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International carbon emissions trading and strategic incentives to subsidize green energy

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ABSTRACT

We examine strategic incentives to subsidize green energy in a group of countries that operates an international carbon emissions trading scheme. In our model, green subsidies of either sign on top of emissions cap regulation reduce the welfare of the group of countries, but this may not hold for individual countries. The cases of small and large countries turn out to exhibit significant differences. While small countries refrain from subsidizing green energy and thus implement the efficient allocation, large permit-importing countries may subsidize green energy in order to influence the permit price in their favor.

1. Introduction

In 2005 the European Union established an EU-wide CO_2 emissions trading system to reduce its greenhouse gas emissions by 8% in 2012 from its baseline emissions in 1990. Similarly, in August 2007 the Western Climate Initiative, launched by seven US states and four Canadian provinces, planned to lay the foundation for an international emissions trading scheme that involves both the United States and Canada and pursues the goal of reducing greenhouse gas emissions by 15% from 2005 levels by 2020.

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Countries under the umbrella of an international emissions trading scheme, e.g. the EU member states, are observed to promote green energy by feed-in tariffs or green tradable certificates. Feed-in tariffs (or renewable energy tariffs) are output subsidies per unit of produced energy (Menanteau et al., 2003) and green certificates are tradable commodities 'earned' by green energy producers for each unit of their output which producers of brown energy are then obliged to purchase in some proportion to their output. Feed-in tariffs are in operation in 63 jurisdictions around the world, including Canada, France, Germany, and in a dozen states in the United States. National trading schemes of green certificates are in use in e.g. the UK, Italy, Norway, Sweden and some US states.

International emissions trading schemes aim at coping with climate change by curbing greenhouse gas emissions, but the economic rationale for promoting green energy is less clear. The literature suggests two justifications for combining emissions control with green energy promotion policies. In the presence of learning spillovers[1] subsidizing the use of renewable energy is efficiency enhancing especially in their innovatory phase in order to spur learning effects that are beneficial for renewable energy producers as well as for society at large (Fischer and Newell, 2008; Lehmann, 2009; Bläsi and Requate, 2009; Reichenbach and Requate, 2012; Kalkuhl et al., 2012). The second justification is energy security, i.e. the reduction of the dependence on insecure fossil fuel imports. Assuming uncertainty about the import price of fossil fuel, Eichner and Pethig (2010) show that risk-averse governments of small open economies may choose to subsidize green energy to reduce the price uncertainty.

The present paper suggests and investigates another rationale for subsidizing green energy. Countries may have a strategic incentive to use (positive or negative) green subsidies in order to manipulate in their favor the permit price. To make this thesis precise, we consider a group of countries operating a joint emissions trading scheme. Each country produces green energy with a domestic resource and brown energy by means of fossil fuel imported from the rest of the world. The domestic resource is also used for the production of an internationally tradable composite consumer good.

Focussing on competitive economies and welfare-maximizing governments, we show that it is efficient for the group of countries to refrain from subsidizing green energy. The governments of small open countries who take as given the price in the international permit market find it optimal not to subsidize green energy and thus also secure efficiency from the viewpoint of the group of countries. In contrast, governments of large countries are aware that their policy affects the permit price and therefore use the subsidy for distorting the permit price in their favor while taking the other countries' subsidies as given. The strategic incentives for promoting green energy differ markedly between permit-exporting and permit-importing countries: the 'basic rule' is that permit-exporting countries choose a negative and permit-importing countries choose a positive subsidy rate.

In the field of international environmental economics the strategic choice of environmental policy instruments has been investigated e.g. by Barrett (1994), Rauscher (1994) and Ulph (1996). There is only a small literature, however, that investigates strategic incentives of national regulation in the context of international emissions trading. In Eichner and Pethig (2009) national governments levy energy or emissions taxes to manipulate the permit price in their favor. In Santore et al. (2001) national regulators impose emissions taxes and tariffs to affect the permit price in a model with spillovers. Helm (2003) analyzes how non-cooperative countries use tradable and non-tradable emissions allowances to strategically influence the permit price. We are not aware of contributions to the literature that explore – as we do in the present paper – the interaction of international emissions trading and national green energy promotion policies.

Strategic incentives also play a prominent role in the capital tax competition literature, see e.g. De Pater and Myers (1994) or Keen and Konrad (2013). Capital taxes/subsidies are used to influence the international capital market and to manipulate the terms of trade (interest rate). Capital-importing [exporting] countries have an incentive to tax [subsidize] capital, which reduces [increases] capital demand, the terms of trade and hence decreases the costs of capital imports [increases the gains from capital exports]. The common feature of that literature and the analysis of the present paper is the strategic exploitation of terms-of-trade effects. Yet the channels through which the regulation works

[1] Learning spillovers are related to technological or R&D spillovers. For an analysis of technological spillovers in the environmental context we refer to Goulder and Mathai (2000).