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Working Paper

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Economics Working Paper Series, No. 07/62

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Suggested Citation: Gersbach, Hans (2007) : The Global Refunding System and Climate Change, Economics Working Paper Series, No. 07/62, ETH Zurich, CER-ETH - Center of Economic Research, Zurich,
https://doi.org/10.3929/ethz-a-005303695

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The Global Refunding System and Climate Change

Hans Gersbach

Working Paper 07/62
January 2007

Economics Working Paper Series

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

The Global Refunding System and Climate Change

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This version: December 2006

Abstract

We propose a global refunding scheme as a new international approach to addressing climate change. A global refunding system allows each country to set its carbon emission tax, while aggregate tax revenues are partially refunded to member countries in proportion to the relative emissions reduction they achieve within a period. Nationally determined environmental policies and global refunding create increasing incentives to reduce emissions and may achieve efficiency and equity objectives of global climate policy.

*I would like to thank Clive Bell, Juergen Eichberger, Martin Hellwig, Till Requate and workshop participants in Frankfurt and Heidelberg for helpful comments.

1 Introduction

The threat of climate change to the well-being of future generations appears to be substantial. A host of scientific studies indicate that, together with other human-induced greenhouse gas emissions, cumulated carbon dioxide emitted by the burning of fossil fuels is leading to warmer surface temperatures. Higher temperatures can have a significant impact on the functioning of ecosystems and the well-being of future generations. Although most current estimates of the marginal damage costs of carbon dioxide emissions suggest that very stringent abatement does not pass the cost-benefit test, such estimates are incomplete and may not capture some of the downside risks.[1] In particular, the probability of large-scale damage appears to be not negligible (see e.g. Goulder and Pizer (2006), Stern (2006) and Tol 2006)).

As greenhouse gases tend to disperse themselves uniformly around the globe and emission reduction is thus a global public good, international coordination is crucial. It is, however, difficult to achieve. The Kyoto Protocol, the first large-scale effort to reduce greenhouse gas emissions, has been criticized for being ineffective (see e.g. Nordhaus (1999), Boehringer and Vogt (2003), Schelling (2002), and McKibbin and Wilcoxen (2002)). Since it limits trading to a small part of the world and ignores the intertemporal dimension, the Kyoto Protocol promises only modest progress in slowing global warming. We suggest an alternative international framework that allows countries to determine their climate policy at a national level, but which creates static and, in particular, powerful dynamic incentives for abatement through global refunding, as outlined in the next section.

[1] Some of the missing impacts are likely to be positive, others are negative, and the impacts vary considerably across regions (see e.g. Tol (2006)).

Refunded emission payment schemes for particular industries within a country have been justified in Gersbach and Requate (2004). They show that such schemes can yield first-best outcomes under imperfect product market competition if the marginal damage from pollution exceeds output distortions.[2] Refunding of emission taxes has been applied, for instance, in Sweden, for nitrogen oxide (NO_x) emissions from large stationary sources. We propose a global refunding scheme for countries in which each country has discretion over its emission tax.

Our proposal represents an alternative to the Kyoto Protocol. Various other approaches to international coordination have been suggested. These are comprehensively discussed and assessed in Aldy, Barrett, and Stavins (2003) and Nordhaus (2006).[3] The distinguishing features of our proposal are: nationally determined environmental policies, global refunding, and accelerating incentives to reduce greenhouse gas emissions over time.

[2]Gersbach (2002) shows that a self-financing tax-subsidy scheme can help to overcome hold-up problems in regulation when investing, clean firms receive subsidies financed by taxes imposed on non-investing, polluting firms.

[3]Fundamental guidelines for treaty-making are derived in Sandalow and Bowles (2001).

2 The Global Refunding System

We propose to establish a global refunding scheme (henceforth GRS) that works as follows:

- Countries decide whether they want to join the GRS. A country joins GRS if it accepts the rules and levies a minimal carbon emission tax.
- In each period, each country belonging to the GRS independently determines its level of taxes on CO_2 emissions. Emission taxes are the sole policy instrument a country is allowed to adopt.[4]
- All tax revenues are collected in a global fund.
- GRS refunds each period a share of the accumulated wealth to the participating countries.
- Each participating country obtains a annual refund in proportion to its share in total CO_2 emissions reduction achieved in the period under consideration.[5]
- Non-refunded wealth of the GRS may either be saved and invested[6] or spent on particular projects in member countries to further accelerate the reduction of greenhouse gases.
- In each period a country is allowed to exit. If a country leaves GRS, it loses its right to refund.
- Decisions within GRS are governed by the majority rule.[7]

[4]This is initially a crucial condition. Later, it may be useful to abolish this requirement.

[5]To account for catching processes of developing countries and to avoid growth-harming policies, one should adjust or normalize CO_2 emissions by GDP growth. Several refunding formulas are conceivable.

[6]It might be useful to focus on green funds.

[7]Various variants such as weighted and flexible majority rules can be considered.

3 A Brief Assessment

In this section we briefly assess the proposal. We follow the criteria outlined in Aldy, Barrett, and Stavins (2003) for evaluating global climate policy regimes:

1. environmental outcome;
2. dynamic efficiency;
3. dynamic cost-effectiveness;
4. distributional equity;
5. flexibility in the presence of new information;
6. participation and compliance.

We discuss the criteria in reverse order and start with the last criterion. The advantage of the current proposal is that participation does not directly imply high costs for member countries, as they have discretion over the emission tax beyond the minimal tax rate. Hence, the system is participation-compatible. Moreover, GRS may make it easier for the United States to participate. The system is also compliance-compatible. However, GRS requires data on emission taxes and per-capita carbon emission levels among member countries. On the one hand these data are difficult to assemble and on the other hand, they always leave scope for attempts to manipulate data politically. This will ultimately require the creation of an international authority that both controls and supervises data from member countries and handles the refunding procedure.

The flexibility of GRS is very high, as no targets or prices have to be negotiated at the international level. The two parameters that govern the

system are the minimal tax rate and the share of refunding, which can be used to strengthen or weaken the incentives for member countries to reduce emissions.[8]

Within GRS, distributional concerns can be addressed at two levels. First, the refunding formula will have strong distributional implications. Depending on the refunding formula, either developing or industrial countries will fare better.[9]

Second, wealth not refunded and accumulated can be used to support particular projects for reducing greenhouse gases in some countries.[10] In general, GRS is flexible enough to allow for fairness concerns regarding the burden of slowing global warming for the developing world. Of course, one has to be aware that starting conditions in terms of CO_2 emissions per capita or CO_2 emissions per value added matter for the prospects to obtain refunds.[11]

Cost-effectiveness is subsumed by dynamic efficiency, which is The most important criterion. A global climate policy is said to be efficient if it maximizes aggregate net benefits over time. Any efficient climate policy must involve participation by all countries, with each country mitigating its emissions to the point where its own marginal abatement costs equal the sum of marginal benefits globally. As there is high uncertainty regarding the estimation of the benefits and costs of global climate change, assessing efficiency at a general level is impossible, and weaker criteria, such as the Kaldor-Hicks

[8]The question of the "optimal level of emission reductions" is the most difficult and controversial issue in the economics of climate change and estimates for appropriate price penalties vary considerably (see e.g. Nordhaus 2006).

[9]Developing countries can benefit from the system if population weights and emissions reductions per value added are used in the refunding formula.

[10]A radical proposal would be to finance general support of developing countries by GRS.

[11]Moreover, anticipation effects could occur when countries wait with taxing emissions until the scheme is implemented or the country decides to join GRS.

criterion, are more appropriate in practical policy analysis. If we start from the premise, supported by a variety of assessment studies, that a substantial reduction of carbon emissions is efficiency-enhancing, then GRS is likely to pass this test. Moreover, GRS scores high on helping to achieve broad participation.

The near-term environmental effectiveness of any new climate policy is difficult to assess. GRS is aimed at initially fostering participation and creating accelerating incentives for reducing emissions over time. Hence, the environmental impact is expected to strengthen after the initiation of GRS.

Of course, this brief assessment cannot be a substitute for a more detailed and analytical analysis of the system which we are developing.

4 Conclusion

As the current Kyoto Protocol appears to have little impact on global temperature change, we propose a global refunding scheme as a new international approach to addressing climate change. Since climate change is a global public good there, are usually at best weak economic and political mechanisms for resolving the issues efficiently and effectively. The current proposal might help to strengthen such mechanisms.

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