



## Border adjustment for European emissions trading: Competitiveness and carbon leakage

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### ABSTRACT

Unilateral or sub-global policies to combat climate change are potentially sensitive to free-riding and carbon leakage. One way of dealing with carbon leakage and competitiveness is the imposition of border adjustment measures for competing imports, for example in the form of the obligation to importers of goods to purchase and surrender emissions allowances to the authorities when importing. In this paper, we explore some implications of border adjustment measures in the EU ETS, for sectors that might be subject to carbon leakage. We examine the implications of two variants of these measures on the competitiveness of these sectors and on the global environment with the help of a multi-sector, multi-region computable general equilibrium (CGE) model of the global economy. Our calculations suggest that border adjustment might reduce the sectoral rate of leakage of the iron and steel industry rather forcefully, but that the reduction would be less for the mineral products sector, including cement. The reduction of the overall or macro rate of leakage would be modest. So, from an environmental point of view border tax adjustments would not be a very effective policy measure, but might mainly be justified by considerations of sectoral competitiveness.

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### 1. Introduction

Unilateral or sub-global policies to combat climate change are potentially sensitive to free-riding and carbon leakage. Well established in economic theory, these “international externalities” (Markusen, 1975) now figure prominently in the political debate on the design of emissions trading schemes on both sides of the Atlantic. Recent Congressional initiatives in the US for a federal cap-and-trade scheme for greenhouse gases included detailed border adjustment measures for carbon-intensive products from countries without “comparable” policy actions. The latest bill proposal by Representatives Waxman and Markey that was passed in the House of Representatives in June 2009 also included the future option to adopt border adjustments if other measures would fail to address competitiveness concerns (Dröge, 2009). The Commission of the European Union (EU), in the context of the preparation for the third phase of its Emissions Trading Scheme (EU ETS), currently investigates which “energy-intensive industry sectors or sub-sectors are likely to be subject to carbon leakage”.<sup>1</sup> Such sectors or sub-sectors could receive a

higher share of gratis allowances or an “effective carbon equalization system with a view to putting [these sectors or sub-sectors at home and abroad] on a comparable footing.”<sup>1</sup> The revised ETS Directive includes the option of border adjustments in the form of the inclusion in the scheme of importers of products from sectors that are exposed to significant risks of carbon leakage.<sup>2</sup>

Policies to mitigate carbon leakage and negative effects on competitiveness have been subject to intense academic and political debate. Much has been said on the issue of free allocation versus auctioning of allowances (e.g. European Commission, 2008; de Bruyn et al., 2008; Fischer and Fox, 2004). While in a textbook cap-and-trade system the modalities of the initial distribution of allowances should not matter for the final outcomes in terms of prices and activity levels (and therefore on competitiveness), in a real-world and imperfect system<sup>3</sup> such as the EU ETS, the way of allocation of the allowances (free versus auctioned) might well matter to the extent that free allocation would give some relief to sectors that are particularly exposed to

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<sup>1</sup> European Parliament legislative resolution of 17 December 2008 on the proposal for a directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community (COM(2008)0016 – C6-0043/2008 – 2008/0013(COD)).

<sup>2</sup> Art. 10b of Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community.

<sup>3</sup> The major “imperfections” are the rules governing new entrants, the closure of installations, and the “updating” of the amount of allowances for installations in subsequent trading periods.

foreign competition.<sup>4</sup> An alternative, and arguably more rigorous way of dealing with carbon leakage and competitiveness is the imposition of border adjustment measures for competing imports, for example in the form of the obligation to importers of goods to purchase and surrender emissions allowances to the authorities when importing. Border adjustment measures can theoretically help to mitigate carbon leakage and negative competitiveness effects for domestic firms and might act as a leverage for foreign firms (or countries) to implement CO<sub>2</sub> reduction measures (Ismer and Neuhoff, 2007).

In this paper, we explore some implications of border adjustment measures in the EU ETS, for sectors that might be subject to carbon leakage. We examine the implications of two variants of these measures on the competitiveness of these sectors and on the global environment with the help of a multi-sector, multi-region computable general equilibrium (CGE) model of the global economy. The structure of this paper is as follows. Section 2 reviews previous research on the economic and environmental effects of border adjustments in the context of unilateral climate change policies. Section 3 describes the model and data that are used for the present analysis. Section 4 outlines the policy simulations, while Section 5 presents the results. Finally, Section 6 offers some conclusions.

## 2. Carbon leakage and border adjustment

Recent years saw a growing interest in practical measures to mitigate the “international externalities” of sub-global climate change policies, such as the EU ETS and federal US cap-and-trade initiatives. These practical measures focus on the potential effects of carbon control costs on the international competitiveness of carbon-intensive firms in regulated countries and on associated “carbon leakage” due to increased levels of production and emissions by competing firms in non-regulated countries. Several potential measures have been identified, including international sectoral agreements, cost containment measures, free or output-based allocation of allowances, and border adjustment measures (Grubb and Neuhoff, 2006; Houser et al., 2008). In this paper we focus on border adjustment measures. Border adjustment measures for carbon-intensive goods can come in the form of import tariffs, export rebates, or the obligation for importers to surrender carbon allowances for the amount of CO<sub>2</sub> that is emitted as a consequence of the good’s production. WTO-UNEP (2009) discusses the issue of whether concerns over carbon leakage and competitiveness can justify governmental measures that impose similar costs on foreign producers through the use of border adjustment measures. It is concluded that there are two main challenges in implementing border measures: providing a clear rationale for border measures (i.e. accurately assessing carbon leakage and competitiveness losses); and determining a “fair” price to be imposed on imported products to bring their prices into line with the domestic cost of compliance with an emission trading scheme. Fischer and Fox (2009) discuss economic and legal research findings regarding border adjustment. They note that legal analysis can be found in the literature that has suggested that the requirement for importers to surrender carbon allowances is more likely to be compatible with international trade law than an import tax. A difficult question concerns the

determination of the amount of carbon allowances per unit of imported good. Fischer and Fox (2009) argue that, from an economic perspective, one would want to base this amount on the actual volume of carbon emissions associated with the production of the good (the emission coefficient) in the exporting country. Determining the actual emission coefficient is, however, not a simple matter. Some analysts have proposed to use the emission coefficient of the predominant method of production in the importing region or even the emission coefficient of the best available technology, which would not only be more simple but, according to Ismer and Neuhoff (2007) also more likely to be compatible with international trade law.<sup>5</sup> Finally, Fischer and Fox (2009) note a relationship between border adjustment and the way of allocating allowances to domestic firms. If importers would be required to *buy* allowances, it could be conceived as unfair competition if domestic firms would get their allowances for *free* through grandfathering (Hepburn et al., 2006).

Dröge (2009) argues that carbon leakage from industrial sectors cannot be addressed by one single approach. Different sectors and sub-sectors have different technical and economic characteristics that determine their response to increases in carbon costs. These different responses will lead to different patterns of carbon leakage. A sector-based approach has the additional advantage that it can flexibly respond to international developments in these sectors, including international sectoral agreements (Dröge, 2009). Several “channels” of carbon leakage have been identified in the literature (Burniaux and Oliveira Martins, 2000), among which the impact of unilateral climate policy on the relative competitiveness of carbon-intensive sectors in regulated and non-regulated regions is one. It is not yet clear how this “competitiveness” or “trade” channel stands in relation to other channels. Most CGE analyses emphasize the effect of climate policies on world demand for primary fuels (mainly oil and coal) that is likely to partially shift from regulated to non-regulated countries (Kuik and Gerlagh, 2003; Paltsev, 2001). Lower demand for primary fuels in regulated countries may lead to lower energy prices which will make production in non-regulated countries more energy-intensive. This is called the “energy channel”. Fischer and Fox (2009), applying a partial equilibrium model, also suggest that “overall” leakage due to carbon taxes in the US and Canada would mainly be caused by “energy channel” effects and less by “competitiveness” effects.<sup>6</sup>

Notwithstanding this uncertain share of the competitiveness channel in total leakage, several studies report high sectoral rates of leakage for certain industries which may be directly associated with shifts in international competitiveness. Demailly and Quirion (2006) and Ponsard and Walker (2008), for example report potentially high rates of leakage for the European cement industry under the EU ETS. Mathiesen and Maestad (2004) find high rates of leakage for the European steel industry. Fischer and Fox (2009) also report high rates of sectoral leakage for US cement and steel industries in case of a federal US carbon tax.

Which industrial sectors are sensitive to carbon leakage and are therefore potential candidates for border adjustments? Hourcade et al. (2007) carried out a detailed investigation of

<sup>5</sup> The basic problem with the approach based on actual emissions is that exporting countries may be unwilling to cooperate in providing information on these emissions. “Second-guessing” the (unknown) emission-coefficients by the importing country is likely to be labelled as unfair trade discrimination under WTO law. Basing the emission-coefficients on BAT is more likely to be allowed under WTO law.

<sup>6</sup> A potential channel of *negative* leakage operates through the impact of unilateral climate policies on global technology development. International technology spillovers could generate negative leakage by offering foreign firms cost-effective CO<sub>2</sub> reduction options that would not have been available without the unilateral climate policy (Grubb et al., 2002; Di Maria and Werff, 2008).

<sup>4</sup> The Commission also points to some measure of “irrationality” of company management of not taking the opportunity cost of gratis allowances into account in management decisions (European Commission, 2008). While it would be foolish to deny all “irrationality” in company management, it does not seem wise to base future policies on the expectation of a long-term continuation of this particular irrationality.

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