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Price floors for emissions trading

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ABSTRACT

Price floors in greenhouse gas emissions trading schemes can guarantee minimum abatement efforts if prices are lower than expected, and they can help manage cost uncertainty, possibly as complements to price ceilings. Provisions for price floors are found in several recent legislative proposals for emissions trading. Implementation however has potential pitfalls. Possible mechanisms are government commitments to buy back permits, a reserve price at auction, or an extra fee or tax on acquittal of emissions permits. Our analysis of these alternatives shows that the fee approach has budgetary advantages and is more compatible with international permit trading than the alternatives. It can also be used to implement more general hybrid approaches to emissions pricing.

1. Introduction

This paper examines issues associated with the implementation of price floors in emissions trading schemes. We look in detail at mechanisms for their implementation, and at the interaction with international permit trading.

Price ceilings are a widely recognised option to limit the risk that carbon prices exceed acceptable levels if constraining emissions turns out to be more expensive than expected, providing greater cost certainty to emitters, and limiting the overall potential short-term economic cost of mitigation. The mirror instrument is a price *floor*, which would ensure a minimum price on carbon. Price floors would provide more certainty for investors in low emission technologies, and allow emissions to go lower than a given target, thus providing more abatement if costs are lower than expected. The basic concept of a combined system of price ceilings and floors in allowance trading goes back to Roberts and Spence (1976).

Both price ceilings and price floors can reduce risk and price volatility in carbon markets, which has been of concern in the EU emissions trading system or ETS (Grubb and Neuhoff, 2006), and can thus make the introduction of ETS systems more acceptable. However, such 'hybrid' instruments also present specific challenges for scheme design and for trading of permits between countries, and in terms of their budgetary impacts.

There has been considerable discussion of approaches that include a price ceiling, also known as a 'safety valve' (Aldy et al., 2001; Jacoby and Ellerman, 2004; Pizer, 2002; McKibbin and Wilcoxen, 2002; McKibbin et al., 2009; Philibert, 2000). Price ceilings have been proposed for various carbon trading schemes, for example in Australia (Commonwealth of Australia, 2008),[1] and in less direct ways for the US Regional Greenhouse Gas Initiative (RGGI, 2008), and the Waxman–Markey Bill as passed by the United States House of Representatives in June 2009 (H.R. 2454, 2009).[2]

The academic debate on price floors is much less developed, though the concept of price floors has begun to find its way into policy and legislative proposals. One of the novel aspects of the Waxman–Markey Bill is that it stipulates a reserve price of US\$ 10/tCO_2-e when permits are auctioned, which would increase by 5% above the consumer price index each year. This reserve price could function as a price floor.

The US Regional Greenhouse Gas Initiative (RGGI) scheme has a reserve auction price in place. In March 2010, approximately 40 million tons of CO_2 allowances for the present compliance period (2009–2011) were auctioned at US\$2.07 per permit, but approximately 2 million tons of CO_2 allowances for the next compliance period were sold at the reserve price of US\$1.86 per permit. Unsold allowances may be sold in future auctions according to each state's regulations (RGGI, 2010). These price levels are substantially lower than prevailing prices under the EU ETS.

The ETS that has been proposed for California is expected to have a price floor of US\$10, which would be implemented as an auction reserve price that will increase by 5% above inflation per year. The Western Climate Initiative (an ETS proposed for 11 US states and Canadian provinces) would also have an auction floor price at a level that is yet to be specified (Hood, 2010).

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[1] The Australian emissions trading scheme proposal was shelved by government in the first half of 2010.

[2] Complementary carbon pricing legislation has not achieved passage through the US Senate.

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Calls in early 2009 for a price floor to be introduced to the EU emissions trading scheme, via an auction reserve price, were rejected by the European Commission. The European Commission claimed that "a floor price may unduly interfere with the market" (Gardner, 2009). This argument seems to overlook that permit markets are entirely the product of government regulation in the first place—introducing a feature like a price floor simply means adopting a different design that will result in a different market outcome. The argument also runs counter to stated EU interests to achieve ambitious climate mitigation outcomes.

Provisions for an effective floor price are under discussion in the United Kingdom (Rebuilding Security, 2010). By contrast, the ETS earlier proposed in Australia did not include price floor provisions. Analogous policies have also been implemented for renewable energy—Belgium has a minimum price for renewable energy certificates (Belgium Renewable Energy Factsheet, 2007).

The next section reviews how a floor price in an emissions trading scheme could interact with various different policy objectives. In Section 3, we compare the different approaches for implementing a price floor. In Section 4, we examine in detail the mechanism where firms pay a tax or extra fee as well as buy permits; and discuss international permit trading, budgetary implications, and political economy considerations. Compared to the alternatives, this mechanism has budgetary advantages and is compatible with international permit trading. In Section 5, we examine how similar mechanisms could be used to implement more general hybrid approaches for putting a price on emissions. One such approach is to use an 'allowance reserve', which is similar to a price ceiling, but where the total number of permits remains limited. Section 6 concludes.

2. Cost uncertainty, price volatility, and innovation

Price floors would influence price volatility, innovation, and the management of cost uncertainty of greenhouse gas abatement policy. What instrument is chosen by a policy-maker depends on their policy objectives. A common objective is to deliver an economically optimal amount of emission reductions in an efficient manner, in the presence of uncertainty. But policy-makers may have other purposes, such as reducing emissions to a specific level, or promoting a specific technology. If the sole objective is to meet a pre-determined emissions target, then the possibility of the carbon price being lower (or higher) than expected is not a problem. But if the objective is to set a carbon price that approximates the marginal damages of greenhouse gas emissions, or more pragmatically to achieve a balance between abatement costs and emissions reductions, then a carbon price that is much lower (or higher) than expected may amount to policy failure.

2.1. Price floors and the economics of uncertainty

At the level of economic theory, uncertainties about abatement costs and benefits affect the relative performance of abatement mechanisms in terms of their expected welfare impacts. Weitzman (1974) showed that there is an efficiency argument for setting the marginal cost of abatement rather than the quantity of abatement, when abatement cost curves are uncertain and the marginal damage function of emissions is relatively flat. It is generally thought that this is the case with climate change for the comparison between price and quantity instruments. In practice emissions pricing policies have mostly taken the form of cap-and-trade.

Hybrid approaches under uncertainty were studied by Roberts and Spence (1976), who examined pollution reduction when the costs of pollution reduction are uncertain, but the benefits are known. It was found that the expected net benefits of using a hybrid approach with both a price floor and a price ceiling are significantly higher than for a purely price or quantity based approach. Quantitative modelling for climate change mitigation (Pizer, 2002; Burtraw et al., 2009; Fell and Morgenstern, 2009) is consistent with this conclusion. Modelling by Philibert (2008, 2009) shows that price ceilings and floors could help design a policy with similar probabilistic climate results at lower expected costs. Further, Philibert argues that price floors must be almost inevitably introduced to maintain the climatic effectiveness of the policy when price ceilings are introduced, on top of some tightening of the emission targets. Another interpretation of this point is that price floors are essential in mitigating the disincentive effects of a price ceiling which would truncate possible upside returns on low-carbon investment.

The economics of climate change mitigation under cost uncertainty therefore suggests that hybrid approaches can be superior to both purely price-based schemes (carbon taxes) and purely quantity-based schemes (cap-and-trade); and that such hybrid approaches include price floors. The purpose of a hybrid scheme is not to approximate a price-based system, but to turn it into an approach that is superior to both price- and quantity-based schemes in terms on managing uncertainty.

If it turns out that a given short to medium term target can be more easily reached than initially thought, the efficient response is to increase the abatement effort. Successful technological innovations lower the carbon price for a particular emissions target, or increase the amount of emission reductions achievable at a particular carbon price. The economically efficient response is to increase the amount of abatement, to keep the abatement cost in line with the social cost of emissions. Under a pure cap-and-trade approach, innovation will only increase abatement if the regulator adjusts emissions targets in response to a lower, or lower than expected, carbon price. A price floor by contrast provides a mechanism for additional emission reductions to be achieved automatically. However, it needs to be recognised that a price floor is no panacea for dealing with all uncertainties pertaining to mitigation policy. For example, a given minimum price may still fail to achieve a given policy ambition for overall abatement or for making specific technologies commercially viable.

2.2. Managing carbon price volatility

Price floors (and ceilings) truncate the possible range of permit prices in the market; hence, can reduce excess price volatility. Price volatility can also be reduced by banking and borrowing of permits; with short-term market fluctuations tempered through longer term price expectations. But recent experience with the EU ETS suggests that high levels of volatility still remain. The EU permit price ranged between €15 and €25/tCO_2-eq from mid-2007 to early 2008, spiked at €30 in mid-2008, declined to a low of €9 in early 2009, and has ranged around €13–16 in the first half of 2010.

The steep reductions in permit prices have in large measure been related to the global financial crisis, which contributed to lower emissions and also constrained financial resources for investment. The price falls occurred despite provisions for banking of permits being in place, which limits short-term downward fluctuation if markets operate properly. Without intertemporal flexibility, the dip in permit prices would likely have been larger.

It can be argued that falling permit prices in times of economic downturn are desirable as an economic stabiliser. However, there are two important counter-arguments. Firstly, it can be argued that policies should be designed in a way that keeps incentives for long-term investments stable through temporary business cycle effects. A short-term emissions price below the long-term optimum