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Are trade integration and the environment in conflict? The decisive role of countries' strategic interactions

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ABSTRACT

Are trade integration and the environment in conflict? I address this controversial issue in a framework of intra-industry trade of a differentiated good produced by firms in monopolistic competition who choose to enter into a market and whose activity pollutes. Two mechanisms are at work in the model: first, unilaterally strengthening a national environmental policy leads to firm relocations. Second, trade integration makes firms more sensitive to any difference in environmental policy between countries. The model then predicts that the non-cooperative environmental regulation is too strict with regard to local pollution and too lax with regard to global pollution and that trade integration reinforces the incentives to strategically use this instrument. As a result, trade integration, which has no direct effect on the environment, generates less local pollution but more global pollution through the environmental policy response it triggers. These effects can be decomposed into a technique effect and a scale effect operating both at the extensive and the intensive margins, highlighting the decisive role of strategic interactions between countries and of firms' decisions.

1. Introduction

Over the past thirty years, environmental awareness has heightened alongside the expansion of international trade. The comparison of these two trends has given rise to impassioned public debates about the responsibility of the rise in trade for the development of various environmental issues. In relation to the serious concerns expressed by environmentalists during negotiations over the North American Free Trade Agreement, Grossman and Krueger (1992) proposed in an empirical paper to decompose the effect of trade on the environment into a scale, a technique and a composition effect, an approach developed theoretically by Copeland and Taylor (1994).[1] Evidence from the empirical literature suggests that liberalizing trade seems to diminish sulfur dioxide (SO_2) emissions or concentrations, a pollutant whose trans-border effects are limited (Antweiler et al., 2001; Frankel and Rose, 2005; Grether et al., 2010), and is likely to increase carbon dioxide emissions responsible for climate change, a global environmental issue (Cole and Elliott, 2003; Frankel and Rose, 2005). Whether trade

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[1] The scale effect is the environmental impact of the trade-induced expansion of economic activity, the technique effect is the environmental impact of the trade-induced change in the emission intensity of production and the composition effect is the environmental impact of the trade-induced economic specialization.

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integration and the environment are in conflict is still a controversial issue, as the following recommendation of the European Parliament to the European Commission on the ongoing negotiations for the Transatlantic Trade and Investment Partnership in July 2015 makes it clear: "the agreement should lead to lasting genuine market openness on a reciprocal basis and trade facilitation on the ground, […] while […] preventing social, fiscal and environmental dumping". In fact, the trade and environment topic is intrinsically linked to that of environmental policy, firm competitiveness and emission leakage. The environmental policy impacts the production cost of polluting firms, which may hinder their ability to cope with international competition and/or trigger their relocation in a country regulating pollution less strictly, inducing pollution leakage and undermining unilateral environmental efforts. As openness to trade increases exposure to international competition, the environmental policy might appear as a substitute for trade barriers, which can definitely impact the environmental quality. Consequently, as stated by Copeland and Taylor (2004), "an analysis of the effects of trade and growth on the environment cannot proceed without taking into account endogenous policy responses". With this recommendation serving as a central theme, I study the impact of trade integration on the environmental quality and social welfare, taking into account the trade-induced incentives to regulate polluting firms in the presence of different countries' interactions and environmental issues.

Pollution and the environmental policy are introduced into a two-country model of intra-industry trade of a differentiated good produced by firms in monopolistic competition (Helpman and Krugman, 1985), which combines economies of scale and product differentiation. Polluting emissions are a by-product of these firms' activity, and they can generate a local or a global pollution. This externality is regulated by a standard that defines the emission intensity of production. The depth of trade integration between the two countries is determined cooperatively prior to further interactions. Countries then play a non-cooperative and static three-stage game: in the first stage regulators set the level of the environmental standard; in the second stage firms decide whether to enter the market; transactions between monopolistically competitive firms and consumers occur in the third stage. The game is solved by backward induction for two policy scenarios: in the first one, governments cooperatively choose the strictness of the environmental policy as the one maximizing their joint social welfare; in the second one, each government chooses the environmental standard maximizing its own social welfare, considering its trade partner's environmental policy as given. The second stage brings into light two essential mechanisms. First, the endogenous number of firms in each country is influenced by the stringency of the environmental regulations: making the environmental standard more severe in a country increases the production cost of domestic firms, decreases their profits, and generates incentives to relocate. This mechanism corresponds to the concept known in the literature as the pollution haven effect. Treating the environmental regulation as an endogenous variable set strategically has proven to be essential to find empirical support for this mechanism (Ederington and Minier, 2003; Levinson and Taylor, 2008; Kellenberg, 2009; Grether et al., 2012). Second, by intensifying international competition, trade integration makes firms more sensitive to any difference in national environmental policies, encouraging relocations from the strictest to the laxest country. This mechanism corresponds to the concept of the pollution haven hypothesis, whose empirical support is more elusive (Grether et al., 2012). In the first stage of the game, as a consequence of the pollution haven effect, the non-cooperative environmental regulation is strategically used by countries to push firms and their polluting emissions abroad when pollution is local and to attract firms and their cheaper varieties when pollution is global. As a consequence of the pollution haven hypothesis, the incentives to strategically use the environmental standard are reinforced by trade integration: it is strengthened to accelerate the relocation of polluting firms abroad when pollution is local (the not-in-my-backyard phenomenon), and it is reduced to further attract firms and improve domestic consumption when pollution is global (the race to the bottom phenomenon). The effect of trade integration on the environment is only indirect through the environmental policy response it triggers: the emissions responsible for local pollution decrease whereas the ones responsible for global pollution increase. When countries cooperate on environmental issues, trade integration does not cause any change in the environmental standard, and therefore has no impact on the environmental quality. The main contribution of the paper is therefore to show that whether trade integration and the environment are in conflict depends on the nature of countries interactions on environmental matters, and on the type of pollution. Furthermore, I decompose the environmental effect of trade into three components, some of them different from the traditional ones presented earlier in the introduction. In the context of intra-industry trade distinctive of trade between developed economies the composition effect is no longer relevant. However, this context allows clarification of the scale effect: it consists of an extensive margin (the trade-induced change in the number of firms) and an intensive margin (the trade-induced change in the individual output of these firms). I finally find that social welfare is a non-monotonic function of trade integration when countries do not cooperate on environmental issues: it increases when openness is low and decreases as soon as openness reaches some threshold. This result contrasts with the cooperative scenario, in which deepening trade integration always improves social welfare. The resulting policy implication then corresponds to the view expressed by Neary (2006): "At the policy level, the interaction of trade and environmental policies is increasingly recognized by both analysts and policy-makers as central to the successful operation of both".

Markusen (1975a, 1975b) initiated the literature on the interdependencies between the environment and the economic activity in an international context by considering perfectly competitive markets and inter-industry trade. This literature later turned to increasing returns to scale in production and intra-industry trade. Within oligopoly models, environmental policies can constitute a strategic instrument to attract mobile capital (Hoel, 1997) or to shift rents toward domestic firms when the factors of production are immobile (Barrett, 1994; Kennedy, 1994). More recently some papers have considered economic and environmental interactions in the framework of intra-industry trade of a differentiated product with

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