Strategic delegation and international permit markets: Why linking May fail ☆

Wolfgang Habla [a,c], Ralph Winkler [b,*]

[a] *Department of Environmental and Resource Economics, Environmental Management, Centre for European Economic Research (ZEW), L7, 1, DE-68161 Mannheim, Germany*
[b] *Department of Economics and Oeschger Centre for Climate Change Research, University of Bern, Schanzeneckstrasse 1, CH-3012 Bern, Switzerland*
[c] *Department of Economics, University of Mannheim, L7, 3-5, DE-68181 Mannheim, Germany*

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ABSTRACT

We analyse a delegation problem in the context of international climate policy. Principals in two countries first decide whether to merge domestic emission permit markets to an international market, then delegate the domestic permit supply to an agent. We find that principals select agents caring less for environmental damages than they do themselves in case of an international market regime, while they opt for self-representation in case of domestic markets. This strategic delegation incentive renders the linking of permit markets less attractive and constitutes a novel explanation for the reluctance to establish non-cooperative international permit markets.

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1. Introduction

Efforts to mitigate anthropogenic climate change are plagued by the public good property of greenhouse gas (GHG) emissions reductions. Each country's efforts to control emissions benefit all countries in a non-exclusive and non-rival manner. The absence

of a supranational authority to enforce efficient provision leads to the observed underprovision of emissions reductions. As a potential remedy to this problem, international emission permit markets have been proposed (Flachsland et al., 2009; Jaffe et al., 2009; Green et al., 2014).

As Helm (2003) and Carbone et al. (2009) have shown, international permit markets have indeed the potential to drastically reduce global GHG emissions. This even holds in a fully non-cooperative setup, in which no global cap is negotiated and countries are free to issue as many permits as they want, which are then non-discriminatorily traded among all participating countries. In such a setup, countries will, of course, only participate if it is in their best interest to do so. In the linear-quadratic case (linear damages and quadratic benefits) – a specification we will also employ in this paper – an international permit market, if it forms, always results in a win-win situation: all participating countries are better off and global emissions are lower compared to a regime of domestic climate policies. Such a win-win-situation can only arise if countries with *high* marginal abatement costs, i.e., high marginal benefits of GHG emissions, and *high* willingness to pay for emissions reductions, i.e., high marginal damages, form an international permit market together with countries with *low* marginal abatement costs and *low* willingness to pay. In a computable general equilibrium model, Carbone et al. (2009) estimate an international permit market comprising the former Soviet Union, the European Union and China to be a Pareto improvement for all three regions and to reduce GHG emissions by half the gap between the emissions in the non-cooperative Nash equilibrium and the global social optimum.

Despite these favorable characteristics, we have yet to observe the formation of many such markets. Only Liechtenstein, Iceland and Norway joined the European Union's Emissions Trading Scheme (EU-ETS), and California and Québec linked their cap-and-trade systems in 2014.[1] In this paper, we offer a novel explanation for the observed reluctance in linking permit markets. We show that, even in these instances where an international permit market is beneficial to countries in the aforementioned model frameworks, this may not be the case anymore once we take the hierarchical structure of climate policy into account. By "hierarchical" we mean that political decisions in modern societies are not made by a single – let alone benevolent – decision maker. Instead, modern democracies typically feature a chain of delegation from voters to those who govern. Thus, one party (an agent) acts on behalf of another (the principal). In a strategic set-up like international climate policy, the choice of an agent with certain preferences enables the principal to credibly commit to a particular policy (e.g., Perino, 2010).

Our paper combines two previously unrelated literature strands – a non-cooperative international permit market setup, which we borrow from Helm (2003),[2] with a strategic delegation or strategic voting set-up similar to Siqueira (2003), Buchholz et al. (2005), Roelfsema (2007) and Hattori (2010).[3]

We find that in case of an international permit market regime, the principals of both countries appoint agents who care less about environmental damages than they do themselves. As these agents issue more permits, global emissions increase compared to a scenario without strategic delegation. This renders the circumstances for an international permit market to form less favorable than suggested by the standard permit market literature, which neglects the hierarchical structure of international climate policy.

2. The model

We consider two countries, $i = 1, 2$ and $-i = \{1, 2\}\backslash i$.[4] In country i, emissions e_i imply country-specific benefits from the productive activities of a representative firm, characterized by a concave quadratic benefit function $B_i(e_i)$. At the same time, global emissions $E = e_1 + e_2$ cause linearly increasing country-specific damages, $D_i(E)$[5]:

$$B_i(e_i) = \frac{1}{\phi_i} e_i(\epsilon_i - \frac{1}{2} e_i) , \quad B_i'(e_i) = \frac{\epsilon_i - e_i}{\phi_i} , \quad B_i'' = -\frac{1}{\phi_i} , \tag{1a}$$

$$D_i(E) = \delta_i E , \quad D_i' = \delta_i , \quad D_i'' = 0 , \tag{1b}$$

where $\epsilon_i \geq e_i$ denotes emissions in the absence of any climate policy, $\phi_i > 0$ is a parameter that is inversely related to country i's marginal abatement costs, and $\delta_i \geq 0$ denotes the marginal environmental damage in country i. In addition, we define $\epsilon \equiv \epsilon_i + \epsilon_{-i}$ and $\phi \equiv \phi_i + \phi_{-i}$.

Both countries establish perfectly competitive domestic emission permit markets[6] and determine, non-cooperatively, the number of permits ω_i that they issue to a representative domestic firm. As firms in all countries i are required to hold permits for an amount equal to the emissions e_i they produce, global emissions are given by the sum of emission permits issued, $E = \omega_1 + \omega_2$. Countries may agree to link their domestic markets and form an international market. In this case, permits issued by any of the two countries are non-discriminatorily traded on a perfectly competitive international market.

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[1] Australia, which had already announced a plan to establish a domestic permit market and link it with the EU-ETS, abandoned these plans after a change in government. Ontario joined the carbon market between Californian and Québec in 2017 but pulled out of it already in 2018. It is also worth mentioning that the EU-ETS does not strictly fit our definition of a non-cooperative international permit market, because of the supranational authority that the EU exerts on the national governments with respect to domestic emission permit levels.

[2] See also Carbone et al. (2009), Holtsmark and Sommervoll (2012) and Helm and Pichler (2015).

[3] For a thorough discussion of the related literature see Habla and Winkler (2017).

[4] All our results can be generalized to n countries in a straightforward manner.

[5] For a discussion of the assumption of linear damages see Section 6.

[6] This is equivalent to levying domestic emissions taxes in our model.