ABATEMENT INVESTMENT DECISIONS UNDER ALTERNATIVE EMISSIONS REGULATION: AN EXPERIMENTAL INVESTIGATION

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Overview

Emissions taxes and emissions permit trading schemes are designed to reduce greenhouse gas (GHG) emissions by providing incentives for large emitters to invest in less emissions-intensive production technologies. Whereas taxes place a fixed price on emissions, tradable permit schemes include a secondary permit market, from which allowance prices emerge after the regulation enters into force. The delayed price information contributes to uncertainty about the future cost of compliance that liable emitters will face, thereby challenging liable entities' ability to make optimal abatement investment decisions.

Using laboratory experiments, we examine the effects of a policy regime that is similar to the one implemented in Australia in 2012. The regime includes a staged transition over time from a regulation-free environment, to an emissions tax and then to emissions trading. We examine the effects of such a staged transition on investment, quantity of emissions, permit prices and trading behavior, comparing it to standard policy regimes that entail only an emissions tax or only emissions permit trading.

The paper is organized as follows: Section 2 reviews related experimental literature. Section 3 outlines the theoretical underpinnings of the model and experiment. Section 4 includes a description of the experimental setup and procedures. Section 5 conveys the results. Section 6 concludes by discussing some implications of the findings, as well as suggestions for future research.

Methods

Laboratory market experiments.

Results

As measured in this study, both an environment regulated by a tax, and one governed by a regime with a staged transition, incurred lower total compliance costs than did an experimental environment operating under the trading-only regime. The transition regime yielded more costly compliance than the tax only but less costly than trade only regulation. The bulk of the higher costs incurred in the trading-only and transitional treatments were due to the inefficient abatement investments made by least technologically efficient producers. Inefficient producers were most likely to unproductively invest heavily in abatement, hold their permits and produce under the trading treatment than they were under the tax and transition schemes. The related eventual low supply of permits eliminated an opportunity for more efficient producers to generate as much income as would have otherwise been possible, and in turn, reduced total welfare.

Price uncertainty present in the newly created market and, what seems to be, an endowment effect of initial permit allocation, both contributed to inefficiency in abatement decisions and a slower learning process demonstrated under the regulations that included trading. The temporary tax's resolution of uncertainty about compliance costs in the early stages of the regulation's implementation seems to yield higher efficiency under the staged transitional regulation. Even with the extensive opportunity for learning and information gathering that the setup provided in the multiple rounds, and even though the average prices that emerged in the market were not substantially higher than the tax level, the decision makers' uncertainty about future compliance costs was left unresolved, and high costs were incurred in both the early and latter rounds, especially in the trading only regulation.

Conclusions

This paper suggests that use of a fixed price in advance of a permit trading system could indeed reduce total social costs of a regulation's implementation, particularly in the short run, due to its ability to resolve some uncertainty about compliance costs. In the long run a permit market may well be the optimal regulatory instrument, but as clearly observed in the important initial stages observed in the lab, a new trading setup can lead to inefficient compliance strategies that could be alleviated by an introductory tax.

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