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International markets for greenhouse gas emission reduction policies—possibilities for integrating developing countries

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Abstract

Greenhouse gas (GHG) emissions are affecting a global common: the climate, and as a global environmental problem with a public good character it provides attractive opportunities for minimising control costs through the use of emission trading markets. This paper introduces cost and benefit principles that can be applied to the assessment of global markets for GHG emission reduction options and evaluates the scope for and the potential economic gains of such markets.

Keywords: GHG emission reduction; Costs and benefits; Developing countries

1. Introduction

The international climate change cooperation based on the United Nations Framework Convention on Climate Change, UNFCCC, and the Kyoto Protocol includes a number of policy implementation mechanisms that can be used for considering how Greenhouse gas (GHG) emission trading markets potentially can work. However, the current international climate change agreements are limited in scope and in the number of participating countries, and therefore the agreements only offer some partial and limited experiences on how global market mechanisms for GHG emission reduction policies might work if more complete and far going international climate change policies were agreed on in the future.

In this paper, special attention is given to the assessment of direct and indirect costs and benefits of implementing GHG emission reduction policies in developing countries. These countries are expected to be major future contributors to global GHG emissions, and cost effective international policies consequently require the participation of developing countries. The preliminary results of international studies furthermore suggest that there may be several synergies between development policies and GHG emission reduction that can make it attractive for developing countries to participate in climate change policies. Based on these results, the paper concludes that there is a potential for expanding future international markets for GHG emission reduction options, if the markets facilitate international financial cooperation about policies that both mitigate the global climate and support broader economic, social, and environmental development goals.

2. Climate change as a global pollution control problem

Climate change exhibits a number of special characteristics as a global pollution control problem. The climate is a public good, as there is no rivalry in consumption, and consumers cannot be excluded. At the same time, the contribution of individual countries to climate change through GHG emissions does not have a significant impact on the climate, implying that only

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globally coordinated efforts will result in significant gains in the form of avoided climate change.

It has been very difficult to establish an international agreement about climate change for various reasons. Climate change is characterised by large uncertainties, time lags, and large differences in costs and benefits around the world. Furthermore, climate change impacts a number of goods that are difficult to value, including ecosystem changes, biodiversity, and human life, and it has not been possible to establish meaningful and reliable economic estimates of climate change damages.[1] International climate change agreements including the UNFCCC (1992) and the Kyoto Protocol (1997), therefore represent relatively small and preliminary policy agreements. However, the agreements include quantitative targets for GHG emission reductions to be implemented by industrialised countries and a number of policy mechanisms that facilitate global cost effectiveness. In the Kyoto protocol, these mechanisms include emission trading and project-based cooperation between industrialised countries and developing countries.

A complicating factor in climate change policy is the fact that GHG emission reduction policies[2] often interfere with more general economic structures and markets through changes in prices or taxes, implying that the policies cannot be seen as isolated marginal technical pollution control efforts. In many cases, GHG emission reduction policies also have a number of significant indirect impacts on other economic and environmental goods in addition to their direct impacts on climate change. Examples of such indirect impacts include employment generation, income distribution, and local and regional air pollution.

The indirect economic and environmental impacts of GHG emission reduction policies emerge, because the control measures imply non-marginal changes to the major GHG emission sources and the economy. Consider, for example, a coal-based power production system. Substituting the coal with natural gas as a GHG emission reduction measure, will imply improved local air quality in addition to the primary policy objective, but may also decrease employment in the coal-mining sector to be considered as a loss to the stakeholders involved. Another example is the introduction of more efficient electrical industrial motors in industry. Depending on the source of power supply, this policy will reduce GHG emissions directly, and may have indirect impacts in the form of reduced energy costs of industry, increased profits and employment, and reduced local air pollution from the power production.

In principle, the marginal costs of GHG emission reduction policies should include an assessment of all direct and indirect costs and benefits to reflect the social costs of the policies. A number of international studies have made an attempt to develop and apply a methodological framework for assessing social cost aspects of GHG emission reduction policies. In particular, the assessment of indirect health impacts of GHG emission reduction policies has been covered in a number of studies. A review of a range of these studies by IPCC (2001), concludes that in particular studies for developing countries exhibit large potential synergies between GHG emission reduction studies and health benefits from improved local air quality.

The existence of such synergies between GHG emission reduction and local air pollution control imply that social cost estimates including direct as well as indirect impacts of GHG emission reduction policies most often suggest a lower cost per unit of GHG emission reduction than estimates only including the direct costs. Given that there is some sort of an upper price ceiling for the costs that society is willing to pay for avoided climate change impacts and thereby GHG emission reduction, a lower estimate of GHG emission reduction costs will tend to expand the scope for international reduction policies.

It should, however, be recognised that this does not imply that that policy options introduced primarily with the aim to curb local air pollution similarly offers large synergies in the form of GHG emission reductions (IPCC, 2001 Chapters 7 and 8, Eskeland and Xie, 1998). This is the case because local air pollution like for example urban SO_2, NO_x, and particulate matter emissions in many cases can be controlled by technical cleaning systems that only control the specific pollution and at the same time have lower cost than policy options that jointly reduce GHG emissions and local pollutants.

3. The economic principles of emission trading

The guiding principle underlying emission trading systems is that markets are used to facilitate globally cost effective pollution control through the equalisation of marginal emission reduction costs across all reduction options. Climate change is a special pollution control case, since the damage in term of climate change is independent of the location of the GHG emission sources, and emission reduction costs therefore in a very simple way can be minimised through international mechanisms that facilitate offsets between all emission sources.

The basic idea behind international emission reduction markets is that global cost effectiveness implies that

[1]The assessment of costs and benefits of GHG emission reduction policies in this paper excludes the economic benefits of avoided climate change due to these difficulties.

[2]The terminology GHG emission reduction options are used throughout the paper as a synonym for reduction and sequestration policies.