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Analysis

On the empirical content of carbon leakage criteria in the EU Emissions Trading Scheme

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ABSTRACT

The EU Emissions Trading Scheme continues to exempt industries deemed at risk of carbon leakage from permit auctions. Carbon leakage risk is established based on the carbon intensity and trade exposure of each 4-digit industry. Using a novel measure of carbon leakage risk obtained in interviews with almost 400 managers at regulated firms in six countries, we show that carbon intensity is strongly correlated with leakage risk whereas overall trade exposure is not. In spite of this, most exemptions from auctioning are granted to industries with high trade exposure to developed and less developed countries. Our analysis suggests two ways of tightening the exemption criteria without increasing relocation risk among non-exempt industries. The first one is to exempt trade exposed industries only if they are also carbon intensive. The second one is to consider exposure to trade only with less developed countries. By modifying the carbon leakage criteria along these lines, European governments could raise additional revenue from permit auctions of up to €3 billion per year, based on a permit price of €30.

1. Introduction

It is widely recognized that the problem of carbon leakage poses a major challenge for designing effective unilateral policies aimed at mitigating global climate change. In its most direct manifestation, carbon leakage occurs when polluting plants that are subject to climate policy relocate to an unregulated jurisdiction. Since carbon emissions are a global pollutant, their "leaking" to unregulated places reduces the environmental benefits from the policy. In addition, carbon leakage creates an excess burden for those countries that regulate emissions to the extent that relocation reduces output, employment, and taxable profits at home.

Not surprisingly, carbon leakage takes the center stage whenever a new climate change regulation is up for debate. So far, the most common deterrent against carbon leakage has been to either compensate or to exempt those industries deemed to be most adversely affected by the policy. For instance, virtually all of the numerous carbon taxes that have emerged in Europe since the 1990's grant rebates or exemptions to energy-intensive firms in order to prevent them from relocating.[1] While this practice may be justified from the point-of-view of industrial policy, it runs counter to the polluter-pays principle underlying environmental policy-making in the EU. It also gives way to rent-seeking behavior, as regulated firms have an incentive to exaggerate their compliance costs in order to receive more generous compensation. Addressing carbon leakage is therefore a difficult and controversial policy issue.

This paper empirically analyzes the current scheme to prevent carbon leakage implemented in the European Union Emissions Trading System (EU ETS), the world's first and largest regional cap-and-trade system for greenhouse gas emissions. During the first eight years of the EU ETS, leakage was addressed by offering manufacturing firms generous compensation in the form of allocating most emission allowances

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[1] Contrary to this view, a recent study of the UK Climate Change Levy finds no causal impact of carbon taxation on output, employment or plant exit among manufacturing firms (Martin et al., 2014a).

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free of charge. In the current, third trading phase, which runs from 2013 until 2020, the European Commission (EC) gradually reduces the proportion of free allowances allocated to manufacturing firms. At the same time, and contrary to its stated objective of achieving full auctioning of emission allowances, the EC exempts from this transition more than three quarters of the regulated emissions from manufacturing, on the grounds that the firms accounting for those emissions are at risk of carbon leakage. Exemptions are granted according to two simple criteria, namely the carbon intensity of value added and trade exposure, both measured at the level of the 4-digit industry code.

Our paper assesses the accuracy of these criteria based on a novel firm-level measure of leakage risk we gathered in telephone interviews with managers of 390 manufacturing firms in six European countries which are regulated under the EU ETS. The flexibility of the interview based approach, along with the bias-reducing format of the survey tool developed by Bloom and Van Reenen (2007) and adapted to the climate policy context in Martin et al. (2012, 2014b), allows us to elicit valuable information on politically contentious issues such as a firm's vulnerability to carbon pricing, defined as the firm's propensity to downsize or relocate in response to climate change policy.

We show that carbon intensity is strongly correlated with our interview-based measure of vulnerability whereas trade intensity is not. This is a reason for concern because most exemptions from auctioning are granted on the basis of the trade intensity criterion alone. We propose two simple improvements to the exemption criteria, based on the principle that free permits should only be given to industries where the average relocation propensity is significantly higher than that of non-exempt industries. First, by not exempting trade intensive sectors but the ones that are at least moderately carbon intensive as well, European governments could raise additional auction revenue of up to €3 billion every year, based on the carbon price of 30€/tCO_2 which is used in the official economic analysis that justifies the leakage criteria (EU Commission, 2009). Alternatively, we show that a sector's intensity of trade with less developed countries such as China is a better proxy for vulnerability than the overall trade intensity. A change in the current trade intensity criterion along these lines could raise €430 million in auction revenues per year in addition to the revenue under the current auction rules.

In extending the normative analysis of industry compensation rules in the EU ETS by Martin et al. (2014b), this paper contributes further evidence of practical value on this controversial aspect of climate policy. This will be relevant for the impending revision of the carbon leakage criteria by the EU Commission, but our findings also inform climate policy far beyond the European context. This is because criteria similar to the ones used by the EC have been adopted in actual and proposed legislation underlying half a dozen regional carbon trading schemes worldwide. For instance, emission intensity and trade intensity are used to determine eligibility for compensation in the recently implemented carbon trading schemes in California and Switzerland, in Australia's Carbon Pollution Reduction Scheme and in New Zealand's ETS. Moreover, these metrics were proposed for a US wide cap-and-trade scheme under the 2009 Waxman–Markey Bill, and will be applied in a future South Korean ETS (http://www.ieta.org/worldscarbonmarkets). In view of this, it is worthwhile to study how these criteria relate to leakage risk, as assessed by the very managers who decide on relocation.

The next section describes the policy background and summarizes the relevant literature. Section 3 describes the dataset and explains our regression based test. Section 4 presents the results and Section 5 discusses their implications for the auction revenues forgone by the actual policy. Section 6 concludes.

2. Policy Background: Carbon Leakage and the EU ETS

2.1. Carbon Leakage

Although the objective of the EU ETS is the mitigation of a global environmental problem, the policy limits greenhouse gas emissions only in the EU — not globally. In the Carbon Leakage Decision,[2] the European Commission acknowledges that this "could lead to an increase in greenhouse gas emissions in third countries where industry would not be subject to comparable carbon constraints ('carbon leakage') and undermine the environmental integrity and benefit of actions by the Union". Matthes (2008) distinguishes between two forms of leakage. Investment leakage occurs in the medium-to-long run as firms do not expand their production facilities in Europe or fail to reinvest in facilities that have reached the end of their economic lifetime. Operational leakage denotes the short-term phenomenon of production activity being decreased or shut down completely in Europe and its possible relocation to other countries without carbon pricing. Since our empirical analysis relies on interviews with managers of existing facilities, the results are most pertinent to operational leakage.

The evident economic solution to the leakage problem is to adjust the price of goods for the implicit carbon cost when they cross the border (see e.g. Monjon and Quirion, 2010). However, such border adjustments – in addition to raising a number of practical issues – may collide with the rules of the World Trade Organization (e.g. Jouré et al., 2013; Quirion and Monjon, 2011). The EU ETS has been relying on free permit allocation as the principal instrument to avoid leakage. Incentives for investment leakage are mitigated by granting free emission permits to new facilities (the EU ETS sets aside permits for this purpose in a 'new entrant reserve'). Conversely, all freely allocated emission allowances are canceled when a regulated facility closes, thereby penalizing operating leakage. If properly designed and enforced, this plant closure provision deters carbon leakage because free allocation is contingent on the continued activity of the plant.[3] The drawback of this is a distortion of productive efficiency because free permits act like an output subsidy (Fischer and Fox, 2007; Quirion, 2009, discusses this in the EU ETS context).[4] Specifically, the plant closure provision may render the operation of otherwise inefficient plants profitable (Matthes and Monjon, 2008).[5]

2.2. Permit Allocation

In phases I and II of the EU ETS, each member state drew up a National Allocation Plan (NAP) that fixed the national cap and determined the sectoral permit allocation. In developing their NAPs in phase I most of the countries opted for "grandfathering", i.e. free permit allocations based on historical emissions (Ellerman et al., 2007). In phase II, the member states imposed more stringent caps so as to honor their commitment to the EU's joint emission target under the Kyoto Protocol, but they also retained free allocation. Auctioning fell far short of what

[2] Cf. Commission Decision 2010/2/EU determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage (2010) OJ L 1/10 (Carbon Leakage Decision).

[3] This deterrent for carbon leakage hinges on free allowance allocation and hence loses bite during the transition to full auctioning, unless low carbon innovation creates a lock-in effect (Schmidt and Heitzig, 2014).

[4] Extending an earlier work by Demailly and Quirion (2006) on the cement sector, Monjon and Quirion (2011) use a computable partial equilibrium model to compare border adjustments and output based allocation. They find that the most efficient way to prevent carbon leakage in the EU ETS is by combining full auctioning of emission allowances with border adjustments. In a theoretical analysis, Meunier et al. (2012) show that a combination of output based and capacity based allowance allocation is second-best when border adjustments are not available.

[5] Notice that making permit allocation contingent on the firm's decisions at the extensive (continued operation) or intensive margins (output) leads to outcomes no longer being independent of the initial permit allocation. As Hahn and Stavins (2011) note, this 'independence property' of emissions trading follows from the Coase theorem under certain conditions (a competitive permit market, rational behavior, and lack of transaction costs, regulatory uncertainty or credit constraints). In a recent study of the RECLAIM program in Southern California, Fowlie and Perloff (2013) test and cannot reject the hypothesis that plant-level abatement of nitrogen oxides was independent of the permit allocation. For the EU ETS, Reguant and Ellerman (2008) obtain a similar finding in a study of Spanish electricity generators. In contrast, Abrell et al. (2011) find some evidence that the EU ETS increased employment at firms that received allowances in excess of their verified emissions.