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Are RTA agreements with environmental provisions reducing emissions?☆

Leila Baghdadi [a], Inmaculada Martinez-Zarzoso [b,*], Habib Zitouna [c]

[a] Tunis Business School, Tunis University, Tunisia
[b] Department of Economics, Georg-August University of Göttingen and Institute of International Economics, Universitat Jaume I, Campus del Riu Sec, 12071 Castellón, Spain
[c] Tunisia Polytechnic School, University of Carthage, Tunisia

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ABSTRACT

This paper investigates whether RTAs with environmental provisions affect relative and absolute pollution levels. In order to do so, the determinants of carbon dioxide emissions convergence are estimated for a cross-section of 182 countries over the period 1980 to 2008. A propensity score matching approach is combined with difference-in-differences techniques to effectively isolate the effect of the Regional Trade Agreement (RTA) variable. The usual controls for scale, composition and technique effects are added to the estimated model and the endogeneity of income and trade variables is modeled using instruments. The main results indicate that the CO_2 emissions of the pairs of countries that belong to an RTA with environmental provisions tend to converge and are lower in absolute terms, whereas this is not the case for RTAs without environmental provisions. As regards specific agreements, we find that emissions converge more rapidly for NAFTA than for EU-27 and Euro-Med countries. We find consistent evidence that only RTAs with environmental harmonization policies affect relative and absolute pollution levels.

1. Introduction

One of the most controversial debates in trade policy concerns the impact of trade liberalization on the environment. Trade liberalization can be implemented unilaterally, with a single country reducing its trade barriers against all its trading partners, or regionally, with a group of countries forming a Regional Trade Agreement (RTA) to eliminate trade barriers among them. The latter form of trade liberalization has been predominant since the early 1990s and there is increasing interest in assessing the effects stemming from this new regionalism. Direct trade and income effects are important, as well as the impact on the environment. In this respect, it is important to distinguish between RTAs with environmental provisions (EPs) and RTAs that do not include any harmonization in environmental standards as part of the agreements.

After two decades of research, it is commonly accepted that the effects of trade liberalization on the environment are complex. They can be classified as scale, composition and technique effects and there may also be interaction between them (Copeland and Taylor, 2003). Most of the recent literature has used changes in trade openness as a proxy for trade liberalization (Frankel and Rose, 2005) and many studies have focused on the effects of NAFTA on the environment (Grossman and Krueger, 1991; Stern, 2007). Contrary to expectations, early findings pointed to positive effects. Surprisingly, few studies have been devoted to other regional trade agreements and to the best of our knowledge no studies have used RTAs as a trade policy variable that could influence pollution levels. This is precisely the strategy we propose in this paper to investigate the effects of trade on the environment, that is, by directly including an RTA variable in an emissions equation. Moreover, we hypothesize that the effect should be different for RTAs with and without EPs, only the former agreements being likely to have a direct effect on pollution levels or on convergence, whereas the latter should not have an effect once we control for changes in trade openness. One problem related to estimating RTA effects is that countries possibly select into trade agreements, which could generate endogeneity bias. In a different context, Badinger (2008), who specified an RTA variable in a productivity equation, addressed the endogeneity issue using an instrumental variable approach. The main shortcoming of this approach in our context is the difficulty in finding adequate instruments that are exogenous to the model. Hence, we will propose an alternative strategy.

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* Corresponding author.
E-mail addresses: leila.baghdadi@tbs.rnu.tn (L. Baghdadi), martinei@eco.uji.es (I. Martinez-Zarzoso), hzitouna@gmail.com (H. Zitouna).

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In this paper we depart from the previous literature in two important aspects. First, we specifically investigate whether RTAs with EPs have a direct "harmonization" effect on pollution. We will therefore be able to determine whether signing an RTA with EPs leads governments to impose guidelines that affect relative and absolute pollution levels and whether this induces pollution convergence. Second, the identification strategy is based on the use of matched samples and difference-in-differences estimation techniques to better isolate these harmonization convergence rules. In addition, we follow the recent literature to correctly account for the complex effects of income and openness on pollution levels. In particular, the underlying control variables, namely openness and income levels, are instrumented away (Frankel and Romer, 1999; Frankel and Rose, 2005), since both might be influenced by RTA formation. Finally, results for specific agreements are also presented and compared.

The main results show evidence of RTAs with environmental provisions statistically explaining convergence of pollution levels across pairs of countries. Moreover, the agreements that specifically include provisions to ensure enforcement (NAFTA) are converging at a higher rate than others (EU), which leave compliance measures to the legal system. Conversely, RTAs without EPs do not affect relative or absolute pollution levels, indicating that controlling for bilateral trade levels and overall openness, the trade policy variable does not have a direct effect on emissions convergence for this type of agreement.

The paper is organized as follows. Section 2 states the main theoretical prediction and Section 3 reviews the main empirical literature. Section 4 describes the empirical strategy and the data, variables and main results are presented in Section 5. Finally, Section 6 concludes.

2. Regional integration and emission convergence: theoretical predictions

2.1. Trade and the environment

The negotiations for the North American Free Trade Agreement (NAFTA) were followed by fears regarding its impact on the environment. Indeed, the literature on trade and environmental quality began to emerge in this period. Grossman and Krueger (1991) was the first paper to decompose the total impact of trade on the environment into three different effects, namely scale, technique and composition effects.

The scale effect is assumed to have a negative impact on the environment. According to general belief, trade liberalization leads to an expansion in economic activity and, all other things being equal (composition and techniques of production), the total amount of pollution will then increase (for example, economic growth due to trade raises the demand for energy and boosts transportation, which is one of the main emitting sectors). It is worth noting that this pass-through between trade and the environment assumes a positive effect of trade liberalization on economic growth.[1] The income effects of trade are linked to the literature on the Environmental Kuznets Curve (EKC), which assumes an inverted U-shaped relationship between per capita income and pollution: Pollution increases in the early stages of development until it reaches a turning point and then declines (Copeland and Gulati, 2006).[2] However, it is nowadays generally accepted that an EKC for CO_2 does not exist for most economies (Carson, 2010).

The second pass-through between trade and the environment is the so-called technique effect. Holding the scale of the economy and the mix of goods produced constant, a reduction in the intensity of emissions – measured in terms of emissions by unit of output – results in a decline in pollution. Three main arguments are behind this effect. First, increased trade promotes the transfer of modern (cleaner) technologies from developed to developing countries. Second, if trade raises income, individuals may demand higher environmental quality (if the latter is a normal good). Third, according to the Porter-hypothesis (Porter and van der Linde, 1995), increased globalization will increase competition. In order to stay competitive, firms have to invest in the newest and most efficient technologies. Thus, more stringent environmental policy can increase international competitiveness. In summary, the technique effect has a positive impact on the environment.

Third, comparative advantage is also an important factor that could explain the relationship between trade and the environment. The economy will pollute more if it devotes more resources to the production of pollution-intensive goods, holding the scale of the economy and emission intensities constant. The composition effect – also referred to as the trade-composition or trade-induced composition effect – is caused by changes in trade policy. Through trade liberalization, countries specialize in the sectors where they enjoy a comparative advantage. Among the sources of comparative advantage, we find classical factor endowment differences or unit cost differences and those based on differences in institutions or regulations between countries. On the one hand, the *Factor Endowment Hypothesis* (FEH) states that environmental policy has no significant effect on trade patterns, factor endowments determining trade instead. This implies that relatively capital-abundant countries will export pollution-intensive goods, since most pollution-intensive goods are capital-intensive. On the other hand, the *Pollution Haven Hypothesis* (PHH) states that differences in environmental regulations are the main motivation for trade and that trade liberalization causes pollution-intensive industries to relocate from high income countries with stringent environmental regulations to low income countries with lax environmental regulations (Taylor, 2004). Hence, with trade liberalization, high income countries will specialize in the production of clean goods and pollution in these countries will decline, while low income countries will specialize in producing dirty goods and their level of pollution will increase.

In general, we expect countries to differ in both factor endowments and environmental policy. High-income countries tend to be capital-abundant and also have stricter environmental regulations than low-income countries. On the one hand, the North could become a dirty-good importer (as it has stricter environmental policy) and, on the other hand, it might become a dirty-good exporter (due to being capital-abundant). The interaction between these two effects determines the pattern of trade. If pollution haven motives are more important than factor endowment motives, the North will import dirty goods from the South. On the contrary, trade could cause the North to specialize in the production and exportation of pollution-intensive goods when factor endowment differences dominate regulatory differences, despite having the stricter environmental regulations (Copeland and Taylor, 2003).

In summary, according to previous literature we could expect comparative advantage to be determined jointly by differences in regulatory policy and factor endowments. If the PHH dominates, following a liberalization process between a developing and a developed country, per-capita emissions will tend to converge. If FEH motives dominate, per-capita emissions should diverge.

One issue that has been overlooked by the theoretical literature is that trade policy negotiations have been increasingly accompanied by environmental policy measures. Those policy measures are planned in most cases to avoid the potential trade effects that could emerge as a consequence of differences in regulations. In particular, a number of recently signed RTAs include EPs that can directly affect the levels of emissions in the countries involved. This pass-through could be considered an additional explanation of the trade-environment relationship. In what follows, we focus on the link between regional integration and emissions and the differences encountered between specific agreements with respect to environmental provisions.

[1] A large body of literature provides empirical evidence of the positive effect of openness (see for example Dollar (1992), Ben-David (1993), Sachs and Warner (1995), Edwards (1998), Frankel and Romer (1999) or Rodriguez and Rodrik (2001) for a critical review).

[2] The Environmental Kuznets Curve relates to the work by Kuznets (1955), who found a similar inverted U-shaped relationship between income inequality and GDP per capita (Kuznets, 1955).