

# Trade agreements, domestic environmental regulation, and transboundary pollution

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## Abstract

This paper investigates a second-best trade agreement between two countries that takes the distortion arising from their non-coordinated environmental policies into consideration. In a reciprocal-markets model with bidirectional transboundary pollution, we find that if the transboundary pollution is sufficiently strong, the second-best trade agreement requires that both countries subsidize the imported goods whose consumption gives rise to pollution. We also find that a bilateral tariff reduction is beneficial to the global environment. © 2007 Elsevier B.V. All rights reserved.

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## 1. Introduction

Trade and environmental linkages have received a great deal of attention in the literature.<sup>1</sup> It has been argued that when the ability of countries to pursue trade goals through trade policy is restricted, the governments will have incentives to distort domestic environmental policies as a secondary means of protection.<sup>2</sup> This point seems to be supported by anecdotal evidence. Disputes such as those over the importation of hormone-treated beef between the United States

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<sup>1</sup> See Ulph (1997), Jayadevappa and Chhatre (2000) and Schulze and Ursprung (2001) for general surveys. In addition, Rauscher (1997) discusses various related issues regarding trade and the environment.

<sup>2</sup> See, e.g., Copeland (1990, 2000), Hungerford (1991), Krutilla (1991), Barrett (1994) and Kennedy (1994). The empirical work of Ederington and Minier (2003) supports this argument.

and the European Union and the impact of mandatory eco-labeling rules are just two examples of where environmental regulation intersects trade policy decision-making.

To avoid the distortion in domestic environmental regulation, many economists have suggested that the domestic environmental policy should be explicitly linked to trade negotiations (e.g., [Abrego et al., 2001](#); [Ederington, 2001](#)). However, trade agreements containing environmental elements are not widespread,<sup>3</sup> and the cooperation among countries in terms of environmental policy is often difficult to establish.<sup>4</sup> A natural question that arises is: how should trade agreements be set to maximize global welfare, when the cooperation in domestic environmental policies is infeasible? The purpose of this paper is to investigate this question. We attempt to capture an important aspect of trade agreements—they are incomplete contracts, in the sense that governments can use domestic policy instruments as substitutes for trade barriers.

To answer this question, we construct a reciprocal-markets model, in which there are two countries, each having a firm producing a differentiated good.<sup>5</sup> The adoption of a reciprocal-markets model highlights the incentives for the governments to distort the domestic environmental regulation as a strategic trade policy. One feature of this paper is that it considers that the consumption of the two goods generates negative externalities. Most of the literature on the link between trade and the environment pays greater attention to production externalities and less attention to consumption externalities. As we noted, toxic substances arising from final consumption are substantial in these areas, e.g., chemicals and post-consumption waste materials, and thus consumption externalities deserve more attention. Moreover, since the problems associated with transboundary pollution have been a high-profile issue,<sup>6</sup> we allow our model to consider that the consumption externality generated by one country will spill over to the other country.<sup>7</sup>

Each country has two policy instruments available: an import tariff and an environmental (consumption) tax. Many previous studies dealt with the case in which multiple instruments were determined simultaneously. In this paper, we extend the analysis to construct a three-stage game in which the tariffs and the environmental policies are determined sequentially. The two countries coordinate the tariffs in order to maximize the joint welfare in the first stage, and then both countries decide their environmental taxes in the second stage.<sup>8</sup> We will consider two cases in the second stage: one is the non-cooperative case and the other is the cooperative case. Given the

<sup>3</sup> An obvious exception is the North American Free Trade Agreement, which contains a number of environmental elements.

<sup>4</sup> See [Folmer et al. \(2000\)](#) for the discussion on the impediments to cooperation in environmental policy.

<sup>5</sup> Intra-industry plays a significant role in the trade in manufactured goods among developed countries (see [Krugman and Obstfeld \(2003\)](#), Chapter 6 for the detail). Thus, as indicated by [Tanguay \(2001\)](#), it is important to investigate the implications of strategic environmental policies in the presence of intra-industry trade.

<sup>6</sup> See e.g., [Hoel \(1999\)](#) and [Folmer et al. \(2000\)](#) for general discussions.

<sup>7</sup> [Conrad \(1996\)](#), [Gurtzen and Rauscher \(2000\)](#), [Tanguay \(2001\)](#) and [Duval and Hamilton \(2002\)](#) also discuss the problems of transboundary pollution in reciprocal-markets models. However, they consider the production externalities rather than the consumption externalities. In addition, except for [Tanguay \(2001\)](#), the papers focus on the determination of environmental policies rather than on trade policies.

<sup>8</sup> Such a sequential setting can be motivated by the situation to which the government needs to commit itself in the framework of certain international trade agreements, such as the World Trade Organization negotiations, whereas environmental policies can be changed more easily. See the second half of [Copeland \(2000\)](#) for this issue. Other situations, such as that where the environmental taxes are decided to adopted before the tariffs, or the two policies are determined simultaneously, are possible. Since the properties of the second-best tariffs are our major concern, we believe that the situation in which the tariffs are set before the environmental taxes is suited to our purpose.

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