ENVIRONMENTAL STRINGENCY AND INTERNATIONAL TRADE: A LOOK ACROSS THE GLOBE

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ABSTRACT
The main goal of this paper is to analyze the impact of carbon pricing, as a means to reducing carbon dioxide (CO2) emissions, on international trade in goods using a pane dataset of OECD and other developing countries with data over the period 2007 to 2018. We use Poisson pseudo-maximum likelihood regressions (PPML) with multi-dimensional fixed effects to estimate a gravity model of trade with panel data. To conduct our empirical analysis, we combine data on emissions from fuel combustion, which account for approximately 80 percent of global human-induced CO2 emissions and have been the main target of carbon pricing, with detailed international trade data using the HS 6-digit codes and information on the market-based policies applied by the countries over the sample period. Our findings confirm that, regardless of the environmental stringency variable used, pollution constraints have a significant impact on trade flows, with this effect being particularly pronounced in the most polluting industries.

Keywords: *Environment and trade, Environmental policy, Pollution haven hypothesis, Gravity models, OECD.*

JEL: *F18, H23, Q52, Q56, Q58.*

1. INTRODUCTION

The relationship between trade and the environment is on the front line of today's policy debate. With trade liberalization, tremendous economic development in some regions, and the fast-growing population, there has been an increasing use of natural resources and pressure on the environment. In 2022, the concentration of carbon dioxide in the global atmosphere reached the highest level in 3 million years, and air pollution poses a great threat to human health and even life

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(NOAA Earth System Research Laboratory). Global environmental pollution and climate change have the potential to limit the sustainable development of the economy and human beings. Thus, effective control of environmental pollution and curbing climate change is essential to sustainable development and is likely the most urgent issue(s) faced by countries nowadays.

In response, over the past decades governments around the world have actively implemented environmental regulations (Khalid *et al.*, 2021). Going forward, with the concept of green development put forward, environmental regulations are likely to be continuously improved and play an increasing role in solving the externalities of environmental pollution and correcting market failures. Thus, an increasing number of countries have incorporated environmental factors into an important part of national and international trade regulation (Baghdadi *et al.*, 2013; Usman *et al.*, 2021a).

At the same time, international trade has become an increasingly critical driver of economic development, and both developed and developing countries consider trade and investment as a central part of their development strategies. In today's world of augmenting economic activity induced by international trade, it is argued that environmental degradation will be accelerated unless it is protected by taking the necessary measures both at domestic and international borders. Thus, nowadays there is a considerable debate over the magnitude and effects of the nexus between trade and the environment. The links between trade and the environment are multiple, complex, and important and consequently, the extent to which environmental problems might affect many facets of trade, or vice versa, deserves a careful investigation. At the most fundamental level, trade and environment are related because economic activities particularly production are based on the environment, as such: the environment provides the basis for all essential inputs and the energy needed to process them as well as the capacity to absorb the produced waste. In this sense, country-specific interventions regarding trade liberalization would be better informed if they were based on an in-depth analysis of the nexus between international trade and climate change.

Ever since the first major environmental regulations were enacted in the 1970s, there has been much debate concerning the effects of changing environmental policies on international trade patterns and investment flows. Businesses and policymakers fear that in a world that is characterized by the integration of trade and capital flows, large asymmetries in the stringency of environmental policies could shift pollution-intensive production capacity toward countries or regions with less stringent regulation, altering the spatial distribution of industrial production and the subsequent international trade flows. This has caused concern, particularly among countries that are leading the action against climate change, because their efforts to achieve deep emission reductions could put their pollution-intensive producers at a competitive disadvantage in the global economy.

This is so because environmental regulations require polluting facilities to undertake abatement activities and may impose costs on companies. The first tool in the government's toolkit for reducing greenhouse gas emissions is a price to be charged per unit of emissions. Carbon pricing is typically considered to be a less invasive policy intervention than direct regulations given that it leaves decisions on how abatement activities will be undertaken to the market (Mankiw, 2009). A carbon price provides a signal to equate marginal abatement costs across polluters and can incentivize abatement across diverse sources at the lowest possible overall cost (Schmalensee and Stavins, 2017). Abatement opportunities that are cheaper than the carbon price are incentivized, while abatement opportunities that are more expensive than the carbon price are not.

As a consequence, regulatory differences across countries, companies, sectors, or jurisdictions can cause changes in the relative production costs of companies. Such changes could arise from differences in direct costs or could be experienced indirectly by various economic actors. For example, the European Union Emissions Trading System (EU ETS), which regulates carbon emissions of approximately 12,000 installations across Europe, is estimated to have increased average material costs (including fuel) for regulated companies in the power, cement, and iron and steel sectors by 5 percent to 8 percent (Chan *et al.*, 2013). Increases in relative costs could also result from higher indirect costs caused by policy-induced changes to input costs. For example, even if they are not directly regulated by the EU ETS, European consumers of electricity face higher electricity costs due to the price of carbon emissions paid by electricity producers. Differences in environmental regulations can thus alter the competition between companies by changing their relative production costs.

Thus, from the point of view of the transmission path of production costs, under the influence of strict environmental regulations in a country, the internalization of environmental costs will lead to an increase in production expenditures (Guo *et al.*, 2018). From the perspective of the technology innovation transmission path, in the short term, companies need to raise environmental internalization costs, pay pollution control costs, and cover technology research and development (R&D) costs to adapt to environmental regulation standards (Hojnik and Ruzzier, 2016), which leads to higher production and operation costs and weakens the price comparative advantage of companies, which can ultimately lead to changes in international trade patterns.

Nevertheless, on the other hand, environmental regulations may lead to increased competitiveness as they may stimulate technological innovation and have positive effects on the economy and environment. For example, a company may be unaware of production strategies to lower costs, and environmental regulations may push the company to adopt such strategies and reduce the costs increasing its competitiveness (Margolis, 2002). Thus, if the world is moving toward more environment-friendly products in the future, then the countries innovating technologies of this sort will be in an advantageous position among other countries.

Thus, the question of whether more stringent environmental regulations harm or foster trade is relevant to the current debate on advancing environmental regulation standards, in particular, related to multilateral agreements. To the best of our knowledge, this issue has been hardly studied in the literature, in particular using disaggregated sectoral trade data to look across sectors and types of goods, dirty and clean, mobile and immobile, and also using trade costs and development status among trading partners. The latter has barely been studied using disaggregated trade data.

Against this background and with the purpose of contributing to the growing body of literature on climate change and environmental discourse, this paper pursues a two-fold aim. First, to examine whether the strictness of a nation's environmental regulations leads to the creation of pollution havens or conversely, consequently affecting trade patterns and potentially creating competitive advantages to countries with less stringent regulations, leading to firms relocating parts of their production chains to these countries. Secondly, it seeks to investigate whether the relationship between carbon pricing and imports varies across industries based on pollution levels (polluting vs. clean) and also in terms of levels of mobility of industries (footloose vs. immobile), agglomeration and the development status of trading partners (*note: last three are work in progress)*.

In order to shed light on these questions, we will conduct econometric analyses estimating a gravity model using Poisson pseudo-maximum likelihood (PPML) with high dimensional fixed effects, (Correia *et al.*, 2020). Our results confirm that irrespective of the environmental stringency variable used, pollution control measures increase imports from countries with more relaxed environmental regulations (thus having a detrimental effect on the export performance of firms), with this impact being particularly pronounced in industries characterized as dirty or contaminating.

The remainder of the paper is structured as follows. Section 2 provides an overview of the related literature and theoretical background. In section 3 we provide early stylized facts examining the relation between environmental stringency and trade. In section 4 we present the model and provide explanations on the different variables. Section 5 presents the main results and section 6 concludes, providing policy options along the way.

2. LITERATURE REVIEW

The literature on the relationship between trade liberalization and the environment started in the 1970s when the first environmental standards were introduced but have really picked up in the last decade or two with the growing number and importance of environmental standards. This has been reflected in the growing attention that multilateral organizations have been placing on environmental issues and the multiple and consecutive international agreements signed, starting from the Stockholm Declaration and continuing with the Montréal Protocol, Kyoto Protocol, Paris Agreement, and the latest Dubai agreement. Moreover, this has gained particular attention as international trade has become an increasingly critical driver of economic development, and a growing number of developing countries consider trade and investment as a central part of their development strategies.

In this context, the links between trade and the environment are multiple, complex, and important. The extent to which environmental problems might affect many aspects of trade, or vice versa, has been the subject of considerable debate over the years. This observation has led scholars to typically decompose the environmental impact of trade liberalization into the scale, technique, and composition effects (Antweiler *et al.*, 2001; Cole and Elliott 2003; Grossman and Krueger, 1991; Lopez and Islam, 2008; Stoessel, 2001). Moreover, it has been noted that these three elements are simultaneously present under a liberalized trade regime.

First, the scale effect indicates that under the assumption of constant composition and production techniques, an increase in the global scale of economic activity, a significant part of which will be driven by international trade, global pollution will increase. This would imply a negative effect of trade liberalization on the environment. Nevertheless, as the links between trade and the environment are mixed and complex the nexus will not be that straight forward. An increase in trade will lead to increased growth and thus national income, which in turn will lead to a rising demand for higher environmental quality and standards, in line with the environmental Kuznets curve that explains the phenomenon that environmental degradation occurs with increasing economic growth until the country attains higher income status, after which the environmental impacts start to decline. This will incentivize companies to increase investments in research and development of cleaner technology and the production of greener goods (Copeland and Taylor, 2004; Grossman and Krueger, 1991). Thus, one cannot directly conclude that the effects of trade and growth on the environment are undesirable. This would imply that the net impact of the scale effect is unclear.

The technique effect makes references to the technology embedded in the production process. It implies that as trade is liberalized, changes in the methods and techniques in the production process will have a positive impact on the levels of pollution and the environment. This stems from the belief that the environment will benefit as companies introduce new technologies that reduce pollution per unit of output. In addition, if we assume that the scale of economic activity and the composition of goods produced are held constant, the effect of an improvement in production technology is even more obvious.

Finally, the composition effect stems from the comparative advantage theory. It assumes that under trade liberalization, countries will specialize in the production of products in which they have a comparative advantage. Nevertheless, as was the case with the scale effects, the impact on the economy under the composition effect is also not that straightforward. In this case, the final net effect on the environment will be linked to whether the source of a country's comparative advantage lies in a country's endowment of capital or labour or the stringency of environmental regulation. In this regard, four hypotheses have been developed which link the effects of trade liberalization and environmental outcomes, including the pollution haven hypothesis, the porter hypothesis, the race to the bottom hypothesis, and the factor endowment hypothesis, with the first two being the most prominent ones.

First, the pollution haven hypothesis goes back more than thirty years (e.g., McGuire, 1982) and in line with Recardian's comparative advantage theory states that differences in environmental regulations are the main motivation for trade. It predicts that if competing companies differ only in terms of the environmental policy stringency they face, then those facing relatively stricter regulation will lose competitiveness. Higher regulatory costs could, for example, reduce the output and scale of R&D investment, crowd out productive investment in green technology innovation or efficiency improvements, and slow down productivity growth (Gray and Shadbegian, 2003; Greenstone *et al.* 2012; Wei *et al.* 2019). If increased regulatory costs are passed through to product prices in fiercely competitive product markets, distortions in trade could occur, as product prices will increase more in countries with relatively strict regulations. Thus, under trade liberalization of goods, there will be a relocation of pollution-intensive trade and production from countries with high income and tight environmental regulations to countries with low income and lax environmental regulations. Companies in countries with higher costs will then lose market share to competitors in countries producing pollution-intensive exports more cheaply. If environmental regulatory differences are expected to last, companies' decisions regarding the location of new production facilities or foreign direct investment may also be affected, with pollution-intensive sectors, and thus manufacturing employment, possibly gravitating toward countries with relatively lax policies and creating pollution havens. Finally, in this scenario, the developed countries will improve their environmental quality, and developing countries will gradually become pollution havens (Baumol and Oates, 1998; Ulph, 1998).

Pollution haven effects have been analysed in the context of environmental regulations, international trade, and foreign direct investment. Early empirical papers revert to a Heckscher-Ohlin (HO) type of model, where revealed comparative advantages are explained by factor endowments, suggesting that the stringency of environmental regulations had little or no impact on trade patterns (Grossman & Krueger, 1991; Tobey, 1990; Xu, 2000). The argument was that, in general, pollution costs are relatively small concerning total costs and multinational firms that operate in developed and developing countries do not want to be seen as transferring dirty operations to the latter countries.

More recently there has been a renewed interest in the area and a number of studies have investigated the PHH largely from a regional or country-specific perspective and using different methodologies to investigate its validity. Approaches range from cross-sections to panels, depending on data availability and questions of interest. The cross-sections allow only very limited control of other potentially relevant developments – such as in endowments or policies - whereas the potential of panels in this respect is not always fully exploited. For example, Kellenberg (2009) investigated underlying reasons for outsourcing the US production processes to emerging economies and suggested that significantly lower environmental stringency is the primary reason for manufacturing companies to move from the USA to emerging economies. Yang (2001) provided strong support to the PHH by examining the environmental impact of WTO membership on Taiwan's economy. He found that CO2 emission in Taiwan has increased after the trade liberalization and the production structure of the economy also has changed towards most polluting industries. Iwami (2001) also found that trade and industrialization in Southeast countries had aggravated the problem of environmental degradation. Similar findings were reported by Takeda and Matsuura (2006). Atici (2012) also found that the export of dirty goods was the main determinant of CO2 emission in the ASEAN countries for the period of 1970-2000.

López *et al.* (2013) again confirmed strong evidence for the support of the PHH from the analysis of bilateral trade between Spain and China. They found that China has become a pollution haven for energy-intensive industries of Spain. Similarly, Gani (2013) also found that trade and industrial activities have a strong impact on pollution in Arab states. Similarly, from the US-India trade between the period of 1991– 2010. Sawhney and Rastogi (2015) concluded that a decade of trade liberalization had made India a pollution haven for some polluting industries of the USA like chemical, steel, and iron. Levinson and Taylor (2008) measured the impact of pollution abatement cost on US net imports of manufacturing sectors from Mexico and Canada over the period from 1977 to 1989. As Mexico is a developing country, therefore, the analysis of US-Mexico trade provided a valid testing ground for PHH. They found that the pollution abatement cost in the USA was a significant determining factor of US trade with Mexico and Canada.

Chakraborty and Mukherjee (2013) are one of the few studies investigating the PHH from a broader perspective. They supported the PHH from the analysis of trade and environment nexus in 114 countries for the period of 2000–2011. They used the environmental performance index as a measure of pollution. They also found that the export of primary and manufactured goods to developing countries has caused environmental degradation in these countries.

A number of studies have investigated the effect of FDI on the environment of a country. According to Winslow (2005), trade and FDI have aggravated the environmental conditions in China. Similar findings were obtained by He (2006) for 29 Chinese provinces. Kellenberg (2009) investigated underlying reasons for outsourcing the US production processes to emerging economies and suggested that significantly lower environmental stringency is the primary reason for manufacturing companies to move from the USA to emerging economies. Seker *et al.* (2015) examined the impact of FDI on CO2 emission in Turkey for the period of 1974–2010. They used autoregressive distributed lag to test the long-run relation between the variables showing a positive effect of FDI on CO2 emission thus supporting the PHH. Tang (2015) explored foreign capital inflows both export-oriented and local market-oriented to claim that environmental standards influence investment decisions, with export-oriented FDI significantly more sensitive to environmental regulations. Sapkota and Bastola (2017) examine the impact of foreign direct investment on pollution in Latin American countries within the scope of the Pollution Haven Hypothesis and the Environmental Kuznets Curve hypothesis. As a result of the panel fixed and random effects models it is seen that the Pollution Haven Hypothesis is valid for Latin American countries

On the other hand, there are also a number of studies that contradicted these empirical findings, concluding that PHH does not hold true. For example, Kearsley and Riddel (2010) suggested that no significant correlation exists between per capita GHG emissions and trade openness. Honglei *et al.* (2011) also, generated arguments against the PHH effects. They examined the effect of a set of variables like FDI economic growth, and foreign trade on environmental pollution in 30 regions of China. They found that FDI was not destructive to the local environment. Rasit and Aralas (2017) examine ASEAN countries in the period 2000–2010 with pooled OLS estimates and show that the Pollution Haven Hypothesis is not valid for the countries in question. Kathuria (2018) examines the case of India with pooled OLS estimates and finds no evidence for the PHH. Balsalobre-Lorente *et al.*, 2019 also came to the same conclusion for MINT countries (Mexico, Nigeria, Indonesia, and Turkey). Shao *et al.* (2019) examine BRICS as well as MINT with panel cointegration tests and obtain similar findings.

Ederington *et al.* (2005) state that there might be three reasons why some studies do not find support for the PHH, including (i) the lion's share of world trade takes place between developed countries, (ii) the likelihood of geographical mobility of industries and (iii) the fraction of total production cost that environmental regulation costs represent in different industries. They argue that in cases where aggregate trade data is used, it may hide the effect of the PHH in the econometric analysis. For this reason, in our study, we test both an aggregate model and a disaggregated sectoral model to account for these possible shortcomings. Moreover, we also account for both clean and dirty industries in our analysis, considering that one would expect to find differences in the pollution regulation effect between the two and also because some authors stated that selecting only dirty industries means selecting the least footloose industries and also (Brunnermeier and Levinson, 2004). Additionally, in our analysis, we also test for the effects of trade costs and the development status of the bilateral trade partners.

The Porter hypothesis takes the more dynamic perspective that more stringent policies have the potential to reduce costs and induce efficient use of resources while encouraging innovation that helps to improve competitiveness (Porter & van der Linde, 1995; Stoessel, 2001). When a country's environmental regulation intensity is high the threshold of export trade is raised, and the market competitiveness of enterprises is weakened, placing pressure on enterprises and incentivizing them to take the initiative and carry out technological innovation. If these technologies induce input (for example, energy) savings that would not have occurred without the policy, they may offset part of the compliance costs.

Porter and van der Linde (1995b) go even further, arguing that environmental regulations can actually "trigger innovation that may more than fully offset the costs of complying with them," i.e., lowering overall production costs and boosting the competitiveness of firms. This Porter hypothesis outcome may occur if cleaner technologies lead to higher productivity, input savings, and innovations, which over time offset regulatory costs (dynamic feedback to the first-order effect) and improve export performance and market share. For example, the existence of learning externalities might prevent the replacement of an old polluting technology by a new, cleaner and more productive technology because firms have a second-mover advantage if they wait for someone else to adopt it first. In this situation, the introduction of an environmental regulation would induce firms to switch to the new, cleaner technology, which improves environmental quality and eventually increases productivity (Mohr 2002). An argument that is related to the Porter hypothesis postulates that a country can generate a first-mover advantage to domestic companies by regulating pollution sooner than other countries, which leads domestic firms toward international.

The empirical tests of the Porter hypothesis are mainly based on specific industries with certain characteristics that profit the most from stringent regulations. Most of the existing studies support the Porter hypothesis and believe that environmental regulation has a positive significance for green technological innovation (Lanjouw and Mody, 1996; Alpay *et al.*, 2002; Horbach, 2008;

Zhang *et al.*, 2011; Yang *et al.*, 2012; Ghisetti and Pontoni, 2015; Li and Lin, 2016; Manello, 2017; Zhang *et al.*, 2018).

Moreover, in recent years, strong and weak versions of the Porter hypothesis have been developed respectively. On one side the ‘‘weak’’ version of the hypothesis states that stricter regulation can actually have a net positive effect on the competitiveness of regulated companies because such policies promote cost-cutting efficiency improvements. stimulate enterprises to further improve the level of pollution control technology by stimulating the innovation process. On the other hand, the ‘‘strong’’ version goes a step further and states that stricter regulation actually enhances business performance and these cost-cutting technologies in turn reduce or completely offset regulatory costs and foster innovation in new technologies that may help firms achieve international technological leadership and expand market share. On the empirical side, the evidence for the weak version of the Porter hypothesis is fairly well established, while the empirical evidence for the strong version is mixed, with only recent studies supporting it (Paul *et al.*, 2011; Nesta *et al.*, 2014; Rubashkina *et al.*, 2015; Xie *et al.*, 2017; Guo *et al.*, 2017). Some studies have found that technological innovation effects of environmental regulation are significantly heterogeneous in different regions, cities, environmental regulation instruments and corporate types (Zhao and Sun, 2016; Li and Wu, 2017; Li *et al.*, 2018; Qiu *et al.*, 2018). Also, the non-linear relationships between environmental regulation and technological innovation have been found, including U-shaped relationship by Zhang *et al.* (2016) and an inverted U-shaped relationship (He *et al.*, 2016; Wang and Shen, 2016; Zhao *et al.*, 2018).

The factor endowment hypothesis, claims that it is not the differences in environmental policy, but the differences in endowments or technology that determine trade patterns. It predicts that the capital-abundant country exports capital-intensive (dirty) goods, which stimulates its production since most polluting industries are also highly capital-intensive (see, e.g., Antweiler *et al.*, 2001; Mani and Wheeler, 1997). Thus, pollution in the capital-abundant country will increase over time. Conversely, pollution falls in the capital-scarce country as a result of the contraction of the production of pollution-intensive goods, since there is no comparative advantage of producing polluting goods in the developing world. Since higher-income countries are more capital-abundant than lower-income countries, in the presence of trade liberalization, developed countries will specialize in capital-intensive, dirty industries, and developing countries will specialize in labour-intensive, relatively cleaner industries. This is the opposite of what the PHH predicts, and thus, the actual impact of liberalized trade on the environment depends on the determinants of comparative advantages across countries.

The race to the bottom hypothesis states that in a liberalized international trade system as countries are faced with economic competition, they will have incentives to relax their environmental standards in an effort to attract new (or retain existing) industries in fear of losing this economic investment or competitiveness to countries with lower standards (Dua and Esty, 1997; Kim and Wilson, 1997, Aşıcı and Acar, 2016; Amran *et al.*, 2018). Some studies suggest that the race to the bottom hypothesis may exist only in developing countries because countries that have implemented high standards (usually developed countries) will not lower their environmental standards for international industrial competition (Porter, 1999; Eichner and Pethig, 2018).

In summary, from the above analysis, it is found that environmental regulations have both inhibitory and promoting effects on export trade. The inhibiting effect on exports is coming from the rearrangement of international trade patterns which will stem from the reallocation of the pollution-intensive industries from countries with stringent environmental standards to countries with lax standards. This will lead to a decline in exports in the former country, but also to an increase in pollution in the latter country. On the other hand, the positive effect stems from the incentives that companies face when confronted with higher environmental standards. This can lead to technological innovation, improve production efficiency, or replace formerly polluting products with new environmentally safe, high-quality products, services, and technology, which builds up long-term competitive advantages and export scale expansion.

3. DATA, VARIABLES AND STYLIZED FACTS

In this section, we present the main data and variables (sub-section 3.1) used and a number of stylized facts of the proxies used for environmental policy stringency (subsection 3.2).

3.1. Data and variables

Trade values are from the Balance International Merchandise Trade Statistics from the OECD. Bilateral exports and imports are measured in current USD. The environmental policy stringency index (EPI) and its different dimensions, as well as environmentally related tax revenues, are also from the OECD. The EPI is a country-specific and internationally-comparable index of the stringency of environmental policy. Stringency is defined as the degree to which environmental policies put an explicit or implicit price on polluting or environmentally harmful behaviour. The carbon price variable and ETS dummy are from the World Bank Carbon Pricing Dashboard.
Emissions intensities are obtained from the inter-country input-output database and the Trade in embodied CO2 database, both maintained by the OECD.
Additional variables used as controls or to compute interactions, such as Gross Domestic Product, value added by activities, and maritime transport costs are also obtained from the OECD.
Table 1 presents the summary statistics of the variables that will be used in the gravity model of trade, with the corresponding mean values, standard deviations, and minimum and maximum values.

Table 1: Summary statistics

VARIABLES	Obs	Mean	Std. dev.	Min	Max
Bilateral imports	418,842	2.11E+08	1.25E+09	0.485646	1.09E+11
Bilateral exports	402,169	2.22E+08	1.31E+09	0	1.07E+11
Carbon Price CO2 Reporter	418,842	0.1459249	2.229063	0	220
Carbon Price CO2_Partner	418,842	0.1141235	1.7544	0	220
Environ. Tax_CO2 Reporter	417,599	0.4310855	10.00676	-1.538529	1020.8
Environ. Tax_CO2_Partner	396,646	0.3977713	8.117552	-1.538529	1020.8
Tax Energy_CO2 Reporter	417,599	0.3257646	8.15302	-1.769811	833.8
Tax Energy_CO2 Partner	396,646	0.3000543	6.621353	-1.769811	833.8
EPI_CO2 Reporter	375,920	0.5140354	6.824891	0	647.7778
EPI_CO2_Partner	303,510	0.5069987	6.02622	0	647.7778

Note: EPI denotes environmental policy stringency index

3.2. Stylized facts

In this subsection we start by reporting some figures on the main proxies used for environmental policies. Figure 1 shows an increasing trend of carbon pricing policies adopted globally. Ever since the first carbon tax was introduced in Finland in 1990, the number of other countries that have implemented a carbon price policy(s) has been growing rapidly. By 2022, 67 countries had a carbon price at either the national or subnational level, covering around 26 percent of global greenhouse gas emissions (World Bank 2023). In addition, 38 countries have or are participating in an emissions trading system (ETS) under international, national, or subnational initiatives. Recent adopters include Indonesia, Vietnam, Mexico, Uruguay, China, and Montenegro, which introduced carbon taxes over the period from 2021 to 2023. However, the geographical coverage of carbon pricing remains far from universal, with the policy instrument facing technical and political barriers that hinder implementation in some countries (Rabe, 2018).

Figure 1: Countries with implemented carbon pricing policies

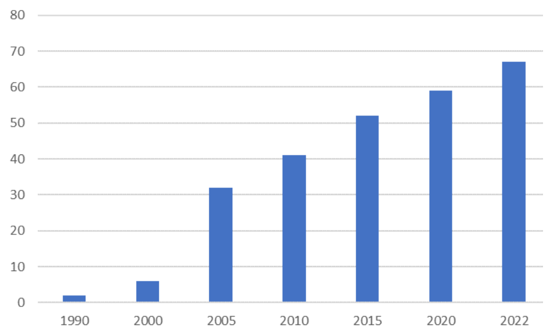
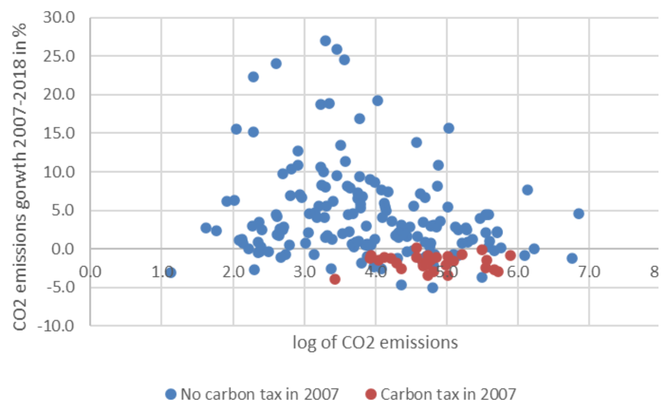


Figure 2: CO2 emissions growth, annual average, %, 2007– 2018 against log CO2 emissions in 2007



(Source: Authors elaboration using data from the World Bank)

Figure 2 plots the average annual growth in CO2 emissions over 2007–2017 against the previous decade's average annual growth rate in this variable. We can observe that for countries without a carbon tax/price in 2007, there is a negative relationship between the initial level of log CO2 emissions and the subsequent growth rate of these emissions. For these countries, the CO2 emissions growth was negative in the period 2007-2018. Their CO2 emissions fell in the period by an average annual rate of 1.7 percent. On the other hand, for the countries that did have a carbon tax/price in 2007, the relationship is positive. For these countries, CO2 emissions increased by an average rate of 4.4 percent per annum (with some exceptions, as it is evident from the chart).

Figures 3 and 4 approximate the stringency of the environmental regulations, using as a proxy the evolution over time of environmental taxes, for the period 2007-2018, distinguish between OECD and Non-OECD countries. Figure 3 shows the evolution of taxes on energy, while Figure 4 shows the evolution of taxes on pollution. On the one hand, some convergence toward lower average values can be observed for the period under study for the OECD countries, indicating perhaps a shift to cleaner production processes that are taxed less. On the other hand, we can see an increase in environmental taxes for the non-OECD countries (the decline in 2020 is due to the COVID-19 effect), likely indicating an increase in the tax base intensity, as new environmental taxes are being introduced in these countries.

Figure 3: Taxes on Energy (including fuel for transport), as % of GDP

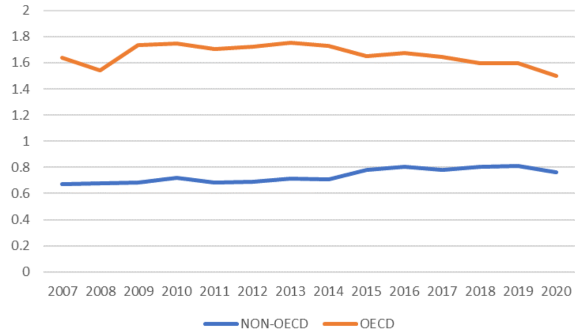
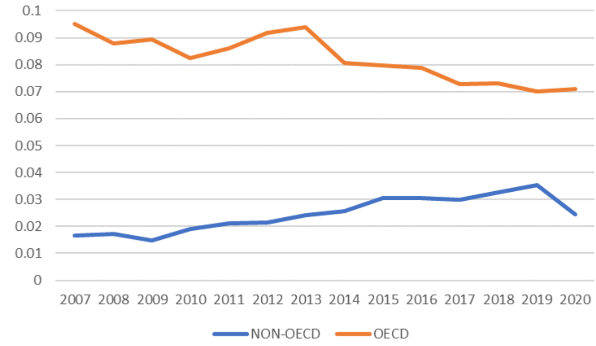


Figure 4: Taxes on Pollution, as % of GDP



(Source: Authors elaboration using data from OECD Environmentally Related Tax Revenue)

Apart from looking at the environmental side of the story we need to take a glimpse at the trade side of the same coin. In Figure 5 we show the evolution of trade, distinguishing between intra- and extra-OECD trade. On average, OECD countries have increased their trade by around 10.7 percent in nominal terms per annum in the period 2007-2018. Nevertheless, trade had increased more with non-OECD countries compared to intra-OECD trade. The former one increased by over 12 percent per annum, while the latter one increased by 10 percent annually. Still, extra-OECD trade increased at a much lower rate. Moreover, as can be seen in Figure 6 the share of intra-OECD trade is much higher compared to extra-OECD trade. In 2018, the former was just over 70 percent of the overall trade of OECD countries, declining slightly from 76 percent in 2007. On the other hand, the share of trade with extra-OECD countries stood at just under 30 percent in 2018, increasing from 24 percent in 2007.

Figure 5: Trade growth in OECD and Non-OECD countries, 2007-2018, in p.p.

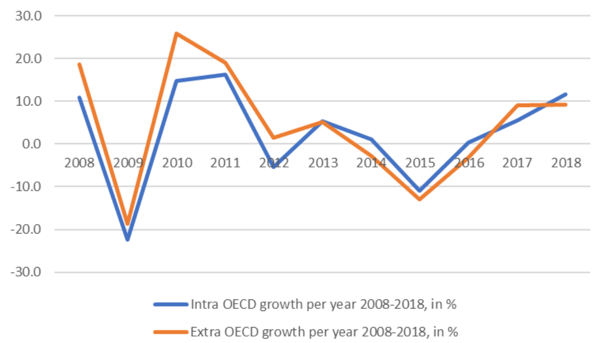
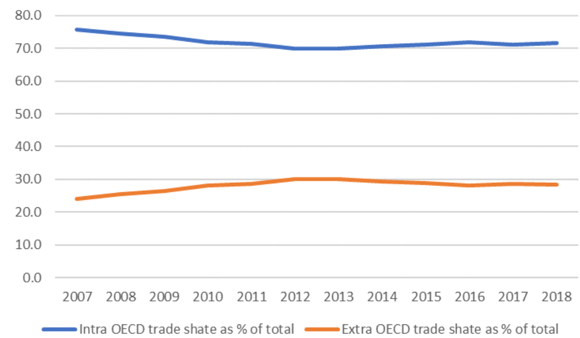


Figure 6: Share of intra and extra OECD trade, 2007-2018, as % of total



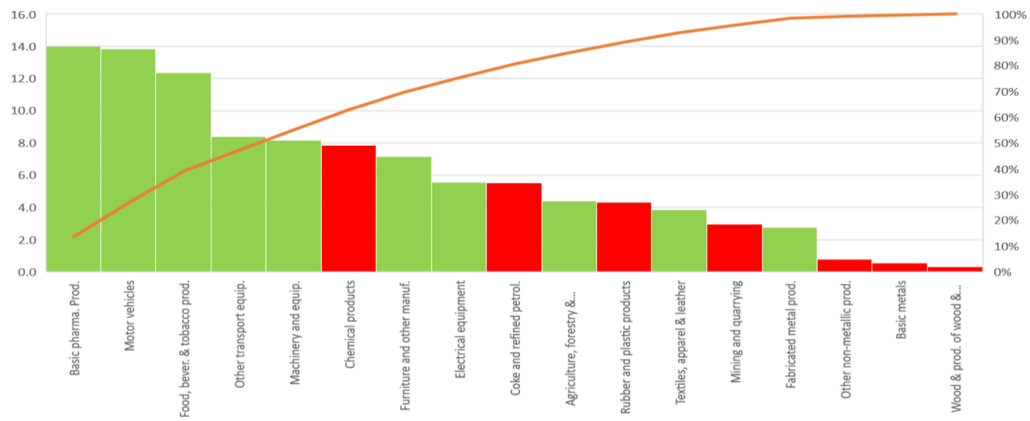
(Source: Authors elaboration using data from OECD Environmentally Related Tax Revenue)

Figure 7 shows the contribution to trade growth of OECD countries by industry. We have divided the industries between clean and dirty for comparison. As can be seen, intra-OECD trade growth was largely driven by clean industries with pharmaceuticals, motor vehicles, food and beverages and transport equipment and machinery equipment leading the way and accounting for almost 2/3 of growth. This indicates that trade (and thus comparative advantage) among these countries, with relatively similar environmental standards, is likely driven by factors that are not environment-related. The contribution of dirty industries was small accounting for 20 percent. Differently, extra-

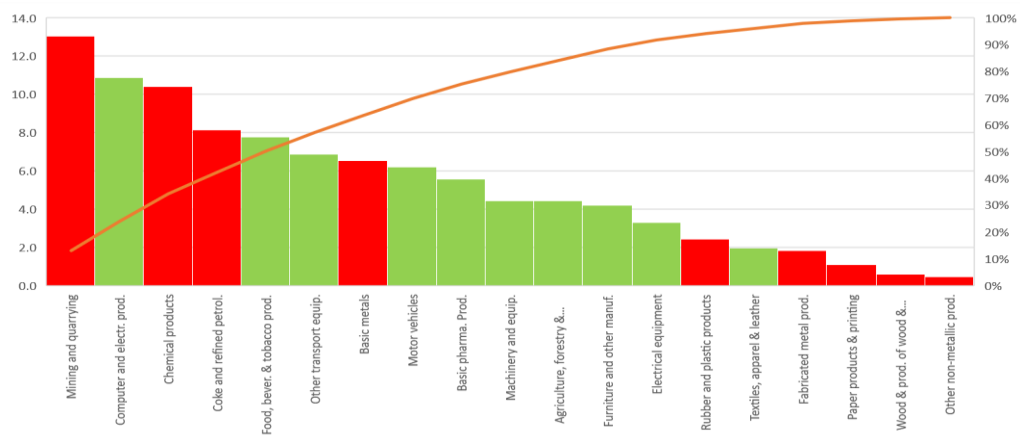
OECD trade in dirty industries accounted for 1/3 of overall trade, but most of the trade growth over the sample period 2007-2018 is attributed to them, representing almost ½ of trade growth, with mining, chemicals, coke and petroleum and basic metals making over 38 percentage points.

Figure 7: Contribution to growth per clean and dirty industry, 2007-2018 in p.p.

a. Intra-OECD



b. Extra-OECD



(Source: Authors elaboration using data from OECD International Merchandise Trade. Note: Clean industries are in green colour and dirty ones in red. See Appendix A.X for the classification)

In summary, from the presented stylized facts we can infer that environmental regulations are becoming increasingly more important in a growing number of countries, not just developed ones, but developing ones as well. Moreover, as a result of the rising number of developing countries that are implementing environmental regulations, we can observe a tentative move towards convergence of environmental taxes among developed and developing countries. A first graphical analysis indicates that in general countries that have had some sort of environmental regulations in the past tend to have lower CO2 emissions. Finally, looking across industries in OECD countries, in terms of dirty and clean ones, we can see that almost all intra-trade growth in OECD countries was mainly driven by clean industries, while the opposite is the case for extra-OECD trade, where trade was primarily driven by dirty industries. This last point provides a first indication, which has to be empirically tested, of the possible existence of a pollution haven hypothesis that will be reflected in trade flows of OECD and non-OECD countries. However, we cannot ignore that other factors that may be also influencing this relationship, or the potential measurement errors are not being taken into account. To deal with these issues, in the following section, we carry out a complete regression analysis, considering other covariates, and potential endogeneity problems.

4. THEORETICAL BACKGROUND AND MODEL SPECIFICATION

The gravity model of trade is nowadays the most accepted framework to model bilateral trade flows (Anderson, 1979; Bergstrand, 1985; Anderson and Van Wincoop, 2003). Independent from the theoretical framework of reference, most of the mainstream foundations of the gravity model are variants of the Anderson (1979) demand-driven model, which assumes a constant elasticity of substitution and product differentiation by origin. According to the underlying theory, trade between two countries is explained by nominal incomes, by the distance between the economic centers of the exporter and importer, and by trade costs usually proxied with a number of trade impeding and trade facilitating variables, such as trade agreements, common language, or a common border.

According to the underlying theory that has been reformulated and extended by Anderson and van Wincoop (2003), the model assumes a constant elasticity of substitution and product differentiation by place of origin. In addition, prices differ among locations due to symmetric bilateral trade costs. The reduced form of the model is given by

$$X_{ijkt} = \frac{Y_{it}Y_{jt}}{Y_t^W}\left(\frac{t_{ijt}}{P_{it}P_{jt}}\right)^{1-\sigma} \quad (1)$$

where are bilateral exports of product *k* from country *i* to country *j* in year *t*, and , and are the GDPs in the exporting country, the importing country, and the world in year *t*, respectively. denotes trade cost between the exporter and the importer in year *t* and are the so-called multilateral resistance terms. is the elasticity of substitution between goods.

The empirical specification of the model in equation (1) in log-linear form is given by

$$\ln X_{ijkt} = ln\, Y_{it} + ln\, Y_{jt} - \ln Y_t^W + (1-\sigma)\ln t_{ijt} + (1-\sigma) ln\, P_{it} + (1-\sigma)\ln P_{jt} \quad (2)$$

The estimation of equation (2) is not straightforward, since some assumptions are required, concerning the trade costs and multilateral resistance terms. The trade cost function is assumed to be a linear function of trade barriers, namely the time-invariant determinants of trade flows such as distance, common border, common language, and whether a country is landlocked.

Substituting the trade cost function into equation (2) suggests estimating the following model:

$$\ln(X_{ijkt}) = \alpha_0 + \alpha_1 \ln Y_{it} + \alpha_2 \ln Y_{jt} + \alpha_3 ln\, D_{ij} + \alpha_4 Landl_i + \alpha_5 Land_j + \alpha_6\, Border_{ij} +$$

$$+\alpha_7 EU_{ijt} + u_{ijkt} \quad (3)$$

where denotes the geographical distance from country *i* to country *j*, and take the value of one when countries *i* or/and *j* are respectively landlocked, zero otherwise, takes the value of one when the trading countries share a border, zero otherwise, and takes the value of one when the trading countries are members of the EU, zero otherwise. Based on the recent gravity literature the multilateral resistance terms are modeled as country-pair specific dummies. That prevents us from obtaining the coefficient estimates for time-invariant variables, and their effects are subsumed into the country-pair dummies.

The gravity model has been widely used to investigate the role played by specific policy or geographical variables in explaining bilateral trade flows. Consistent with this approach, and in order to investigate the effect of environmental regulations on trade, we augment the model with the different environmental regulations in the reporter (OECD) and partner countries (OECD or non-OECD) and use bilateral imports of OECD countries as the main dependent variable. Additionally, we also estimate the results of exports and net imports as a robustness check. Introducing several sets of fixed effects, the specification of the gravity model is as follows:

$$\ln\left(X_{ijkt}\right) = \alpha_0 + \alpha_1\,(\mathrm{EI} * EnvPol)_{ikt} + \alpha_2\,\mathrm{EI} * (EnvPol)_{jk\mathrm{t}} + \theta_{it} + \lambda_{jt} + \delta_{ij} + \gamma_{kt} + \varepsilon_{ijkt} \quad (4)$$

where, is exports (imports) of industry *k* from country *i* to country *j* at time *t*; and EnvPol is proxied by the interaction of carbon emissions intensity (EI_{kt}) with 4 different environmental policy variables: Pis a dummy variable with a value of one for countries that had implemented carbon pricing in year t and zero otherwise; ln represents taxes on different environmental aspects, including pollution and energy; is a country-specific and internationally-comparable measure of the stringency of environmental policy, where stringency is defined as the degree to which environmental policies put an explicit or implicit price on polluting or environmentally harmful behaviour. We use in our estimations several sets of fixed effects: reporter-time, *it*; partner-time, *jt*, sector-time, *kt;* and reporter-partner, *ij*.

Despite the widespread use of linear models, for estimating the gravity equations we employed an efficient estimator designed for panel data models featuring multi-way fixed effects, a Poisson pseudo-likelihood estimator with high-dimensional fixed effects (PPML-HDFE**)**. This approach combines the strengths of PPML regression, which has clear advantages over OLS as outlined by Santos Silva and Tenreyro (2006), with the flexibility of a high-dimensional fixed effects estimator developed by Correia (2019)[1].

The PPML specification is given by:

$$X_{ijkt} = \exp\left(\alpha_1\,[\mathrm{EI} * EnvPol]_{ikt} + \alpha_2\,[\mathrm{EI} * EnvPol]_{jk\mathrm{t}} + \theta_{it} + \lambda_{jt} + \delta_{ij} + \gamma_{kt}\right) * \epsilon_{ijkt} \quad (5)$$

where the variables have been defined below equation (4).

4. MAIN RESULTS

The main model has been estimated for imports and exports, separately. Results from estimating specification (5) are presented below for imports and exports of OECD countries. Four different proxies for environmental policy stringency of the importer and exporters are introduced sequentially in the specification, each of them interacting with the CO2 emissions intensity by sector and time. For instance, carbon prices in column (1), environmental and energy taxes in

[1] This estimator accommodates multiple fixed effects and interactions. Building upon this, Correira, Guimarães, and Zylkin (2020) propose a novel and more robust approach for verifying the existence of (pseudo) maximum likelihood estimates, referred to as fast Poisson estimation with high-dimensional fixed effects.

columns (2) and (3), and the EPI in column (4). The estimated coefficients show positive and significant effects on imports of the introduction of a carbon price, an increase in taxes, and increases in the EPI of the importing country (i), whereas decreases in imports are observed when the stringency of environmental policy increases in the exporting country. This result is in accordance with the theories indicating that more stringent environmental policies increase imports of dirty goods.

Table 2: Main Results Imports: PPML estimations, 2007-2018

Dependent variable: Imports	(1)	(2)	(3)	(4)
	Carbon Price	**Envir. Taxes**	**Tax Energy**	**EPI**
Explanatory variables:				
Env stringency importer*EI	0.027***	-0.046**	0.003	0.240***
	(0.003)	(0.019)	(0.004)	(0.027)
Env stringency exporter*EI	-0.114***	-0.055***	-0.011**	-0.325***
	(0.034)	(0.016)	(0.005)	(0.033)
Observations	496851	293312	307283	288278
Reporter-partner FE	YES	YES	YES	YES
Reporter-time FE	YES	YES	YES	YES
Partner-time FE	YES	YES	YES	YES
Sector-time	YES	YES	YES	YES
Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by pair-sector.				

Table 3: Main Results Exports: PPML estimations, 2007-2018

Dependent variable: Exports	(1)	(2)	(3)	(4)
	Carbon Price	**Envir. Taxes**	**Tax Energy**	**EPI**
Explanatory variables:				
Env stringency exporter*EI	-1.041***	-0.440***	-0.347***	-0.623***
	(0.091)	(0.087)	(0.080)	(0.065)
Env stringency importer*EI	0.157**	0.057**	0.021	-0.013
	(0.067)	(0.028)	(0.042)	(0.051)
Observations	1031769	304808	435557	291021
Reporter-partner FE	YES	YES	YES	YES

Reporter-time FE	YES	YES	YES	YES
Partner-time FE	YES	YES	YES	YES
Sector-time	YES	YES	YES	YES
Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by pair-sector.				

Table 4: Heterogenous effects for groups of countries, 2007-2018

Dependent variable: OECD and non-OECD importers	(1)	(2)	(3)	(4)
	CarbonP	**EnvTax**	**EnerTax**	**EPI**
Explanatory variables:	b/se	b/se	b/se	b/se
Env String#Non-OECD_P#c.EI	0.026***	-0.021	-0.181***	0.153***
	-0.003	-0.036	-0.035	-0.043
Env String#OECD_P#c.EI	0.031***	-0.113***	0.005	0.140***
	-0.004	-0.029	-0.003	-0.035
Env String_P#Non-OECD_P#c.EI	-0.016***	-0.04	-0.105***	-0.875***
	-0.005	-0.041	-0.018	-0.053
Env String_P#OECD_P#c.EI	-0.134***	-0.111***	-0.012*	-0.156***
	-0.038	-0.023	-0.007	-0.045
Observations	496851	293312	307283	288278
Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by pair-sector.				

Table 5: Main Results: PPML estimations, 2007-2018

Dependent variable: Polluting Imports	(1)	(2)	(3)	(4)
	Carbon Price	**Envir. Taxes**	**Tax Energy**	**EPI**
Explanatory variables:				
Env stringency importer*EI	0.081***	-0.048**	-0.001	0.250***
	(0.020)	(0.022)	(0.010)	(0.020)
Env stringency exporter*EI	-0.199***	-0.056***	-0.021	-0.308***
	(0.040)	(0.018)	(0.017)	(0.028)
Observations	224477	132461	137998	132687

Reporter-partner FE	YES	YES	YES	YES
Reporter-time FE	YES	YES	YES	YES
Partner-time FE	YES	YES	YES	YES
Sector-time	YES	YES	YES	YES
Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by pair-sector.				

Table 6: Main Results: PPML estimations, 2007-2018

Dependent variable: Imports neutral products	(1)	(2)	(3)	(4)
	Carbon Price	**Envir. Taxes**	**Tax Energy**	**EPI**
Explanatory variables:				
Env stringency importer*EI	1.118***	2.218***	2.216***	3.701***
	(0.237)	(0.237)	(0.289)	(0.245)
Env stringency exporter*EI	-2.086***	0.319***	-0.344*	-3.038***
	(0.230)	(0.051)	(0.203)	(0.189)
Observations	272350	160844	169284	155591
Reporter-partner FE	YES	YES	YES	YES
Reporter-time FE	YES	YES	YES	YES
Partner-time FE	YES	YES	YES	YES
Sector-time	YES	YES	YES	YES
Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by pair-sector.				

NOTE: Comments and explanations of the tables are not included because of time constraints in submitting the paper. Nevertheless, if the paper is accepted full comments and explanations will be provided by the time of the Conference.

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VARIABLE	SOURCE	DESCRIPTION	UNIT OF MEASURE	AVAILABILITY PERIOD
Reported Export Value	OECD - Balanced International Merchandise Trade Statistics (by CPA) https://stats.oecd.org/Index.aspx?DataSetCode=BIMTS_CPA#	The reported export value: The value of exports from the Reporter to the Partner, as reported by the Reporter (Values are expressed in US dollars).	US dollars	2007-2018
Reported Mirror Import Value	OECD - Balanced International Merchandise Trade Statistics (by CPA) https://stats.oecd.org/Index.aspx?DataSetCode=BIMTS_CPA#	The reported import value: The value of imports by the Reporter (OECD country) from the partner, as reported by the Reporter (Values are expressed in US dollars).	US dollars	2007-2018
OVERALL Environmental Stringency Index	OECD - Environmental Policy Stringency Index https://stats.oecd.org/Index.aspx?DataSetCode=EPS	The ESI is a country-specific and internationally-comparable measure of the stringency of environmental policy. Stringency is defined as the degree to which environmental policies put an explicit or implicit price on polluting or environmentally harmful behaviour.	The index ranges from 0 (not stringent) to 6 (highest degree of stringency) and	covers 40 countries for the period 1990-2020
Carbon price and ETS (dummy)	World Bank - carbon Pricing Dashboard https://carbonpricingdashboard.worldbank.org/map_data	The dummy variable taking the value of 1 if the country has a carbon tax or an ETS (or both) in place and 0 if otherwise.	Dummy variable with values 1 or 0	1990-2023
Environmental Taxes as % of GDP	OECD - Environmentally related tax revenue https://stats.oecd.org/Index.aspx?DataSetCode=ERTR#	An environmental tax is a charge levied on a physical unit of an item that has a proven negative impact on the environment. A gallon of petrol, a passenger flight or a ton of waste bound for landfill are examples of such physical units. It contains detailed qualitative and quantitative information on environmentally related taxes, fees and charges, tradable permits, deposit-refund systems, environmentally motivated subsidies and voluntary	Overall environmental tax revenues as % of GDP. The data need to be interpreted with caution as environmentally related tax revenue can increase or decrease for several independent or interlinked factors. For	1994-2021

		approaches used for environmental policy	example, declines can be caused by base erosion beneficial from an environmental perspective) or lowered tax rates (usually harmful from an environmental perspective).	
Taxes on Energy, (including fuel for transport)	OECD - Environmentally related tax revenue https://stats.oecd.org/Index.aspx?DataSetCode=ERTR#	Includes all CO2-related taxes on energy products (e.g. fossil fuels and electricity) including those used in transportation (e.g. petrol and diesel).	Tax revenues from energy products as % of GDP	1994-2021
CO2 emissions intensities	OECD - OECD Inter-Country Input-Output Database and Trade in embodied CO_2 (TeCO2) Database	CO_2 emission intensities are calculated by dividing the CO_2 emissions from fuel consumption by output from the OECD Inter-Country Input-Output (ICIO) Tables and multiplying the result by 1 million for scaling purposes	Metric Tons of CO2 Emissions per $ 1 million USD of output	1995-2018
OTHER VARIABLES THAT WE DID NOT USE AT THE END				
Market-based ESI	OECD - Environmental Policy Stringency Index https://stats.oecd.org/Index.aspx?DataSetCode=EPS	The ESI is a country-specific and internationally-comparable measure of the stringency of environmental policy. Stringency is defined as the degree to which environmental policies put an explicit or implicit price on polluting or environmentally harmful behaviour.	The index ranges from 0 (not stringent) to 6 (highest degree of stringency) and	covers 40 countries for the period 1990-2020
Non-market based ESI	OECD - Environmental Policy Stringency Index https://stats.oecd.org/Index.aspx?DataSetCode=EPS	The ESI is a country-specific and internationally-comparable measure of the stringency of environmental policy. Stringency is defined as the degree to which environmental policies put an explicit or implicit price on polluting or environmentally harmful behaviour.	The index ranges from 0 (not stringent) to 6 (highest degree of stringency) and	covers 40 countries for the period 1990-2020

Teck supp policies ESI	OECD - Environmental Policy Stringency Index https://stats.oecd.org/Index.aspx?DataSetCode=EPS	The ESI is a country-specific and internationally-comparable measure of the stringency of environmental policy. Stringency is defined as the degree to which environmental policies put an explicit or implicit price on polluting or environmentally harmful behaviour.	The index ranges from 0 (not stringent) to 6 (highest degree of stringency) and	covers 40 countries for the period 1990-2020
National Greenhouse gas emissions	United Nations Framework Convention on Climate Change (UNFCCC). 2022. Greenhouse Gas Inventory Data - Detailed data by Party Annex I. https://di.unfccc.int/detailed_data_by_party	The data contains annual Net Emissions/Removals of all Greenhouse Gas Emissions	Million metric tons of CO_2 equivalent	1970-2021
Domestic CO_2 emissions embodied in gross exports	OECD - Carbon dioxide emissions embodied in international trade (2021 ed.) https://stats.oecd.org/Index.aspx?DataSetCode=IO_GHG_2021#	Domestic CO_2 emissions embodied in gross exports, by industry i in country/region c to partner country/region p, represents the embodied CO_2 emissions in exports that have been generated anywhere in the domestic economy (i.e. not just by the exporting industry).	Million of Tonnes	1995-2018
CO_2 emissions	OECD - Carbon dioxide emissions embodied in international trade (2021 ed.) https://stats.oecd.org/Index.aspx?DataSetCode=IO_GHG_2021#	CO_2 emissions from a production perspective, are equal to CO_2 emitted and consumed domestically + CO_2 emitted domestically and embodied in exports. It shows for country c and industry i the total emissions in production and it is here defined only for partner World.	Million tonnes of CO_2 Estimated from the IEA's CO_2 emissions from fuel combustion (http://www.iea.org/statistics/topics/co2emissions).	1995-2018
CO_2 emissions intensities	OECD - OECD Inter-Country Input-Output Database and Trade in embodied CO_2 (TeCO2) Database	CO_2 emission intensities are calculated by dividing the CO_2 emissions from fuel consumption by output from the OECD Inter-Country Input-Output (ICIO) Tables and multiplying the result by 1 million for scaling purposes	Metric Tons of CO_2 Emissions per $ 1 million USD of output	1995-2018
CO_2 emissions multiplirs	OECD - OECD Inter-Country Input-Output Database and Trade in embodied CO_2	CO_2 emission multipliers are calculated by multiplying the Leontief inverse (also known as output multipliers matrix) from the OECD Inter-Country Input-Output (ICIO) Tables by the CO_2 emission intensities.	Metric Tons of CO_2 Emissions per $1million USD of output	1995-2018

	(TeCO2) Database			
Gross Value Added per industry (source OECD)	OECD - Value added and its components by activity, ISIC rev4 https://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE6A#	Gross value added per industry in a given country	in mill US$	1950-2021
GDPpc, constant prices, constant PPPs (source OECD)	OECD - Gross domestic product (GDP) https://stats.oecd.org/index.aspx?queryid=60706#	Gross domestic product, expressed in constant prices and using Purchasing Power Parity	in constant US$ PPP	1950-2021
GDPpc, Per head, current prices, current exchange rates (source OECD)	OECD - Gross domestic product (GDP) https://stats.oecd.org/index.aspx?queryid=60706#	Gross domestic product in current prices and expressed per capita	in mill US$ per capita	1950-2021
Transport costs - exporter OECD country (source OECD)	OECD - Maritime Transport Costs https://stats.oecd.org/Index.aspx?DataSetCode=MTC#	Maritime transport costs are calculated at 6 6-digit product level and aggregated per industry using conversion tables.	in USD	1991-2007
Transport costs Ad Valorem-exporter OECD country (source OECD)	OECD - Maritime Transport Costs https://stats.oecd.org/Index.aspx?DataSetCode=MTC#	Maritime transport costs are calculated at 6-digit product level and aggregated per industry using conversion tables. Maritime transport cost is divided by the import value, i.e. the share of transport cost represents the total import value of the product.	in % as the share of transport cost represents the total import value of the product.	1991-2007
International Transport and Insurance Costs of Merchandise Trade (ITIC)	https://stats.oecd.org/Index.aspx?DataSetCode=CIF_FOB_ITIC#	The OECD ITIC dataset combines the largest and most detailed cross-country sample of official national statistics on explicit CIF-FOB margins with estimates from an econometric gravity model	Ratio (The Cif-Fob ratio corresponds to: (Cif value-Fob value)/(Cif value)	1995-2020