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CAN SECTORAL AGREEMENTS AND OUTPUT BASED ALLOCATION ADDRESS LEAKAGE?

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[1] The presentations from the workshop can be downloaded from http://www.electricitypolicy.org.uk/TSEC/2/prog2.html. We would like to thank workshop participants for their constructive input, and Wolfgang Eichhammer, Andreas Tuerk, Neil Walker, Damien Demailly, Barbara Buchner, Richard Arman and Misato Sato for comments on the draft paper. Financial support from the UK research councils under the project TSEC and from Climate Strategies for workshop expenses is gratefully acknowledged. Contact Faculty of Economics, University of Cambridge, CB3 9DD, UK. karsten.neuhoff@econ.cam.ac.uk

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Background and Objective

The objective of European Climate Policy is to deliver emission reductions associated with European economic activity. Carbon price signals from the European Emission trading scheme are an important component of the policy mix.

For some sub-sectors like cement or semi-finished steel there is a concern that where only some regions implement strong CO_2 price signals this would result in leakage of emissions from relocation of activities towards regions with no or low CO_2 price signals.

The workshop provided a platform for presentations and a detailed discussion of two possible approaches to avoid emissions leakage.

First, output based allocation makes the allocation of allowances to a specific process conditional on current or recent production volumes. Thus the marginal costs of CO_2 allowances for production are reduced. We discuss to what extent this can address leakage, and what are the implications for innovation, efficiency improvements and substitution towards lower Carbon technologies.

Second, sectoral agreements offer the opportunity to engage a wider set of countries into climate policy. It is discussed what type of agreements could contribute towards reducing leakage effects. While sectoral agreements might offer opportunities to engage other countries in more stringent climate policy, this wider – and potentially more important – policy objective is not subject to this discussion so as to retain the focus on the competitiveness aspects.

1 Output based allocation

The principle of output based allocation is that the volume of free allowance allocation is calculated by multiplying the production volume of an installation with a benchmark allocation rate. This is not allowed for under the current EU Directive, as it is classified as ex-post adjustment. Closure rules in national allocation plans that stop or reduce allocation if production volumes or emissions fall under certain thresholds de facto implement some aspects of output based allocation.[2] Furthermore, if market participants believe that governments will allocate allowances in future allocation periods based on their current production volumes, then this can create similar incentives to output based allocation result.[3]

2 New entrant allocation provides subsidies for investment and can thus also induce various distortions.

3 Assume the allocation in the subsequent five year period is based on the average production volume in the current five year period. Then increasing today's production will increase future allocation. Assuming allowance prices increase at 5% per year and firms discount the value of future allocation at 10% then this creates 100%*(1.05/1.10)^5=80% of the incentives direct output based allocation would create.

1.1 Options for implementation of output based allocation

Three main parameters can be decided when determining output based allowance allocation. First, the process step (or equivalent intermediary product) at which the benchmark is to be applied. The benchmark can, for example, be applied to the clinker (intermediary product) or cement production, semi finished steel or steel production. Second, the level of benchmark, e.g. average emission levels, best available technology or a lower level. Third, the time delay between production and allocation. The current directive would for example not allow for ex-post adjustment, therefore the output based allocation would be implemented in the subsequent allocation period, resulting in some discounting of the value due to the time delay and possible regulatory uncertainty.
Governments have thus extensive flexibility in implementing output based allocation - certainly a draw back if the objective is to develop emission trading schemes that might eventually be internationally harmonised and integrated. See Baron and Bygrave (1992) for a discussion of linking emission trading schemes in the presence of output based allocation.

1.2 Does output based allocation avoid emission leakage?

Output based allocation reduces avoid leakage, if applied directly to the first tradable intermediary product after the CO_2 intensive process, e.g. semi finished steel, clinker, raw aluminium.

If output based allocation is applied to later stages of the product, the risk remains that intermediary products are imported and production is relocated. E.g. output based allocation based on the production volume of cement allows producers to import the CO_2 intensive intermediary product clinker while retaining the free allowances.

It would thus be necessary to require that companies use intermediary products in the area covered by the emission trading scheme to qualify for free allowances allocation. This approach creates administrative hurdles that are likely to restrict efficient operation investment and innovation. To the extent that it implies discrimination against foreign intermediary products it raises questions about WTO incompatibility.

1.3 (a) Does output based allocation retain incentives for process improvements of ETS?

The incentive is only retained to the production steps preceding the product that is used as metric for the output based allocation. Opportunity costs for the production of this intermediary product are not significantly altered, therefore little incentives are created for the improvement of subsequent production steps.

For example if output based allocation is based on the clinker production, then this only creates incentives to reduce the CO_2 intensity of clinker. If the allocation is based on the cement production, then there is also an incentive to reduce the clinker content of cement. In the absence of financial incentives, one could still change the standards for cement composition so as to limit the clinker content (See work of Neil Walker for detailed analysis). In the steel sector one could envisage that higher costs of semi-finished steel increases the efforts to use steel more efficiently to achieve the required design specifications.

(b) Does output based allocation retain incentives for substitution of the final product?

The output based allocation removes the product price impact of ETS, and thus eliminates the incentive to substitute the product against lower carbon alternatives. The discussions highlighted the importance of empirical evidence on the substitution effect between intermediary products in response to (energy) price changes (refer to Demand Substitution Draft Paper, Sato & Neuhoff, 2007)

1.4 (a) Does output based allocation create administrative constraints?

The product used as metric for the free allocation has to be carefully defined. For example, if free allowance allocation is proportional to the clinker production, then the nature of clinker has to be carefully defined. Otherwise clinker producers have an incentive to increase the weight of clinker and thus increase the allowance allocation. It might be financially viable for the individual firm to do so even so it might reduce overall efficiency and creates welfare losses. (see for example recent discussion in Australia). This is frequent experience from government policies using financial incentives. Metrics that have worked for decades for international performance tests are not necessarily good metrics to allocate financial benefits. The private sector is rather creative in altering production processes in order to receive more benefits, even where the resulting physical outcomes and changes are inefficient from the perspective of the wider economy.

(b) Does output based allocation retain incentives for innovation of process and products similar to text book emission trading schemes?

Output based allocation can undermine the incentive for low Carbon innovations.
First, the administrative constraints induced by the 'careful' definition of the intermediate product that qualifies for free allocation, restrains the freedom to innovations to improve the product are restrained, as they might not be captured by the definition and not receive free allowance allocation.
Second, there is no incentive to innovate in subsequent production steps to reduce the use of the CO_2 intensive intermediary product.
Third, the final product price is not increased to the extent it would be under an efficient emission trading scheme. This eliminates the incentives to develop substitutes that offer the same service at lower CO_2 costs.

1.5 Summary on output based allocation

Output based allocation aims to prevent leakage by limiting the CO_2 price signal to the direct CO_2 emissions and not allowing the signal to feed through to product prices.

For most production processes one has to decide at what stage of the value chain the production should be basis for the allocation. If the allocation is early in the value chain (Table 1 for the example of clinker), then incentives to reduce clinker consumption in cement production are eliminated. If the allocation is moved to the cement production (Table 2), then additional administrative constraints are required to avoid emission leakage at the clinker stage.

In both cases the output based allocation will eliminate incentives for innovation and substitution of cement by alternative commodities that could provide the same service (e.g.

wood, steel, more labour intensive structures) and between products further down the value chain.

	Production		Sector	Economy
	Stage 1 (clinker, semi finished steel)	**Stage 2 (cement, steel)**	**Construction of houses, cars**	
2.2 Emission leakage	Avoided	No	No	No
2.3(a), (b) Incentives for improvement	Yes	No	No	No
2.4 (a) Administrative constraints	Definition of clinker	No	No	No
2.4 (b), (c) Incentives for innovation	Limited, as long as within clinker definition	No	No	No

Table 1 Output based allocation based on first tradable intermediary product after CO_2 intensive production process (stage1)

	Production		Sector	Economy
	Stage 1 (clinker, semi finished steel)	**Stage 2 (cement, steel)**	**Construction of houses, cars**	
2.2 Emission spill over?	Yes – unless specific allocation provisions in cement	No	No	No
2.3(a), (b) Incentives for improvement	Yes – if not restraint by cement allocation provisions	Yes – if not restrained by allocation provision	No	No
2.4 (a) Administrative constraints	Likely required	Likely required	No	No
2.4 (b), (c) Incentives for innovation	Limited	Limited	No	No

Table 2 Output based allocation based on subsequent product (stage 2)

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2 Sectoral agreements

There still is a distinct lack of clarity about what a SA would involve. The most extensive survey of existing and evolving sectoral agreements and various approaches towards their classification is coordinated by the IEA (cf. Baron et al., 2007 *forthcoming*).

For our discussion a simplified structure, as presented in Figure 1, illustrates the main dividing line between government-led and voluntary sectoral agreements.

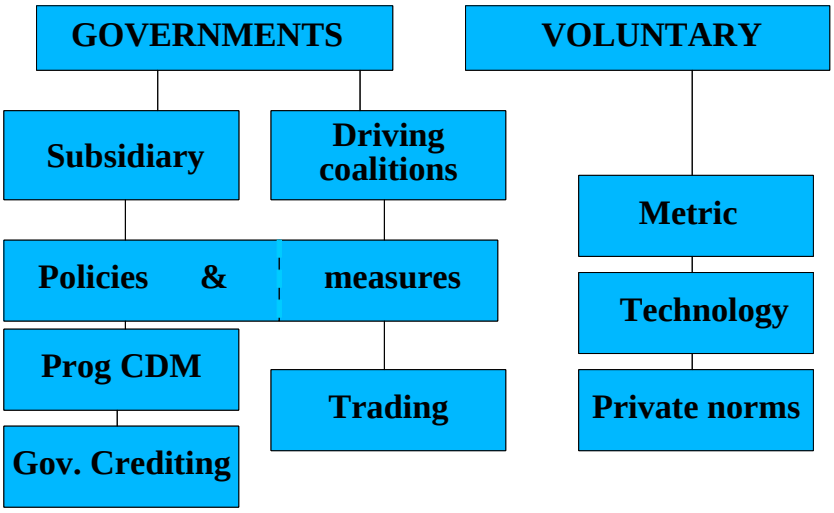

Figure 1

The main purpose of sectoral agreements is to secure engagement of countries (particularly developing countries) by targeting specific sectors:

- realise abatement potentials
- transfer technology
- incentivise implementation of domestic policies and measures
- create the dynamics to support engagement

This report neither aims to evaluate these objectives nor to assess how sectoral agreements can contribute towards achieving these objectives, but aims to better understand whether sectoral agreements could also address leakage. Could they be structured to allow countries to expose their industry to the full CO_2 price?

2.1 Internalise CO_2 costs for a sector in participating countries

If a sectoral agreement results in policies that ensure that CO_2 environmental costs are reflected in product prices, then this will ensure a more level playing field at least from a climate policy perspective and thus address competitiveness concerns. This is far from a trivial objective at this stage, when one considers the starting point (EU ETS and the related cost here, CDM, i.e., a subsidy to modernisation in developing countries).

(a) Could private sector-led (voluntary) sectoral agreements achieve price internalisation?

Experience show that private sector led agreements can respond to three motivations:

First, they create a competitive advantage for participating firms. Global firms might find motivation to adopt voluntary, meaningful targets. But this would certainly not be a widely shared objective. In particular, it is difficult to see how firms exposed to CO_2 price signals in their countries could convince possible competitors to share the competitive disadvantage of price internalization.

Second, adopt minimum standards of “good practices” – but again these are unlikely to be stringent enough to create a level playing field with ETS requirements.

Third, respond to government “potential” intervention. Private-led agreements can thus allow a sector to escape a public policy. In this case potentially all firms present in the sector would “voluntarily” join the agreement. Such agreements are observed on national level – but would require a credible threat that governments could coordinate on jointly putting in place a public policy if a sectoral agreement is not stringent enough or fails to deliver. The central element is again the (potential of) government leadership – and will as thus be discussed in the next section.

If voluntary agreements can play an important role on the global agenda in terms of technical and managerial innovation and enlargement, they offer no clear protection against outsiders to industries covered by a regional C&T instrument, and would certainly not offer sufficient attractiveness to governments to allow participating firms to opt out from the ETS.

In the absence of global government, the only way of creating “potential regulatory pressure” is to include national governments in the design and the implementation of sectoral agreements.

(b) Could government-led sectoral agreements achieve price internalisation?

The participation of governments in the establishment and possibly, but not necessarily, the governance of sectoral agreements would in opposition ensure that all firms in the participating countries are covered.

We have to consider two possible tracks:

(i) One proposed and quite accessible design would be to “carve out” industrial sectors and get an international agreement under governmental pressure. This ensures coverage of all firms based on performance indicators.

One of the elements in favour of sectoral agreements is that industrial production is concentrated, and thus an agreement between say large A1 countries plus the main developing countries would cover more than 90% of production. But this would not protect participating firms from new investments dedicated to exports in neighbouring countries (e.g. clinker projects in Tunisia).

Assuming that the geographical coverage is sufficiently wide this type of sectoral agreement would address leakage (by reducing/avoiding price internalisation). But the paradox is that,

according to the design, reallocation of production within the covered countries would still be an option for global firms to comply with their objectives.

Approaches that carve out specific sectors from the CO_2 price signal, provided for example by EU ETS, would present strong disadvantages. There is a risk of "path dependency" with a design where CO_2 externalities would not be internalized in the economy and thus substitution effects could not fully contribute to emission reductions. Where individual sectors are initially excluded, the relative efforts required for each sector and possibly for each region of the world would be progressively harder to negotiate

(ii) One can also find in the literature quite optimal designs based on sectoral agreements ensuring price internalization (through emission trading schemes or tax instruments deployed in an harmonized manner across participating countries), providing a full economic interface with national economies and domestic policies in the non-covered sectors. But the implementation of such transnational sectoral agreements will face severe obstacles: free allocation in the ETS is not a good precedent, the failure to implement a carbon tax is even worse, emerging economies are not ready to efficiently internalize costs (neither politically nor economically). The instrument is certainly attractive, but cannot be considered a likely "next step" in the international regime

Some of these concerns could be addressed:

- China and other developing countries might appreciate taxing energy intensive activities in order to reduce energy consumption and thus increase security of supply.
- Historically energy intensive industries have been excluded from energy taxation because of international competitiveness concerns. Climate policy might offer a coordination mechanism to overcome this effect.

2.2 Drivers for government-led sectoral agreements

How can sectoral agreements be designed and pursued so as to incentivise the adoption of national policies with a medium term objective of price internalisation

(a) Financial incentives

Financial incentives in principle offer a direct and open driver to engage additional countries. They do pose the question who pays and who should receive the funds. Project based mechanisms (CDM, JI) are increasingly perceived as offering an attractive option. They raise private sector money and expertise in developed countries and engage a wider set of stake holders in countries where the projects are realised. However, they do raise additional concerns for leakage.

Financial streams and technology transfer towards developing countries, e.g. from CDM credits, could create additional costs for industries in developed countries and reduce at the same time costs for their competitors in developing counties. The additionality criteria for CDM credits reduces this risk, as projects are only approved where they create additional emission reductions relative to conventional investment choices. In practice the definition of additionality is controversial and the ability of specialist companies that validate and verify the CDM projects is sometimes debatable.[4]

[4] CDM EB Report during Nairobi COP/MOP

Payments introduced at a more sectoral level, if received by sectors that are producing products traded in competitive international markets, might also result in competitive distortions. We are equally concerned that if payments are received by CO_2 intensive sectors, then they can easily constitute subsidies for this sector. While they might accelerate improvements in the specific (intermediary) products, the subsidy might undermine emission reduction potentials that could result from substituting the (intermediary) products with lower Carbon options. Once such subsidies are established – or sectors are excluded from emission trading - it might be difficult to revert to an efficient solution even after the initial motivation to address competitiveness concerns is no longer valid.

In contrast, payments are unlikely to create distortions if they are directed to:

- Government – But this might be politically difficult in 'donor' country, if not explicitly conditioned on the implementation of measurable (performance based) sectoral domestic policies.
- Sectors not part of international competition, like housing, transport, agriculture

(b) Industry drivers

There is, at least in the North, a trend towards national policies where emission trading or tax instruments are contemplated. No full harmonization is needed in order to address long-term leakage issues. Short term arbitrage based on production capacity and cost differential will remain but in this case CO_2 prices are only one of many drivers. Transnational firms might increasingly ask for linkage as a step to transnational harmonized agreement, leading to regional sectoral agreements.

(c) Using border adjustments to reduce disadvantages from joining

Countries joining a sectoral agreement that involves exposing their industry to CO_2 prices face industry opposition. The higher production costs might result in leakage and overall demand reduction. The demand reduction results in substitution towards increased consumption of less CO_2 intensive products and might thus offer benefits for other sectors. The leakage effect however results in relocation of jobs, profits and taxes, and can thus constitute a disincentive for joining a sectoral agreement. Border adjustments for the specific product covered by the sectoral agreement (clinker content, semi-finished steel) can avoid the leakage effect and thus simplify government-led sectoral agreements. The side benefit of this approach is that border adjustment will explicitly be used as a part of an international strategy, rather than pursued by an individual region.

2.3 Dynamic considerations about sectoral agreements to address leakage

If sectoral agreements increase the likelihood of future price internalisation by all engaged countries, then this can address competitiveness distortions. The analysis of the competitiveness work stream suggested that the biggest concern is a sustained price difference. If the private sector is confident that price differences are not sustained, then re-location is not attractive.

2.4 Summary on sectoral agreements to address leakage

Our preliminary analysis suggests that where leakage concerns are strong, voluntary sectoral agreements are unlikely to succeed in addressing these.

Sectoral agreements involving governments of participating countries might offer a better opportunity. In this case incentives might be required to induce countries to participate.

These could involve (i) transfers to attract countries to participate (ii) measures to address disincentives to participate, for example border adjustment to create a level playing field.

If sectoral agreements increase the confidence of market participants that CO_2 prices will be internalised in other countries in due course, then this can address many of the leakage effects.

2.5 References:

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