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Can Double Auctions Control Monopoly and Monopsony Power in Emissions Trading Markets?[1]

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We conduct a laboratory experiment to investigate whether the double auction institution can suppress market power in emissions trading markets. We study 24 markets with varying market structure in a ABA crossover design which controls for subject effects. We find clear evidence of successful use of market power. Average prices rise under monopoly and fall under monopsony. Opening prices are affected much more than closing prices. Profits are redistributed in favor of the agent with power. Efficiency is not affected significantly. Analysis of convergence trends suggests that this is not a transitory phenomenon. We interpret our results as evidence of successful price discrimination within a double auction market. © 2001 Elsevier Science (USA)

Key Words: emissions trading; double auctions; market power; tradable permits; price discrimination.

1. INTRODUCTION

Emissions trading is frequently advocated as an institution for market-based environmental regulation; however, practical implementations were rare and unique to the United States until the 1990s.[2] Since then, the success of American initiatives, in particular the U.S. EPA SO_2 emission permit market, has increased international enthusiasm for this institution. It may be optimistic, though, to expect that American successes will be easily replicated elsewhere. The SO_2 market has

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[2] Emission permit markets were first discussed by Crocker [4] and Dales [5].

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been characterized by large numbers of sellers and buyers and trading has taken place using transparent institutions. These features have been important in generating the competitive market outcomes and benefits which the approach promises. Application of the institution in other countries or in an international arena may, however, involve markets with less competitive characteristics. In particular, they could be sufficiently dominated by large sellers or buyers to create market power. At the international level, it is frequently thought that the United States will be a dominant buyer and the states of the former Soviet Union dominant suppliers in Annex I trading under the Kyoto protocol. Nordhaus and Boyer [17, p. 121] estimate that the United States will account for approximately 44% of carbon emissions permit purchases by 2010 while the former Soviet Union will account for nearly 56% of sales. By 2050 the share for the United States will fall to 39% while the share for the former Soviet Union will rise to 68% (in both 2010 and 2050 eastern Europe will account for the balance of sales). These estimates are based on competitive market pricing. Bernstein *et al.* [1, p. 250] estimate that full exploitation of monopoly power by Eastern Europe and the former Soviet Union could induce a monopoly markup of 180% and raise international carbon permit prices from US$90/ton to $129 per ton.

These concentration concerns are particularly relevant if trading under the Kyoto protocol is implemented on a country-to-country basis. If countries delegate trading authority to polluting firms, concentration in world greenhouse gas markets could be significantly lessened. High market concentration may still be a problem in trading permits for other pollutants, however, particularly in markets for regionally restricted air and water pollutants. For example, the Ontario Ministry of Environment [22] has announced a mandatory cap on nitrogen oxide (NO_x) and sulphur oxide (SO_x) emissions from six fossil fuel generating stations at the beginning of 2001. The generating stations are all owned by Ontario Power Generation (OPG), but these may be sold in the future. Current production of NO_x is about 50 kton per year, well in excess of the cap of 36 kton. The shortfall can be made up by purchases of emission reduction credits from sources in the non-capped sector. The market for these credits is geographically restricted by a requirement that they be generated by sources in or (to a limited extent) upwind from Ontario. Specific measures are proposed for discounting credits generated more than 300 km upwind of the region. OPG has undertaken an extensive program of amassing and banking these credits. There are no other purchases. Off-the-record comments from industry observers suggest that OPG is paying distinctly less for these credits than might be expected in the United States. This is consistent with the exercise of monopsony power.

The effective exercise of market power in emissions trading markets might raise concern on two distinct grounds. First, of course, market power may restrict the net sales of permits and lead to an inefficient allocation of responsibilities for abatement. Second, market power may redistribute the gains from trade in a direction that may or may not be viewed favorably, depending on one's political perspective. Note that it is possible to have the second effect without the first if the traders with market power are able to practice price discrimination. Porter [20] has conjectured that this is a possibility in double auction markets.