International dimensions of environmental policy

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deal with the protectionist measures that will inevitably appear under an environmental banner. Trying to go further is not only unnecessary but also politically unwise, since more than 80 per cent of the citizenry in the US and Europe identify themselves as environmentalists and very few people call themselves free traders.

Environmentalists should devote themselves to their own national environmental problems and let environmentalists in other countries do the same. The United States did not fulfill its voluntary commitments made at Rio to stabilize greenhouse gas emissions, which are currently 10 per cent above 1990 levels, and the US Congress shows no sign of ratifying the Kyoto Protocol. Surely, this is something for American environmentalists to demonstrate about. The Endangered Species Act is failing in the United States. For every endangered species that is recovering, nine are declining. The few much-trumpeted success stories, such as the peregrine falcon and the bald eagle, are results of the ban on organochlorine pesticides, little thanks to the Endangered Species Act, which Congress consistently refuses to fund adequately. Isn't this reason enough to take to the streets?

People in developing countries are by no means impervious to their own environmental problems even without prodding from the Sierra Club. Urban air pollution, inadequate water and sanitation, and the degradation of rural areas are of great concern, especially to those who have achieved some economic security. The financial crises in Asia and Latin America were environmental as well as economic disasters because they threw many millions of people back into poverty. International economic cooperation to raise living standards in the developing world is one of the most powerful environmental protection measures and will help in achieving international cooperation to protect the global environment as well.

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1. Introduction

When pollution and its effects are not limited to one country but are associated with cases where activities in one country create negative externalities not only in the country itself but also in other countries, then policies to regulate environmental externalities acquire international dimensions. Such problems include the pollution of rivers and lakes that border more

than one country—a transboundary pollution problem—and regional or global environmental problems, which are by now well known, such as acid rain, ozone depletion, and global warming.

However enlarging environmental regulation to include international aspects inevitably creates a link between environmental and trade policies. Two basic approaches for analysing the issue can be considered. The first concentrates on local or domestic environmental issues and focuses on the potential effects of domestic environmental policy on environmental quality and trade.[1] It has been argued that trade liberalization could create excess pollution in countries resulting from the use of non-environmentally friendly process and production methods, or 'flight of capital', and loss of international market share of countries that follow relatively tougher environmental policies. This is the primary issue that is explored in the central paper of this forum.

The second approach, which is the one on which this note concentrates, considers transboundary or global pollution problems. The focus of the analysis is to examine whether trade policy can help to design and enforce international agreements in the presence of transboundary or global pollution problems.

2. Environmental policy and global pollution

Economic theory suggests that the analysis of global pollution belongs to the theory of the voluntary provision of 'public bads', since global pollution satisfies non-rivalry in consumption and non-excludability. The general theoretical approach to analysing a global pollution problem involves the following steps:

- To determine the non-cooperative emissions, where countries choose their emissions—for example their greenhouse gasses (GHGs)—without taking into account the external costs that their emissions impose on other countries through increases global warming.
- To determine cooperative emissions, where countries determine their emissions by taking into account the cost of their emissions for the rest of the countries, so that a Pareto efficient outcome is obtained.
- To establish the inefficiency of the laissez-faire or non-cooperative equilibrium compared to the cooperative case.
- To propose a course of action that can achieve the efficient outcome, which is the global pollution level that satisfies the Pareto criterion.

This approach is similar to the one used to regulate domestic pollution problems. There is, however, one important institutional difference between global and domestic pollution problems. In a domestic pollution problem the policy chosen by the environmental regulator can in principle be enforced, given the legal framework and the informational constraints associated with the problem. In a global environmental problem, there is not however a regulator *per se* vested with the power to enforce a given policy in a number of nations. In the absence of such an authority, the policy needs to be agreed upon. This particularity related to global

[1] For a survey of these issues see Ulph (1994).

environmental problems suggests, as Carraro and Siniscalco (1991) note, that the analysis should shift from the context of government intervention—the regulation approach—to the context of negotiations between nations and international policy coordination.[2]

Negotiations among nations should lead to some international agreement, which specifies policies that should be adopted by countries participating in the agreement.[3] Thus an international agreement could refer to the adoption by the signatory countries of the obligation to reduce domestic emissions in a uniform or a discriminatory way by following some type of national or internationally coordinated environmental policy.[4]

3. International environmental agreements and lessons from economic theory

Perhaps the major obstacles to the successful establishment of international agreements to reduce emissions associated with global environmental issues are free-riding incentives and asymmetries among countries. Free-riding incentives develop because of the common access character of global environmental problems. It might be a in a country's best interest not to participate in an agreement to reduce emissions while the rest of the countries participate, since by doing so it can reduce its own cost of abating pollution and enjoy the benefits from the overall pollution reduction brought about by the cooperation of the rest of the countries. If countries have strong free-riding incentives, the agreement cannot be sustained.[5]

When countries have major asymmetries regarding their fundamentals, moving from the noncooperative equilibrium to cooperation could create gainers and losers. In this case some countries will be better off if everybody cooperates to reduce emissions and other countries will be better off if no country cooperates to reduce emissions. It seems that this might be the most likely situation in a world where countries with predominant

[2] For an analysis of the issues related to international environmental problems, see, for example, Barrett (1992, 1995), Carraro (1997, 1999a, b), (Carraro (ed.) (1999), Xepapadeas (1997, chapter 6).

[3] The Montreal Protocol or the Kyoto Protocol can be regarded as classic examples of such agreements. As noted by Barrett (1995) the United Nations Environmental Programme lists 132 multilateral agreements adopted before 1991 and several that were adopted afterwards.

[4] For example according to the Kyoto protocol the reduction in the emissions of the six greenhouse gasses in the Annex I countries can be obtained by using the mechanisms of 'Joint Implementation', 'Clean Development' and 'International Emission Trading'.

[5] This situation corresponds to the well-known prisoners' dilemma. In a repeated prisoners' dilemma with symmetric countries, cooperation can be sustained through trigger strategies. In a trigger strategy situation a country participates in the agreement if the other countries have done the same in the past and refrains from cooperation forever in the future once the agreement is violated by another country. As Barrett (1991) notes, a trigger strategy can be recognized in the 1957 North Pacific Seal Treaty (Article 12).

asymmetries contribute to a global environmental problem. In such a case, although cooperation to reduce emissions increases the joint pay-off, cooperation is not individually rational since a country might be better off without the agreement. This could happen because of differences in abatement costs or in environmental damages from global pollution among countries. So, a country might not be willing to join the environmental agreement because the cost to its country of reducing emissions to satisfy the agreement might exceed the perceived benefits to the country from the mitigation of the global environmental problem.

An international environmental agreement, or, as it is also called, an environmental coalition, to reduce emissions will be sustainable and self-enforcing if it is:[6] (i) *profitable*, that is a country profits from joining the coalition relative to not joining it, and (ii) *stable*, that is there are no incentives for countries to leave the coalition, or countries outside the coalition to join it. As, however, has been shown, a sustainable self-enforcing coalition is formed in general by a small number of countries.[7]

If we consider asymmetries and free riding as two distortions in the objective of achieving a profitable and stable international agreement, then economic theory tell us that we need two instruments to make the correction (Carraro (1999b). The two instruments that have been proposed are *transfers* and *issue linkage*.

Transfers or side payments aim mainly at making the coalition profitable. The main idea is that gainers from the environmental coalition compensate losers, through a transfer mechanism, so that everybody is better off relative to the non-cooperative case.[8] Self-financing transfer mechanisms can also satisfy the stability criterion if a group of countries *commits* to cooperation and then uses the self-financing mechanism to induce other countries to join the coalition.[9]

Issue linkage[10] refers to the idea of linking an agreement about an environmental issue to agreement among the same group of countries on another issue. Formally issue linkage can help design profitable and stable coalitions without the commitment requirement. At the applied policy level, while transfers are rarely observed in international environmental agreements,[11]

[6] See Carraro and Siniscalco (1994).

[7] See for example Barrett (1994), Hoel (1992), Heal (1994).

[8] It has been shown in the literature (Chander and Tulkens, 1994, 1995) that there exist self-financing transfer mechanisms that make every country better off when they cooperate in reducing emissions.

[9] The commitment requirement is analysed for the symmetric case by Carraro and Siniscalco (1993) and for the asymmetric case by Petrakis and Xepapadeas (1996). In the latter case the countries that commit to cooperation are identified as the environmentally conscious countries.

[10] The concept of issue linkage in environmental agreements was introduced by Folmer, van Mouche and Ragland (1993), Cesar (1994), Cesar and de Zeeuw (1996).

[11] Exceptions are the 1957 North Pacific Seal Treaty in which the US and the USSR agreed to pay Canada and Japan, and the 1972 agreement between France and the Netherlands in which the Netherlands agreed to pay cleaning-up costs for the river Rhine (Cesar and de Zeeuw, 1996).

it is more common to have an international agreement in which the agreement on the part of a country or group of countries to reduce emissions is linked to agreements among the same countries on other issues. In the London amendment of the Montreal Protocol for example, the developing countries agreed to phase out the CFCs, but their agreement was linked to technology transfers from the developed countries.[12] Linking the environmental agreement to R&D cooperation has been proposed by Carraro and Siniscalco (1995, 1997) and Katsoulacos (1997). There have also been discussions about linking the environmental agreement to agreements on trade liberalization, or using trade threats to enforce environmental commitments (e.g. Whalley, 1991; Barrett, 1995).

Managing the global commons, on issues like global warming, involves issues of intergenerational equity and goes beyond the imposition of the 'values' of one country to the environmental problems which are of domestic concern to another country. It seems that the design of sustainable agreements requires some form of linkage between the environmental issue and corresponding issues that are of concern to the countries involved. The extent to which the desirable linkage has a 'benign' nature like R& D cooperation, or involves punishments or trade threats, is an issue that should be associated with the design of the specific environmental treaty. Nevertheless there are strong indications that some kind of issue linkage is necessary in order to create sustainable agreements on global environmental problems.

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