Environmental Policy Instruments and Imperfectly Competitive International Trade

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Abstract. Policy makers, industrialists and environmentalists express concern that the imposition of tough environmental policies in some countries displaces production, and hence pollution, to countries which impose less tough environmental policies. Yet empirical studies of such impacts suggest they are small. However, these findings are derived from models in which international trade is modelled as being perfectly competitive. In this paper I model trade as imperfectly competitive with scope for strategic behavior by producers, in this case investment in capital. I show that the choice of environmental policy instrument can have a marked impact on the incentives for producers to act strategically, with environmental standards significantly reducing the incentives for strategic overinvestment relative to environmental taxes or no environmental policy at all. Whether welfare is higher using standards or taxes depends on whether producing countries are also significant consumers of the polluting product, and on whether all producing governments act to reduce emissions or only some subset of governments. To assess the quantitative significance of these theoretical results I conduct policy simulations on a calibrated model of the world fertilizer industry. These simulations show that the impact of environmental policy on strategic behaviour can be large.

Key words: environmental policy, pollution, strategic behaviour

1. Introduction

Policy makers, industrialists and environmentalists frequently express concern that the imposition of tough environmental policy by some countries simply displaces production, and hence pollution, to countries with less tough environmental policies. Such concerns are particularly acute in the case of global environmental problems, where, for example, the EU governments have expressed unwillingness to impose a carbon tax unless similar policies are pursued by other governments. In the case of governments and producers the concern has been with loss of competitiveness and hence economic welfare; in the case of environmentalists the concern is that actions taken by some countries to reduce pollution are offset by expansions of pollution elsewhere – the ‘carbon leakage’ problem in the case of CO₂ emissions. Yet empirical studies have shown that both concerns seem to be exaggerated. A wide range of studies of the macroeconomic impact of carbon tax (see Boero et al., 1992; Hoeller et al., 1992; Cline 1992 for good recent surveys), show that the welfare costs of even quite substantial carbon taxes are rather low, even when only some subset of countries imposes such a tax. For example, using
the GREEN model, Burniaux et al. (1992) calculate that the effect of OECD countries stabilizing emissions at their 1990 level from 2000 to 2050 (a cut in emissions by 2050 of 43% relative to a Business as Usual scenario), would cause a welfare loss for the OECD which would never exceed 1.3%, while carbon leakage would never exceed 2.5% of the OECD reduction. 1

However, the above results have been derived using models in which markets are largely assumed to be competitive, and it is not surprising that the impacts are rather small. For energy costs are a rather small component of overall costs, so even a large carbon tax will have a small impact on the marginal products of other factors (assumed to be fully employed) and hence a small impact on welfare. While competitive assumptions about world markets may be appropriate in many cases, other markets, such as specialized chemicals, are better characterized by substantial scale economies and fewer firms serving a world market, and it is precisely in these kinds of markets that concerns about loss of competitiveness are most strongly voiced. This raises the question whether dropping the assumption of competitive behaviour will make a significant difference to the assessment of the impact of environmental policy on competitiveness, welfare and carbon leakage.

At first sight it might be thought that imperfectly competitive markets would be even less affected by environmental policy than competitive markets, because pricing policies, barriers to entry and product differentiation could allow producers with higher costs than their rivals to survive in an imperfectly competitive market (albeit with reduced market shares) when they would be driven out of business in a competitive market. However, the rather sparse literature that exists on environmental policy with imperfectly competitive markets suggests that there are other factors at work offsetting these considerations. First, the existence of imperfectly competitive markets creates rents and this means that the welfare analysis of environmental policy needs to take account of what happens to such rents. Second, the existence of rents means that firms or governments will be tempted to undertake strategic competition to try to manipulate subsequent competition over output or price so as to get a larger share of the rents for themselves. The analysis of environmental policy has to consider not just the usual impact on costs of production, but also on the incentives for such strategic behaviour.

In this paper I shall be concerned with the incentives for strategic behaviour by producers, and, to a lesser extent, by governments. By this I mean that (some) governments have exogenously set targets for emission reductions, but can choose what policy instruments to use to achieve these targets; these assumptions capture the case where some governments sign up to an international agreement to cut emissions, but can choose how to achieve this target. By contrast, Barrett (1994) and Rauscher (1994), amongst others, consider models where there is no strategic behaviour by producers but governments can choose their targets for emission reductions strategically.