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Sellers' Hedging Incentives at EPA's Emission Trading Auction

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Cason (1993, *J. Environ. Econom. Management* **25**, 177–195, doi:10.1006/jeem 1993.1041) argued that the auction which the EPA used in order to start the market for sulfur allowances may reduce the efficiency of the market since it gives sellers an incentive to understate their valuation. In this paper we show that the sellers' incentives are even more perverse than Cason suggested when we take into account that sellers can also submit a bid. We show that sellers have an incentive to set their asking price equal to 0 while simultaneously hedging their bets by submitting a positive bid.

Key Words: EPA auctions.

1. INTRODUCTION

Since Dales [4], economists have recommended tradeable permits as an efficient instrument of environmental policy. However, the development of this instrument in policy practice has been slow. In the 1970s emissions trading rules emerged in the U.S. Because there was no conscious design, the rules were unclear and controversial and required a lot of government intervention (Liroff [11]).

In 1990, the first large-scale, consciously designed emission trading scheme was introduced in the U.S. It was applied to the SO_2 emissions of electric utilities.[1] In Phase I (1995–2000) a limited number of electric utilities participated in the scheme. In Phase II (from 2000 on) all electric utilities participate.

Sulfur allowances can be traded in two different ways. One way is to trade privately between utilities, possibly with the intermediation of a broker. By now, the lion's share of allowances is traded in this way. The other trading option is the annual auction in March, organized by the EPA. This auction was first held in 1993. At the auction the EPA sells the small part (2.8%) of the total amount of

[1] Ellerman *et al*. [6] provide a comprehensive report of the whole program. Schmalensee *et al*. [13] summarize the report. Joskow *et al*. [8] discuss the allowance market. Stavins [14] discusses the positive and normative lessons from the program.

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allowances that is not grandfathered directly to the utilities. The revenues of the auction are distributed among the allowance holders. Electric utilities and other interested parties can not only bid at the auction but also offer allowances for sale.

The way in which the auction is conducted is unique.[2] The bids are ranked from high to low. The allowances from the EPA are sold to the highest bidders. The other suppliers are ranked according to their asking price, from low to high. The lowest asker is matched to the highest remaining bidder, etc., as long as the asking price is below the bid price. A successful bidder pays his bid price to the seller to whom he is matched.

This was the first time that this auction design had been implemented. Also, it had not been analyzed before. Cason [1] is the only paper which provides an analysis of the auction.[3] The author claims that the market-clearing prices are too low and not all gains from trade are exhausted. The EPA's rules can therefore generate significantly biased price signals and reduce the efficiency of the allowance trading market.[4] In a standard uniform price auction, all trades take place at the market-clearing price, given all bidding and asking prices submitted. In such an auction buyers have an incentive to bid slightly lower than their valuation, whereas sellers have an incentive to ask a price that is slightly higher than their valuation (see for example Vickrey [15] or McAfee and McMillan [12]). In the EPA auction, however, Cason shows that a seller has an incentive to offer units at prices below her costs. Given that she will sell, the lower her asking price the higher the bid to which she will be matched and therefore the higher her expected revenue. Given that bidders still have an incentive to bid below their valuations, this results in downward-biased price signals which may reduce the efficiency of the market.

Naturally, for the purposes of his paper Cason uses a model that is a highly simplified representation of the actual EPA auction. He assumes that buyers and sellers have demand, resp. supply, of only unit of the good. Recent research suggests that in multiunit auctions it is very hard to achieve efficient outcomes, even if the auction is properly designed (see Klemperer [10]). Also, Cason assumes that the distribution of bids is given, and he does not take the interaction between the auction and the secondary market into account. Joskow *et al.* [8, pp. 12–13] argue that auction prices can only depart systematically from competitive market prices if the nonauction part of the market is seriously imperfect. Also, they argue that the presence of a private market leads to overstatement, not understatement, of reservation prices. Joskow *et al.* [8] criticize Cason's assumption of private values.

This paper analyzes a less obvious extension of Cason's analysis. We allow for the possibility that sellers can also submit bids at the auction. We show that if that is the case then the equilibrium derived in Cason is no longer a Bayesian Nash equilibrium. Specifically, sellers can improve upon that equilibrium by submitting an asking price of 0 while simultaneously hedging their bets by submitting a bid equal to their valuation. This possibility is unique to this particular auction design. Therefore, we believe that it is a useful extension of Cason's analysis and a further addition to his point. We show that the sellers' incentives in this particular auction

[2] This way of conducting the auction is not explicitly laid down in the 1990 Clean Air Act Amendments (CAAA). Rather, it is based upon the EPA's interpretation of the CAAA (Cason [1]).

[3] In the remainder of this paper, we will refer to Cason [1] simply as Cason.

[4] Cason [1, p. 177].