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Environmental regulations and environmental provisions' impact on trade

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The objective of this paper is to examine how environmental regulatory stringency affects international trade flows. We show that national environmental legislation reinforces the effect on trade of deep environmental provisions in trade agreements.

Keywords: International trade, environmental regulations, environmental provisions in trade agreements.

JEL Codes: F18, K32.

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1. INTRODUCTION

There is a wide consensus (IPCC, 2021) that a huge decarbonization effort is required without delay to avoid the detrimental consequences of increasing temperatures and increasing frequency of climatic disasters. While the increase in trade flows has contributed to climate deterioration, trade policy can be used to reduce carbon emissions through the environmental provisions that are included in regional trade agreements (RTA). Thus, this paper examines how stringent environmental regulations affect export flows.

The link between trade and environmental quality, and the possibility that lax regulations could lead to environmental relocation of industries were first analyzed by Grossman and Krueger (1993). One strand of the literature argues that more stringent environmental provisions and environmental laws can lead developed countries to move away from dirty production, which could be relocated in developing countries, as predicted by the Pollution Haven Hypothesis (PHH). Indeed, companies may choose to relocate pollution-intensive industries in countries with less strict environmental regulations, where low compliance costs enable them to gain a competitive advantage and become pollution havens. Another strand of the literature examines the impact of environmental provisions in trade agreements on trade flows. For instance, Brandi et al. (2020) show that environmental provisions in RTA can reduce the share of dirty exports and increase the share of green exports from developing countries, specifically from those with stringent environmental regulations. They argue that a developing country with stricter enforcement mechanisms might have a greater flexibility in adapting its export structure in accordance with environmental provisions in RTA.

Against this background, we contribute to the literature in two ways. First, in addition to environmental provisions in RTA, we take national environmental laws into account. This enables us to investigate whether more stringent environmental provisions and national environmental laws can reinforce each other. Second, we examine the depth of the environmental provisions in RTA by classifying them according to their enforceability. Methodologically, we estimate a gravity model of trade for a global sample of countries over the period from 2001 to 2015, distinguishing between clean, footloose, and dirty products. The result of the estimation show that national environmental legislations strengthen the effect of deep environmental provisions in trade agreements.

The rest of the paper is organized as follows. Section 2 presents some stylized facts; Section 3 is outlining the empirical analysis and present the results and Section 4 concludes and provides some policy implications.

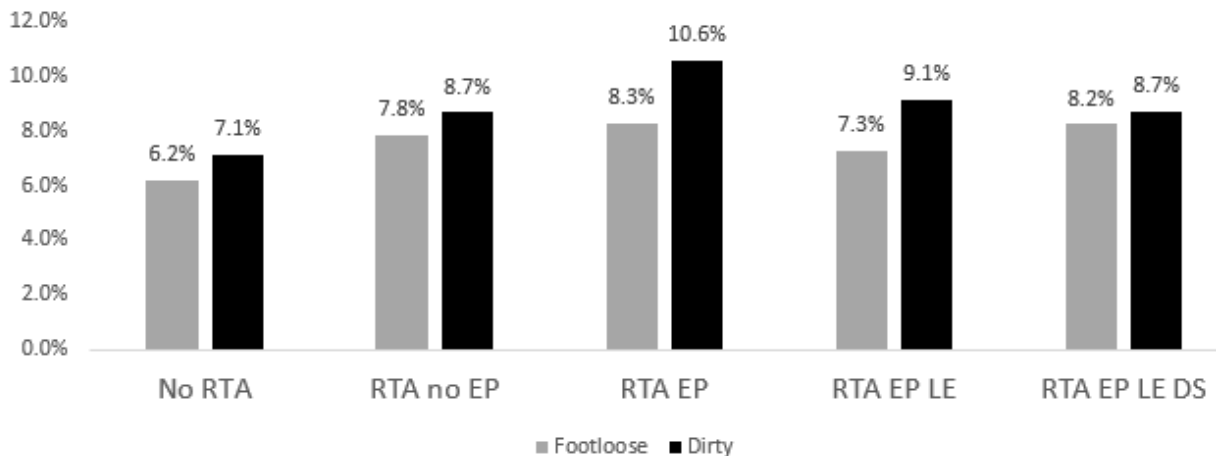
2. TRADE AND ENVIRONMENTAL REGULATIONS

To examine the impact of environmental regulations on trade, we rely on several data sources. The dependent variable, bilateral trade expressed in thousands of current USD, is obtained from the BACI dataset (from CEPII). We distinguish between three groups of products: normal goods, footloose goods and dirty goods. This classification is taken from Martínez-Zarzoso et al. (2017), according to which dirty goods belong to pollution intensive industries for which incurred pollution abatement and control costs represent more than one percent of total costs (e.g. petroleum

products). Footloose industries use very few raw materials and face low transportation costs since they do not need to locate near the sources of raw materials (such as chemical materials). Normal goods are those that do not belong to the previous two categories.

The explanatory variables related to environmental regulations come from two sources. The first one is the Deep Trade Agreement dataset (World Bank) that shows whether a trade agreement includes any environmental provision or not. In addition, it includes information the legal bindingness of the provision (Hofmann et al., 2017). The resulting variable takes the value of zero when there is no agreement, one if there is an agreement without environmental provisions, two if there are non-enforceable environmental provisions in the agreement, three if these environmental provisions are legally binding, and four if there are legally binding environmental provisions that are subject to a dispute settlement mechanism. Figure 1 shows that when the stringency of the environmental provisions increase, the share of trade in dirty goods decreases from 10.6% to 9.1% when the environmental provisions are legally enforceable and to 8.7% when they are also subject to a dispute settlement. However, the inclusion of provisions that are not legally enforceable (*de jure* only) might not be effective in reducing trade in dirty goods. In fact, Figure 1 indicate that trade in dirty goods represents 8.7% of total trade for RTA without environmental provisions, versus 10.6% for agreements with.

Figure 1: Share of footloose and dirty products in total trade – by agreement depth



Source: authors' own elaboration. EP denotes Environmental Provisions; LE denotes Legally Enforceable, DS denotes Dispute Settlement.

The second source for environmental laws is Ecolex from which we have built a variable for the number of national laws that countries have passed over the period of interest (in the spirit of Núñez-Rocha and Martínez-Zarsoso, 2018). We focus on laws that aim to protect the environment in general, or deal with issues related to energy, or with aspects of air and atmosphere. These data show that while, after 2000s, environmental treaties have been increasing at lower rates in both OECD and non-OECD countries, national legislation has been exponentially increasing, pointing out the importance of taking the latter into account while analyzing the impact on trade flows.

3. EMPIRICAL ANALYSIS AND RESULTS

To examine the effect of environmental regulations on trade, we estimate a gravity model of trade given by:

$$X_{ijkt} = \exp (\alpha_1 EP_{ijt} + \alpha_2 (EP * Type\ of\ product)_{ijkt} + \delta_{ij} + \theta_{ikt} + \theta_{jkt}) * \eta_{ijkt} \quad (1)$$

where X_{ijkt} denotes the level of bilateral exports of product k from exporter i to importer j in year t , EP_{ijt} is a dummy variable that takes the value of 1 if the country-pair has an environmental provision and this for each depth category; and second a variable that defines the type of product traded (dirty products, footlose products, the rest is the default). θ_{ikt} measures exporter-product-time, θ_{jkt} the importer-product-time and δ_{ij} bilateral fixed effects. η_{ijkt} is the idiosyncratic error term. The specified model is estimated using the Poisson Pseudo-Maximum Likelihood estimator (PPML) to take into consideration zero trade flows and the potential heteroscedasticity in the error term (Santos Silva and Tenreyro, 2006). This specification is estimated for different groups of countries and according to the direction of trade to see whether the enforcement of environmental regulations is affected by the development level of the trading countries.

The second specification includes the national laws as follows:

$$X_{ijkt} = \exp (\alpha_1 EP_{ijt} + \alpha_2 (EP * EL * type\ of\ product)_{ijkt} + \delta_{ij} + \theta_{ikt} + \theta_{jkt}) * \eta_{ijkt} \quad (2)$$

where EL denotes the number of environmental laws at the national level. An interaction between EP and EL is introduced to show whether they are substitutes or complementary.

The main results indicate that it is important to consider the heterogeneity of the RTA effects on trade of different types of goods (dirty, footlose, and normal goods). More specifically, RTA with EPs increase trade of normal goods by around 5% on average, slightly less than RTAs without EPs. Moreover, in the case of dirty goods (footlose) RTA with EPs reduce trade by 18 (17%) with respect to RTAs with EPs for normal goods. When distinguishing by groups of countries and the direction of trade, the results show that export flows from non-OECD to OECD of dirty and footlose goods decrease when an RTA has EPs that are legally enforceable and are subject to dispute settlement.

Finally, when adding interactions between RTA variables and the number of national environmental laws, the results are less robust. Although not concluding, the findings indicate that environmental legislations seem to reinforce the effect of EPs in RTAs for exports of dirty and footlose goods from non-OECD to OECD countries. Moreover, this also holds for exports of footlose goods from OECD to non-OECD countries.

Finally, our results are robust to the use of different levels of aggregation of the trade data, to the inclusion of lagged values of the target variables and to specifications with nonlinear forms of the environmental regulation variables.

4. CONCLUSION

From a policy perspective, this paper highlights a number of relevant considerations. First, the existence of an environmental law does not necessarily lead to a concrete and tangible effect on trade flows. For this reason, although the *de jure* dimension is necessary, it is not sufficient. Thus, making the laws legally enforceable at the international level and subject to a dispute settlement – the *de facto* dimension– should make them more effective. Second, for developing countries, there is still a long way to go before environmental provisions could be effectively applied. While most trade agreements with those provisions have been proposed by advanced economies to avoid the PHH hypothesis, many developing countries do not have the sufficient capabilities to enforce the international laws. Therefore, international efforts have to be complemented with national laws. Indeed, our findings indicate that national environmental legislation could reinforce the effect of environmental provisions in trade agreements on reducing trade in dirty goods, especially for developing countries.

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