantees for more credits rather than being returned to government coffers. Of course, if none of the options are executed, not only does the government save the original $200 million that had been allocated, it then gets to keep the $50 million—but in this case, only if the options are not executed.

No Simpler Alternatives?

If this seems slightly complicated, it is—but it has important advantages over simpler proposed mechanisms, such as non-auctioned price guarantees and reverse auctions, in that it provides an efficient way to ration fixed budget resources and avoids certain counterparty risks.

Consider, for example, a simpler approach, where governments provide a price floor for emission reductions over a specified horizon, guaranteeing to pay a minimum price for certified credits if the market fails to match that price (Edwards 2010; Methane "Blue Ribbon" Panel 2009). The government achieves the goal of having tangible results—certified emission reductions—and the market price for credits is supported at the price floor. Like the auctioned put option, if the market price exceeds the floor, the government owes nothing.

The problem with this approach is the uncertainty (and potentially limitless nature) surrounding the volume of guarantees. If the government wants to limit its liability, it is unclear how it would ration guarantees if they were oversubscribed. That is, if the government sets aside $200 million to provide a price floor at $5 per ton, and market participants show up with more than 40 million tons' worth of certified reductions, how does the government decide who to pay and who not to pay? And how would the recognition of this dilemma affect the decision by various participants to invest in projects or not?

This need to ration a fixed budget has led to the idea of a reverse auction, where the bidders offer to provide credits at various prices, and the government can choose to purchase the ones it wants—perhaps the cheapest, perhaps those with other desirable features (Edwards 2011). Importantly, it can choose an exact amount of funds to expend, purchasing as much as possible based on the submitted bids. Reverse auctions have already been used in a climate change context by the U.K. government and others seeking voluntary emissions reductions, as well as in the U.S. for domestic clean energy (Climate Connect 2011; Kreycik 2010; National Audit Office 2004).

A key element in the reverse auction, however, is that the auction occurs before the emission reductions have occurred. It is the outcome of the auction that provides winners with a guarantee for future emission reduction purchases (if not the actual cash) that, in turn, can be used to help those winners seek project financing. While one could commit to holding an auction in the future, after credits are issued, such an auction would not provide project developers with any guarantees (or cash) in advance of their investments and, in turn, would be less likely to facilitate financing.

Because of this timing, it is entirely possible that auction winners can change their minds and default on their obligations. In the U.K. program, for example, 3 of 34 participants withdrew. More famously, the C-block auction of the radio spectrum led to almost complete nonperformance (Zheng 2001). Intuitively, when auctions are well in advance of settlement, changing circumstances can lead bidders to renege on their bids (Chen, Xu, and Whinston 2010). (This is different from and in additional to other risks surrounding offsets, including leakage and permanence.) In this case, the government risks setting aside (or even spending) money, contracting with auction winners to provide emission reductions, and then ending up with nothing.

All of this brings us back to the auctioned put option. It is similar to the price floor approach in that participants are provided a guaranteed price when they deliver the emission reductions, but participants must pay for this price guarantee. It is also similar to the reverse auction in that there are a limited number of guaranteed payments. But rather than participants bidding to supply future emission reductions to the governments, participants pay now to have a guaranteed option to sell to the government later. Rather than bidding down the future selling price to win the reverse auction, they bid up the option purchase price (and, by construction, bid down the net payment they will eventually receive).

Also in contrast to the reverse auction, the government reduces their counterparty risk by creating a cash auction and not tying the delivery of future emission reductions to the auction winners. That is, the reverse auction creates auction winners who, if it becomes unprofitable to deliver emission reductions to the government, have an incentive to default. In contrast, the put option winners have already shelled out money for the put options. If they cannot profitably use them, they will try to sell them to someone who can and reduce their loss on the original purchase. As long as opportunities exist to reduce emission below the strike price, the options have value.

Final Thoughts

All of these arguments make auctioned put options appealing. They do not address all concerns. For example, those looking to see governments fulfill international financial commitments may find the possibility of unexecuted options unappealing. In these high-price cases, the resources saved from unexecuted options could be reprogrammed for other international climate activities—and likely with greater cost-effectiveness—but this would take time.

More generally, the ultimate role of pay-for-performance mechanisms alongside other public finance tools remains to be seen (along with a rigorous economic analysis of such mechanisms versus various alternatives). Yet, within the pay-for-performance grouping, it is important to design such mechanism to match the features of the problem. Here, auctioned put options would seem to dominate price floors and reverse auctions for government purchases of certified emission reductions on a fixed budget.

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