



Contents lists available at ScienceDirect

## European Economic Review

journal homepage: [www.elsevier.com/locate/eer](http://www.elsevier.com/locate/eer)

# Efficient CO<sub>2</sub> emissions control with emissions taxes and international emissions trading<sup>☆</sup>

Thomas Eichner<sup>a,\*</sup>, Rüdiger Pethig<sup>b</sup>

<sup>a</sup> Department of Economics, University of Bielefeld, Universitätsstr. 25, 33615 Bielefeld, Germany

<sup>b</sup> Department of Economics, University of Siegen, Hölderlinstr. 3, 57068 Siegen, Germany

## ARTICLE INFO

### Article history:

Received 9 February 2007

Accepted 20 February 2009

Available online 19 March 2009

### JEL classification:

H21

H22

Q56

### Keywords:

Emissions taxes

Emissions trading

International trade

## ABSTRACT

We consider a stylized model of the hybrid CO<sub>2</sub> emissions control in the EU. A group of countries operates a joint emissions trading system (ETS) covering only part of each country's economy. The countries levy an emissions tax in the rest of their economy and, possibly, an additional tax in their ETS sectors. Welfare-maximizing governments are shown to lack incentives for group-efficient policies. Preexisting taxes overlapping with the ETS lead policy makers to allocate more permits to their ETS sectors than cost effectiveness would suggest. The cases of 'small' and 'large' countries exhibit significantly different efficiency implications.

© 2009 Elsevier B.V. All rights reserved.

## 1. The problem

In the Kyoto Protocol, the European Union (EU) has committed itself to reduce greenhouse gas emissions by 8% by 2012 from the base year of 1990. To share the burden, the member states agreed upon *national* emissions (reduction) targets or 'caps' (EU, 1999). Moreover, the innovative instrument of an EU-wide CO<sub>2</sub>-emissions trading system (ETS) was introduced in 2005 (EU, 2003a). The ETS is confined to CO<sub>2</sub> emissions of emission-intensive installations, the most important of these being combustion installations, mineral installations, and pulp and paper production. The ETS does not cover major energy consumers like households and the transportation sector.

The Emissions Trading Directive (EU, 2003a) stipulates, among other things, that all national governments must submit an allocation plan fixing the split of their national emissions cap into two sectoral caps, one for the sector covered by the ETS (ETS sector) and one for the rest of the economy (non-ETS sector). Governments also have to specify their national strategies to enforce the cap in their non-ETS sectors. Among the member states' national policy instruments there are taxes on various energy products that come close to CO<sub>2</sub> emissions taxes. Such taxes are levied not only in non-ETS sectors but also in ETS sectors, in the latter often at lower rates, though. For example, Austria, Germany,<sup>1</sup> Ireland and Poland levy

<sup>☆</sup> Helpful comments from Thorvaldur Gylfason, an associate editor and three anonymous referees are gratefully acknowledged. Remaining errors are the authors' sole responsibility.

\* Corresponding author. Tel.: +49 521 106 4857.

E-mail addresses: [teichner@wiwi.uni-bielefeld.de](mailto:teichner@wiwi.uni-bielefeld.de) (T. Eichner), [pethig@vwl.wiwi.uni-siegen.de](mailto:pethig@vwl.wiwi.uni-siegen.de) (R. Pethig).

<sup>1</sup> In Germany, various energy-related taxes are levied in both sectors although possibly at different fixed rates ([www.bundesfinanzministerium.de](http://www.bundesfinanzministerium.de); following the link 'Steuern' and 'Energiebesteuerung'). Policy initiatives for full exemption of the ETS sector from those taxes appear to be unlikely in the near future.

**Table 1**

Centralized and decentralized patterns of competence to use policy instruments.

Competence to use the policy instrument			Emissions tax in the ETS sector		
			Central agency (uniform tax rate, possibly zero) 1	National government 2	National tax preexists and is inert 3
National cap of emissions permits	Central agency	1	A	B	C
	National government	2	D	E	F

taxes on heavy fuel oil for electricity generation; various countries also tax coal and light fuel that is used in both sectors (International Energy Agency, 2007).<sup>2</sup> As a result, the EU approach to the reduction of CO<sub>2</sub> emissions consists of a hybrid mix of policy instruments that are partly complementary and partly overlapping.

The present paper focuses on the aforementioned hybrid EU policy and aims at exploring the (dis)incentives of welfare-maximizing national governments to implement the group-efficient policy mix,

- when they have the discretion to fix the sectoral split of their national emissions cap and are free to choose the rate of emissions taxes overlapping with the ETS;
- when they face preexisting emissions taxes overlapping with the ETS;
- and when they do or do not take account of the impact of their own policies on the international permit price.

To capture the EU scenario in a stylized way, we consider a group of countries. The emissions of these countries are constrained by predetermined national emissions caps and the countries operate a joint ETS with mandatory participation of each country's ETS sector. Hence the national emissions caps need to be split into a cap for the ETS sector (permit cap) and a cap for the non-ETS sector.<sup>3</sup> In the non-ETS sector, emissions are assumed to be properly capped through a domestic sectoral emissions tax. In addition, we consider another emissions tax in ETS sectors overlapping with the ETS that may be imposed either by a supranational agency on all countries at a uniform rate (which is not the case in the EU) or by the countries' governments (as in the EU). The latter tax may be either freely chosen or it may preexist and is inert.<sup>4</sup>

Regarding the efficiency properties of policies, it will turn out to be important whether the competence for fixing permit caps and rates of overlapping emissions taxes lies with some central agency (e.g. with an EU agency) or with national governments. In the EU, emissions taxes in ETS sectors are the national governments' sole responsibility.<sup>5</sup> However, the competence for determining national permit caps is not so clear. According to the ETS Directive (EU, 2003a) each government has to stipulate its permit cap in its allocation plan, however, it has to submit that plan to the European Commission prior to implementation to verify its compliance with certain criteria. Thus, although the commission exerts some influence, governments appear to retain considerable discretion in fixing their caps.

We take account of both ways of placing the competence for fixing permit caps and add to these options the possibility of preexisting overlapping taxes. That gives rise to a set of six scenarios as shown in Table 1. The first column of Table 1 is not empirically relevant but is useful as a benchmark. Our emphasis will mainly be on the second row of Table 1.

Focusing on competitive economies and welfare-maximizing governments, we first characterize the emissions control that is efficient for the group of countries and then decentralize the efficient allocation by prices and tax rates (scenario A in Table 1). Next we explore the efficiency implications of emissions control in the case of decentralized policy making (second row of Table 1). Welfare and efficiency implications will turn out to depend on whether countries are assumed to be 'small' or 'large'. Beginning with the small-country case, we first consider governments that are free to use overlapping taxes or abolish existing ones (scenario E in Table 1). We show that such governments do not want to levy overlapping taxes and thus group efficiency is achieved. When a preexisting and inert overlapping tax (scenario F in Table 1) is in force, the second-best strategy for governments<sup>6</sup> is to choose a larger than cost-effective permit cap. Interestingly, the literature

<sup>2</sup> In 2003 the Energy Tax Directive (EU, 2003b) was passed to widen the scope of the EU's *minimum* (!) energy taxation of energy-using installations in both sectors.

<sup>3</sup> The emissions cap for the ETS equals the number of emissions permits the government issues and allocates to the installations in its ETS sector. The ETS sector's effective emissions will deviate from the permit cap in case permits are exported or imported.

<sup>4</sup> We use the term 'inert tax' in the sense that changes of that tax are not at the governments' disposal.

<sup>5</sup> Except that the (low) minimum requirements of the Energy Tax Directive need to be observed.

<sup>6</sup> Pollution control in a second-best world of preexisting distortionary taxes has been studied in the context of ecological tax reform (e.g. Bovenberg and de Mooij, 1994; Goulder et al., 1999). Yet unlike that literature, we envisage the use of several policy instruments all of which target CO<sub>2</sub> emissions and we do not deal with the issue of revenue recycling.

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات