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# Sectoral and regional expansion of emissions trading



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## ABSTRACT

We consider an international emissions trading scheme with partial sectoral and regional coverage. Sectoral and regional expansion of the trading scheme is beneficial in aggregate, but not necessarily for individual countries. We simulate international CO<sub>2</sub> emission quota markets using marginal abatement cost functions and the Copenhagen 2020 climate policy targets for selected countries that strategically allocate emissions in a bid to manipulate the quota price. Quota exporters and importers generally have conflicting interests about admitting more countries to the trading coalition, and our results indicate that some countries may lose substantially when the coalition expands in terms of new countries. For a given coalition, expanding sectoral coverage makes most countries better off, but some countries (notably the USA and Russia) may lose out due to loss of strategic advantages. In general, exporters tend to have stronger strategic power than importers.

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## 1. Introduction

International emissions trading is considered a key instrument to combat global warming because it promotes cost-effectiveness of emission abatement and thereby increases political feasibility of stringent emission reduction objectives.

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Since 2005, the EU has been a forerunner in the implementation and operation of a multi-jurisdictional emissions trading scheme. While the EU emissions trading scheme (EU ETS) has been critically observed as a “New Grand Experiment” (Kruger and Pizer, 2004) in the early stage, it is meanwhile perceived that the EU ETS could be the nucleus for a gradually expanding system toward global coverage (Convery, 2009). As a matter of fact, the EU strongly pushes policy initiatives to link the EU ETS with other regional greenhouse gas cap-and-trade systems outside the EU (2007).<sup>1</sup>

With respect to cost-effectiveness of emission abatement, an important characteristic of the EU ETS is its incomplete coverage. The EU ETS focuses on energy-intensive installations and thereby covers only around 45% of the EU-wide greenhouse gas emissions. To achieve its reduction target of 20% by 2020 (compared to 1990 emission levels), the EU must undertake complementary regulation of emission sources outside the EU ETS. The segmentation of emission regulation into one EU-wide ETS market and multiple national non-ETS markets has given rise to concerns on adverse implications for cost-effectiveness of EU emission abatement: While the allocation of emission allowances across sources would not matter for cost-effectiveness in the case of comprehensive trading, it may induce substantial additional costs of emission abatement in the case of unlinked markets should the regulator not be able or willing to choose the cost-effective split of the emission budget between ETS and non-ETS segments (see e.g. Böhringer et al., 2005).<sup>2</sup>

Even in the case of perfect planner information the segmentation of regional emissions into an international ETS market and unconnected non-ETS markets can have adverse efficiency implications as regions obtain incentives to manipulate emission prices through strategic segmentation (Böhringer and Rosendahl, 2009): importers of emission allowances have incentives to over-allocate emissions to the international ETS in order to lower the emission price whereas exporters of emission allowances would like to do the opposite.<sup>3</sup> Each country would then trade off the benefits from price manipulation with the costs of driving apart the marginal abatement cost between the ETS and their domestic non-ETS emission sources.

For the first two phases of the EU ETS (2005–2007 and 2008–2012), each Member State had to submit a National Allocation Plan to the European Commission, detailing how many emissions allowances of the national budget under the Kyoto Protocol are allocated to its ETS sectors and how these allowances are spread across the ETS sectors. For the third phase of the EU ETS (2013–2020), the National Allocation Plans has been replaced by an EU-wide cap for ETS sectors with harmonized allocation rules. The determination of the allowance allocation is now completely out of the hands of the individual Member States avoiding incentives for strategic partitioning. However, if other countries outside the EU start joining the trading scheme, the EU as a whole as well as the joining countries might still want to set their allocation strategically.

The strategic incentives in a hybrid regulation scheme where countries can divide up national emission budgets between international trading sectors and domestically ruled sectors provide the conceptual background for our analysis. Given the wide-spread policy interest in expanding the EU ETS toward a global emissions trading system, we investigate the prospects for sectoral and regional expansion when countries decide strategically on how to allocate their emission budget. Can we expect that the EU ETS will be easily expanded to include more regions and sectors, thereby increasing overall cost-effectiveness of emission reductions? If self-interests of regions impede more comprehensive coverage, how severe are the foregone gains in aggregate cost savings?

For answering these questions we complement basic theoretical analysis with numerical simulations on international CO<sub>2</sub> emission quota markets using sector- and region-specific (marginal) abatement cost functions. As to regional coverage, we point out that quota exporters and importers tend to have conflicting interests about admitting more countries to the trading coalition. When expanding sectoral coverage, the bulk of potential cost reductions is achieved in the first step: going

<sup>1</sup> For example, RGGI and WCI in the USA, GGAS in Australia, or JVEITS in Japan (for an overview see Schüle and Sterk, 2009).

<sup>2</sup> Note that we use the terms “allowances”, “permits” and “quotas” interchangeably throughout the paper.

<sup>3</sup> The mechanism is similar to the “optimal tariff” argument (e.g. Bhagwati et al., 1998).

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