KOMMERSKOLLEGIUM
NATIONAL BOARD OF TRADE SWEDEN

The Role of Trade in the Green Transition

Regional trade agreements and environmental goods provisions

2023

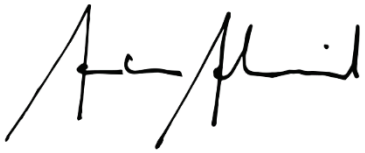
Foreword

According to Agenda 2030, all policy domains should contribute towards the creation of a more sustainable world economy. A main task of trade policy can and should be to facilitate the diffusion of environmentally friendly goods and technologies. Right now, existing trade barriers on these goods make the green transition more expensive than necessary. As discussions at multilateral level have not yet resulted in an agreement to remove these barriers, regional trade agreements have been used to address this issue.

In this study, we empirically assess whether the focus on environmental goods in regional trade agreements facilitates trade in these goods. This report continues earlier work of the National Board of Trade in the domain of trade and climate. More specifically, it builds on the 2020 report on 'Trade barriers to goods and services important for climate action' and the 2021 report on 'Trade and Climate Change: Promoting climate goals with a WTO agreement'.

The study has been written by Fredrik Gisselman, Erik Merkus, and Nils Norell. Valuable comments and suggestions are gratefully acknowledged from Kristina Olofsson and Neil Swanson, the National Board of Trade. We would also like to thank Lars Nilsson, as well as seminar participants at the SNEE conference in Lund (Sweden) in November 2022, and the Trade Economist Network meeting in Prague (Czechia) in December 2022 for their feedback.

Stockholm, March 2023



Anders Ahnlid
Director-General, National Board of Trade Sweden

Summary

Supporting the spread of environmentally friendly goods and technologies has long been recognised as one of the core contributions that trade policy can make to facilitate the transition to an environmentally sustainable world economy. Existing trade barriers make the green transition more expensive than necessary, exacerbating an already massive challenge. In an attempt to lower these barriers, several countries include specific environmental goods provisions in their (bilateral) regional trade agreements (RTAs). These provisions explicitly aim to promote, facilitate, or otherwise support trade in environmental goods. The effectiveness of such a policy aim, however, has not been established. The main purpose of this report is to empirically investigate whether RTAs that include environmental goods provisions, affect trade flows of environmental goods.

To answer this question, we use a state-of-the-art gravity model of international trade. The main outcome of this gravity model is an estimate of how much trade is affected by a reduction in trade costs due to the implementation of a trade agreement. In the absence of a universally accepted definition, we use the lists created by the WEF and OECD to classify goods as environmental goods.

The analysis shows that, in general, RTAs with environmental goods provisions do not have a statistically significant effect on absolute or relative trade flows in environmental goods. Trade flows between countries that have an RTA with environmental goods provisions are not larger than trade flows between countries without such an RTA, all else equal. When we assess EU RTAs specifically, the results are the same.

We appreciate the inclusion of environmental goods provisions to potentially create awareness and facilitate a discussion on the diffusion of these goods. However, our findings indicate that they are not a particularly effective method to achieve the objectives of diffusing environmental goods. Our conclusions leave us with the question of what can be done to further encourage trade in environmental goods. In the absence of multilateral or plurilateral progress, we build on the findings in this report and earlier work of our trade policy experts at the National Board of Trade to propose a number of recommendations.

Our policy recommendations

To boost trade in environmental goods within regional trade agreements, countries should:

- **Ensure good governance**
  - Define environmental goods
  - Specify the goal of the environmental goods provisions
  - Communicate clearly how they intend to achieve the policy goal
  - Evaluate the effectiveness of the provision and adjust the approach if needed
- **Mainstream the promotion of environmental goods in RTAs**
  - Liberalise non-core, indirect and indispensable environmental services to a further extent
  - Prioritise environmental goods within regulatory cooperation and/or TBT chapters
  - Consider more liberal rules of origin for environmental goods
  - Regulate subsidies to encourage environmental goods trade and production
  - Actively search for remaining barriers to environmental goods trade
  - Provide a mandate to address environmental goods in committee meetings
  - Highlight environmental goods in other international (environmental) agreements

These recommendations provide a way forward to use trade policy more effectively as a tool in the green transition and to boost trade in environmental goods.

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1 Introduction

Supporting the diffusion of environmentally friendly goods and technologies has long been recognised as one of the core contributions that trade policy can make to facilitate the transition to an environmentally sustainable world economy. Trade barriers to environmentally friendly goods make the green transition more expensive than necessary, exacerbating an already massive challenge. In addition, recent global developments have made the move to decarbonise our energy supply and economy in general more urgent, and trade policy could play a facilitating role in this.

Efforts to promote[1] trade in environmental goods have been on the multilateral trade policy agenda since the start of the Doha round in 2001, with the most promising efforts made during the Environmental Goods Agreement (EGA) negotiations between 2014 and 2016. Since those negotiations fell apart, large-scale plurilateral negotiations have been put on hold. The issue reappeared on the plurilateral level in 2020, when talks were reopened in the WTO within the Trade and Sustainability Structured Discussions (TESSD).[2] However, the outcome of the discussions is still uncertain, and even if they do result in a decision to move forward with negotiations, negotiations at the multi- and plurilateral level within the WTO are known to be lengthy.

Consequently, countries aiming to diffuse environmental goods and services via trade policy have used ongoing negotiations for bilateral or regional trade agreements. In the last 15 years, 50 countries (counting the EU as one) have included provisions that aim to encourage trade in environmental goods in some of their regional trade agreements (RTAs).[3] The EU has included such provisions in all its RTAs since 2011 and has emphasised the promotion of trade in environmental goods and technologies as an integral part of its trade strategies since 2012.[4]

While several important reports have recently been published on the topic of trade in environmental goods,[5] evidence of the trade effects of the inclusion of environmental goods provisions in trade agreements is scarce. Previous empirical work has focused on analyses of single RTAs with environmental goods provisions,[6] or looked at a slightly different question.[7] There is thus a need for empirical evidence of the effects

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1 Throughout this report, we will use the words “promote”, “encourage”, and “facilitate” trade in environmental goods interchangeably.

2 One aim of TESSD is to explore opportunities, partnerships, and possible approaches for promoting and facilitating trade in environmental goods, including encouraging the global uptake of new and emerging low-emission and other climate friendly-technologies.

3 For the purpose of this report, we define regional trade agreements (RTAs) the same as the World Trade Organization. RTAs are reciprocal trade agreements between two or more partners. See: https://www.wto.org/english/tratop_e/region_e/scope_rta_e.htm

4 The Trade Strategies of the European Commission: Trade, Growth, and Development (European Commission, 2012). Trade for all (European Commission, 2015). An Open, Sustainable and Assertive Trade Policy (European Commission, 2021).

5 For example: Bellman & van der Ven (2020), OECD (2021), World Trade Organization (2022), World Economic Forum (2022), and Bellmann & Sugathan (2022).

6 The EU – Republic of Korea RTA has been studied by Norell (2020), while the ex-post evaluation of the RTA between the EU and Central America includes a descriptive analysis too (DG Trade 2022).

7 De Melo & Solleder (2022) come closest to our research question. Cantore & Cheng (2018) and Brandi et al. (2019) use slightly different variables of interest (environmental regulatory stringency

of environmental goods provisions to study whether the current approach is sufficient to achieve the desired diffusion of environmental goods and technologies.

1.1 Purpose of the report

The main purpose of this analysis is to empirically investigate whether RTAs that include provisions that aim to encourage trade in environmental goods, affect trade flows of environmental goods. As EU trade policy is especially relevant for Sweden, we isolate the effect of EU RTAs with environmental goods provisions. This allows us to assess if the objective to boost trade in environmental goods, as stipulated in the EU's Trade Strategy, is fulfilled.

However, as we will discuss in more depth below, the exact goals of these provisions are uncertain. They could aim to increase trade in environmental goods in absolute terms or aim to increase trade in environmental goods in relative terms. The latter aim would mean that trade in environmental goods increases by more than trade in other industrial goods, thus making trade greener.

As a result, this report aims to answer the following questions:

1. Do RTAs that include environmental goods provisions affect absolute trade in environmental goods?
2. Do RTAs that include environmental goods provisions affect relative trade in environmental goods? Put differently, do they affect trade in environmental goods more than trade in other industrial goods?
3. Is the effect of RTAs that include environmental goods provisions different for EU RTAs compared to the effect of other RTAs?

We end this report with a discussion of potential ways forward to enable trade policy to play a facilitating role in the diffusion of green goods. We build on the findings in this report and earlier work of trade policy experts at the National Board of Trade to put forward a number of concrete recommendations.[8]

1.2 Structure of the report

The rest of the report is structured as follows. In the second chapter, we discuss the background of this report, operationalise the questions and provide relevant descriptive statistics. The third chapter presents the data sources, while the fourth discusses the methodological framework. Finally, we present the results, the conclusions and policy recommendations. The Appendix contains more detailed information on the methodology and provides a wider overview of trade in environmental goods.

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and the number of environmental provisions in RTAs, respectively). Baghdadi et al. (2013) look at the effect of RTAs with environmental goods provisions on emissions.

[8] We specifically build on earlier reports within this domain at the National Board of Trade. For instance, the 2020 report on "Trade Barriers to Goods and Services Important for Climate Action" (See the link here: Trade policy is underutilised in helping to achieve climate goals | Kommerskollegium), and the 2021 report on "Trade and Climate Change: Promoting Climate Goals with a WTO Agreement" (see the link here: Promoting climate goals with a WTO agreement | Kommerskollegium).

2 Background

This chapter sets the stage for the main analysis and provides the necessary background information on environmental goods trade and environmental goods provisions in RTAs. More concretely, the first part of this chapter introduces environmental goods and discusses how we define them. Furthermore, it provides an overview of global developments in trade in environmental goods since 2000. In the second part of the chapter, we develop our interpretation of environmental goods provisions in RTAs, and discuss their goals and the policy instruments used to achieve them. The last part elaborates on the EUs approach towards environmental goods.

2.1 Environmental goods

2.1.1 What is an environmental good?

The definition of environmental goods is still an open question, and no universally accepted definition exists. An early proposal by the OECD interprets the set of environmental goods to cover "goods that measure, prevent, limit, minimize, or correct environmental damage" (OECD and Eurostat, 1999). However, this definition leaves room for interpretation and there continue to be different views on definitions and classifications of environmental goods. Below, we address several challenges surrounding the definition question and elaborate on our choice of definition.

There are several issues directly related to the definition question. First, several goods have *dual-uses*, which means that the good can be used for environmentally friendly and non-environmentally friendly purposes. Second, *environmentally preferable products* are goods that, at a given time, are less environmentally harmful compared to the alternative. An example of the former is a multimeter[9], and examples of the latter are an energy-efficient refrigerator or low-emission steel.[10] These issues have their roots in the "universal language for international trade", the Harmonized System (HS, developed by the World Customs Organization). This system is a classification nomenclature that assigns a code to goods depending on their characteristics but does not provide a unique code for every individual product (or its end-use). A partial solution is to split up an HS code (that is, create *ex-outs*) into a more detailed level where environmental and non-environmental uses and characteristics can be distinguished. This then allows negotiators and analysts to deal with the issues of *dual-use* and *environmentally preferred products* at least partly. It does not, however, provide an optimal solution to all challenges.

Different proposals to define the set of environmental goods have been made. Two lists come from plurilateral trade negotiations. The first is in use within the Asia-Pacific Economic Cooperation (APEC) framework, the second one is the

[9] A multimeter is a device used to measure voltage, resistance, or current. The non-environmental application is a do-it-yourself tool around the house, but more advanced models can be used to improve energy efficiency of smart grids and renewable energy systems (WEF 2022).

[10] See, amongst others, Steenblik (2005) and National Board of Trade (2021)

never-finalised list of the Environmental Goods Agreement negotiations that failed in 2016. The ongoing negotiations for an Agreement on Climate Change, Trade and Sustainability (ACCTS) will most likely also present a list in the near future. In addition, a small number of bilateral trade agreements include an annex with a proposed list of environmental goods, most notably the recent trade agreements that New Zealand has concluded with the UK and the EU.[11]

For analytical purposes, the OECD (Sauvage, 2014) and UNEP (2018) have compiled comprehensive lists of environmental goods. In addition, several lists have more of a sectoral focus, such as ICTSDs lists relating to buildings, renewable energy and transport, and the National Board of Trade's (2020) list of goods relevant for cleaner road transport. Lastly, the World Bank (2008) and World Economic Forum (2022) have produced lists with a specific focus on climate goods.[12]

With this in mind, we choose to use two of these lists for the analysis for this study. The first is the OECD Combined List of Environmental Goods (CLEG) list from 2014 (Sauvage, 2014), and the second is the World Economic Forum's Reference List of Climate Goods from 2022 (WEF, 2022). We believe that the lists reflect an objective view of what should be considered an environmental or climate good, as they are not a result of political considerations and negotiations. These lists are comprehensive and cover a broad range of goods from different sectors. Another benefit is that one list focuses on environmental goods more broadly and has been used for a decade now, while the second one has a narrower focus on climate goods and reflects recent technological advances. As a result of using existing lists, we forego the discussion of whether to include *dual-use* goods and how to deal with *environmentally preferrable products*. The OECD list and the WEF list include both types of goods.[13] The WEF list also includes *ex-outs* for some of the HS codes and due to data limitations, we have to include the trade flows of the entire HS code in our analysis.[14]

2.1.2 Stylised facts: Trade in environmental goods since 2000

This section provides an overview of the development in global trade in environmental goods between 2000 and 2020. **Figure 1** shows the total value of global trade in three sets of goods: environmental goods on the OECD list, environmental goods on the WEF list, and other industrial goods. Trade values are expressed in natural logarithmic values to assess the development of growth rates of these trade flows. Since 2000,

[11] Four different RTAs have specified lists of environmental goods: The Partial Cooperation and Trade Agreement between Argentina, Brazil and Uruguay, The agreement between New Zeeland and the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu on Economic Cooperation, New Zeeland-UK FTA, and a non-exhaustive and illustrative list in the EU-New Zeeland trade agreement.

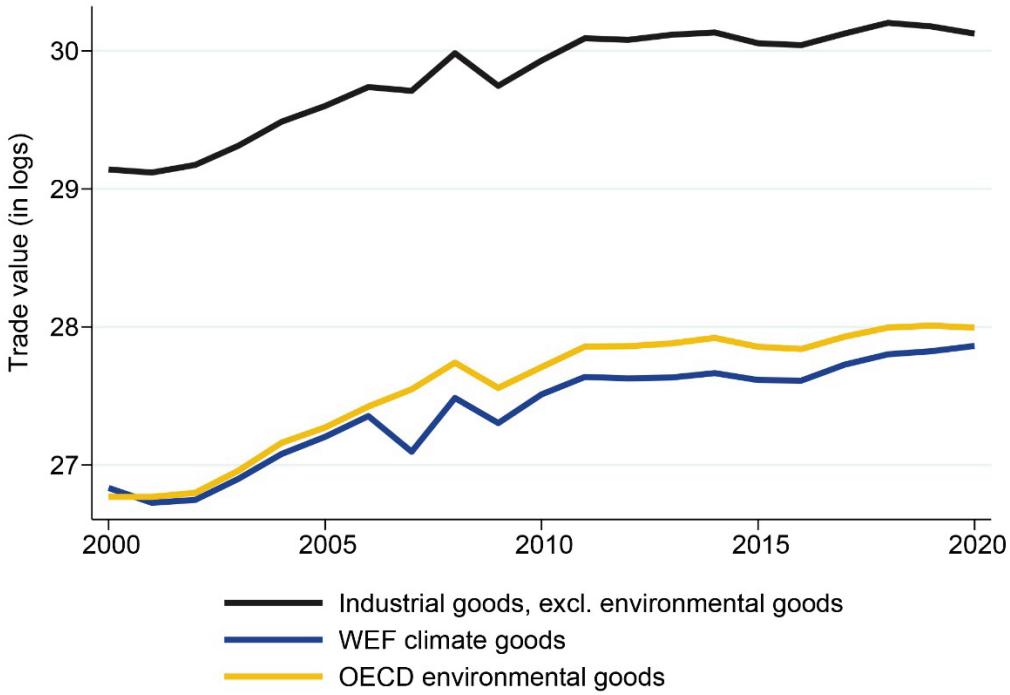
[12] For a discussion of the differences between some of these lists, see amongst others National Board of Trade (2021) & UNEP (2018).

[13] This implies that increased trade in these goods does not necessarily lead to improved environmental quality or emission reductions.

[14] As a result, we include more goods than strictly intended by the WEF in our analysis, but we have no reason to believe that this should disproportionally affect our results.

trade flows of environmental goods and other industrial goods have followed the same trend.[15] The first decade is characterised by substantial growth in trade in industrial and environmental goods, whereas growth stagnated since 2011 for both types of goods. This change in pace of growth rates is indicative of a general slowdown in global trade flows since the Financial Crisis of 2008 and is important background to interpreting the analysis in the next section.

Figure 1. Development of global trade flows between 2000 and 2020, by type of good



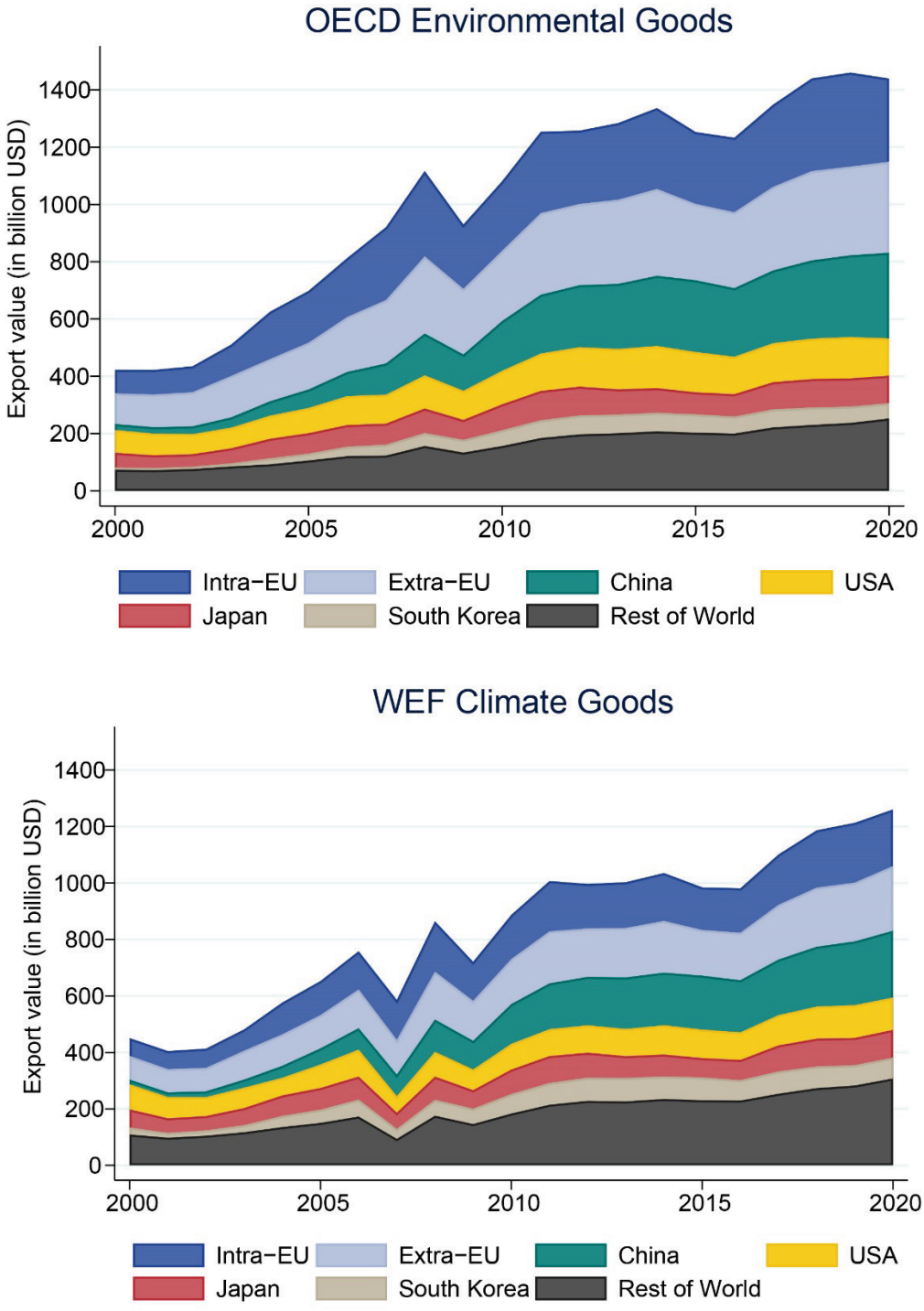
Notes: Trade data comes from UN Comtrade. Authors' calculations. Natural logarithmic transformation applied to the absolute trade flows to facilitate assessment of growth rates.

If we look at absolute trade values, global trade in environmental goods increased from USD 400 million in 2000 to over USD 1300 million in 2020, for both the OECD and WEF lists (See **Figure 2**). The average annual growth rates of global trade in environmental goods range between 7 and 9 percent for the years 2000–2011 and slow down to 1–2 percent between 2011 and 2020. The EU is the largest exporter of environmental goods to external partners. In addition, about half of the EU trade in environmental goods is between EU Member States. China, the US, Japan, and South Korea are the four next largest exporters of environmental goods, and especially noteworthy is the emergence of China as a major exporter since 2000. As China does

[15] We focus solely on industrial goods in this analysis only. For this report, industrial goods are defined as all goods other than agricultural goods (e.g. those listed in Annex 1 of the WTO Agricultural Agreement of 1995), and mineral fuels (all goods under HS chapter 27). The reason is that trade patterns in these two types of goods are driven by other determinants such as natural resource availability and decisions made by organizations such as the OPEC rather than trade policy.

not have many trade agreements with other large trading partners (other than Korea), a substantial part of global trade in environmental goods remains outside of trade agreements.

Figure 2. Largest exporters of environmental goods, by list



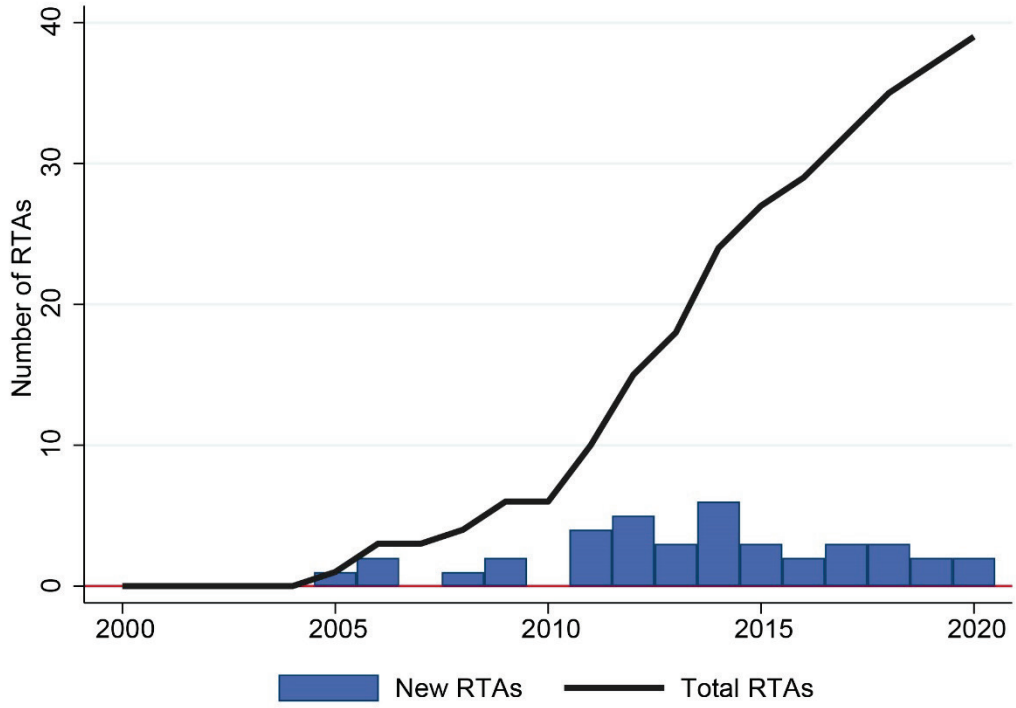
Notes: Trade data comes from UN Comtrade. Authors' calculations.

2.2 Environmental goods provisions in RTAs

The focus of this report is on trade agreements with provisions that aim to promote or facilitate trade in environmental goods, services, and technologies. The precise location of these provisions in the text of the agreements varies. Some have been introduced in horizontal chapters, others in specific commitments in the parties' tariff schedules and lastly some in sectoral chapters or annexes directed towards specific technologies or environmental problems (for example climate, energy efficiency, etc).[16] Explicit environmental goods provisions have been included in 39 RTAs between 2000 and 2020, as can be seen in **Figure 3**.

Over time, trade agreements that include environmental goods provisions cover an increasing share of global trade in environmental goods, as **Figure 4** shows. After the first trade agreement with environmental goods provisions entered into force in 2005, the share rose to roughly 10 percent of global EG trade by 2015 and doubled in the 5 years after. This latter increase is mostly due to the entry into force of Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) in late 2018, and United States–Mexico–Canada Agreement (USMCA) in 2020. Even though the number of RTAs with environmental goods provisions is relatively small, they do account for a substantial part of global trade (excluding intra-EU trade).

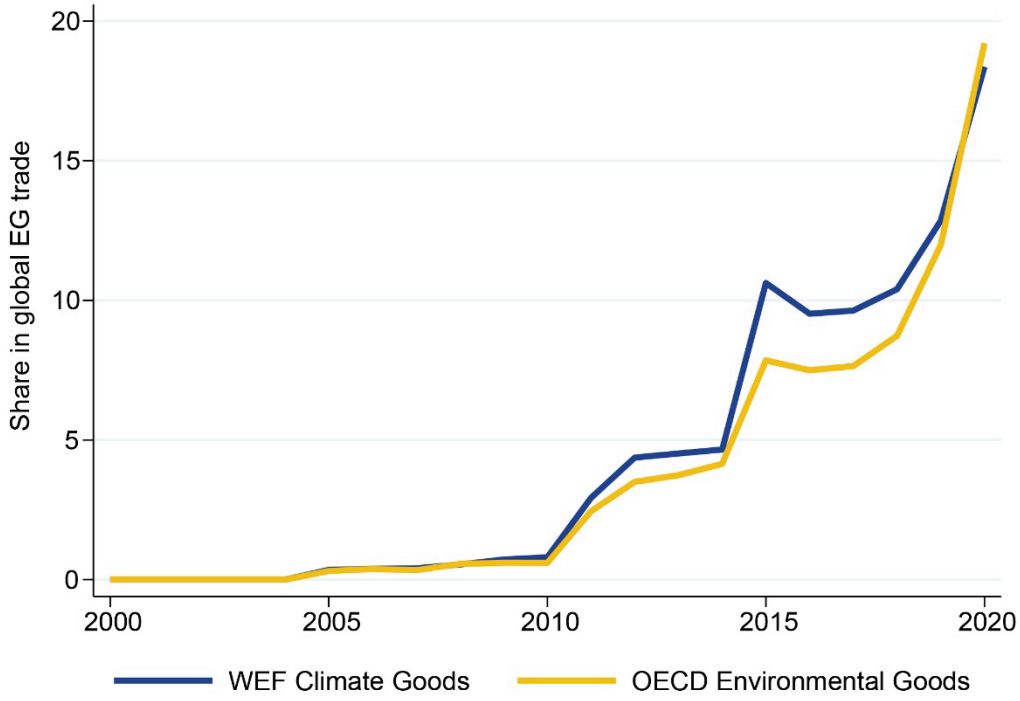
Figure 3. Number of trade agreements with environmental goods provisions, by year



Source: Trade & Environment Database (TREND), version 2 by Morin et al. (2018). Authors' calculations. For each year, the bar displays the number of new RTAs with environmental goods provisions that are (provisionally) applied. The line is the cumulative number of RTAs with environmental goods provisions.

[16] See Bellman & Sugathan (2022) for an overview.

Figure 4. Share of global environmental goods trade covered by RTAs with environmental goods provisions



Notes: Trade data comes from UN Comtrade. Authors' calculations. Data on RTAs with environmental goods provisions is based on Morin et al. (2018). For each year, we calculate the global trade in environmental goods between trading partners with an RTA with environmental goods provisions. We divide that by total global trade in environmental goods.

2.2.1 What do environmental goods provisions aim to achieve?

Environmental goods provisions within RTAs generally state that parties should work towards promoting and facilitating trade in environmental goods and services.[17] A more detailed goal is seldom provided. Therefore, it is difficult to interpret what the parties aim to achieve with the provisions. The aim of the provisions can be interpreted in different ways: (i) to increase the absolute trade in environmental goods, or (ii) to increase the relative trade in environmental goods. By this latter goal we mean that trade in environmental goods increases more than trade in other industrial goods. This may be the more intuitive goal for two reasons. First, most trade agreements have broad sustainability ambitions, and singling out environmental goods with explicit provisions must therefore mean they have an additional goal to boost trade in these goods. This is particularly the case for the EU, as it emphasises the

[17] CETA Article 24.9 reads:
"The Parties are resolved to make efforts to facilitate and promote trade and investment in environmental goods and services, including through addressing the reduction of non-tariff barriers related to these goods and services."

importance of greener and more sustainable trade in its three latest trade strategies.[18] Second, as the main purpose of RTAs is to lower trade costs and increase trade in general, an environmental goods provision would be redundant if the purpose is not to increase trade more in these goods than other goods. For these reasons, the most interesting outcome is the relative share of environmental goods in trade, which will be further discussed below.

2.2.2 What instruments are used to reach the goal?

In addition to the uncertainties as to the precise objectives of the environmental goods provisions, it is generally not specified which measures are taken. The inclusion of specific environmental goods provisions could imply that more has been or will be done, to encourage trade in environmental goods than goods in general.

Conceptually, there are three ways trade in environmental goods can be encouraged more than goods in general. First, special consideration could be given to environmental goods in the negotiation of the agreement. This could for example include an extra focus on these goods in negotiations on tariff schedules, regulatory cooperation, services chapter, and rules of origin. These areas have also been identified as some of the most important factors to focus on to promote environmental goods trade.[19] However, as tariffs for most industrial goods are normally liberalised in an RTA, environmental goods rarely receive favourable treatment within market access chapters. Furthermore, we do not have information on whether environmental goods receive a specific focus in other chapters of the agreements.

Second, environmental goods could receive a favourable treatment in the implementation of the agreement, i.e., within the work of specific committees after the agreement has entered into force. For example, environmental goods can be prioritised in regulatory cooperation or within market access committees addressing lingering barriers.

Third, environmental goods could receive favourable treatment in both the negotiation and implementation of the agreements. This approach would most likely generate the largest effect. With the available data, we cannot distinguish between these three different approaches. We therefore choose to analyse the aggregate effect of all potential efforts in the negotiation and implementation phases.

2.2.3 Stylised facts: Existing trade barriers

Environmental goods provisions claim to strive for facilitation of cross-border flows of environmental goods. This facilitation can be achieved through a reduction of tariffs, but also by working towards a reduction in costs associated with non-tariff barriers (NTBs). While we acknowledge that in general NTBs are much higher than

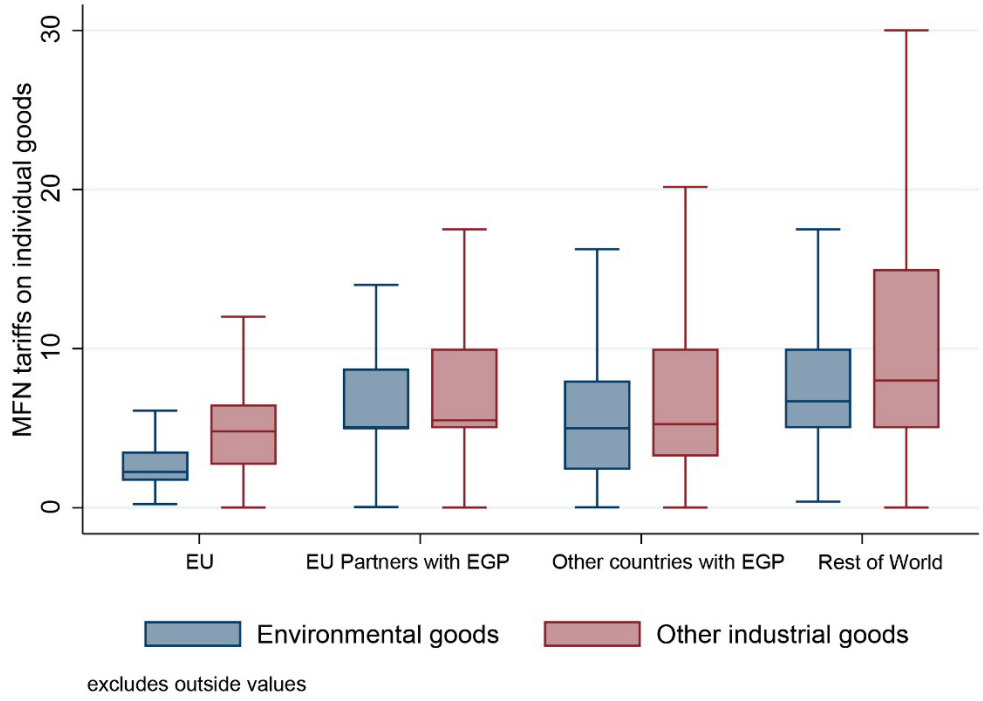
[18] The 2021 Trade Policy Review reads (European Commission, 2021):
"The EU's vast network of bilateral trade agreements facilitates trade in green technologies, goods, services and investments. In addition to providing for ambitious trade and sustainable development chapters, the sustainability dimension will continue to be reflected in many other aspects of the EU's trade and investment agreements. They support the diffusion of clean and more efficient production methods and technologies and create market access opportunities for green goods and services."

[19] See for instance the reports: NBT (2014) on services, NBT (2020b) on Rules of Origin, and NBT (2022) on regulatory cooperation.

tariffs, we do not have comprehensive data on the former. This section therefore focuses on existing tariffs on environmental goods.

The most direct way to lower trade costs is by lowering (or removing) tariffs on imports, as it allows for goods to be traded under preferential tariffs as opposed to the Most Favoured Nation (MFN) tariffs applied to non-partners. **Figure 5** shows a boxplot with the MFN tariffs on environmental goods (in blue) and other industrial goods (in red) for four different sets of countries. The EU applies lower MFN tariffs for environmental goods than for other industrial goods, but for the other three country groups this is not the case. A first take-away from this figure is that countries still apply substantial MFN tariffs. A second take-away is that potential trade cost reductions are lower for environmental goods, particularly for the EU, due to the lower MFN tariffs in general. For the other three country groups, this is not the case. However, even relatively low tariffs can accumulate to substantial trade barriers, as global supply chains often mean that components and parts cross borders several times before the completion of a product. Addressing these in trade agreements may therefore have a meaningful impact on prices.

Figure 5. MFN tariffs on individual goods, by type of good and country classification



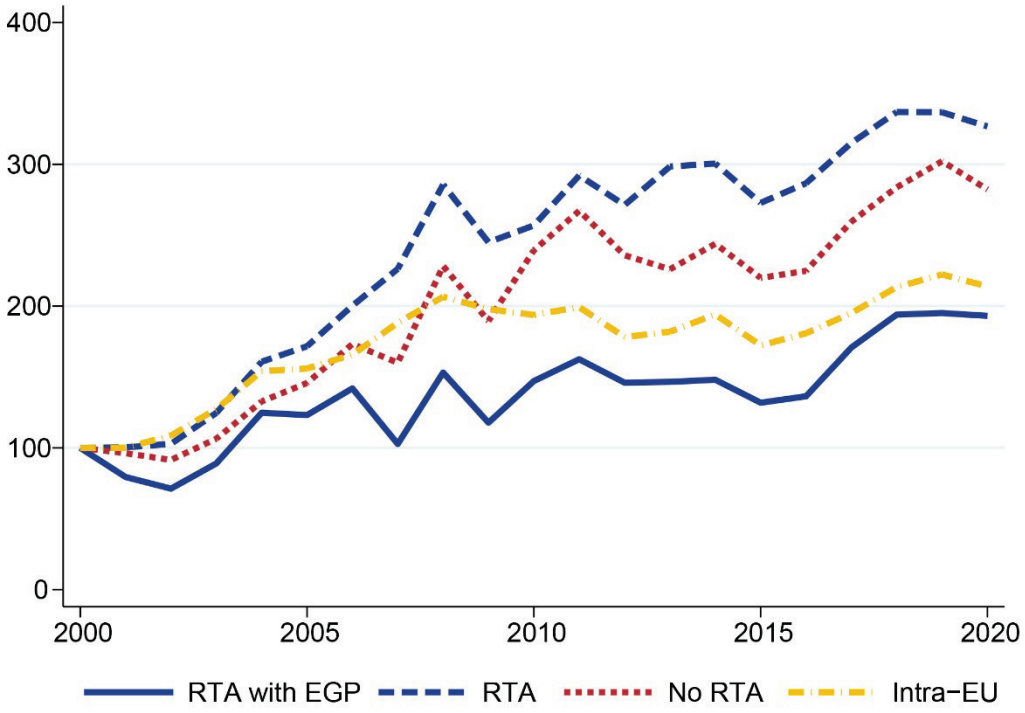
Notes: This boxplot[20] contains all MFN tariffs on individual environmental goods. Data comes from the TRAINS database of UNCTAD. The four country classifications are: (1) the European Union, (2) partner countries with which the EU has an RTA that includes EGP, (3) countries that have at least one RTA that includes EGP, not elsewhere classified, and (4) countries without an RTA that includes EGP. Boxplot excludes outliers.

[20] A boxplot summarises the median tariff, and the median of the bottom and top half of the distribution (the 25th and 75th percentile, respectively) within the box. The whiskers above and below the box are an indication of distribution outside this interquartile range. Outliers are not shown in this figure but do exist in the MFN data.

2.3 EU approach to environmental goods

The European Union has taken a special interest in boosting trade in environmental goods. **Figure 6** shows that the EU does indeed trade more in environmental goods every year with outside partners. In addition, intra-EU trade has almost doubled since 2000. The largest increase in extra-EU trade flows is with partners with which the EU has an RTA that does not include an environmental goods provision. These are partners such as Mexico, Chile, and the neighbouring countries of the EU. EU trade with partners without an RTA, such as the US and China, has almost tripled since 2000. Remarkably, the smallest increase is in trade flows with a group of countries with which the EU has an RTA that does include environmental goods provisions. The increase has trailed that of other partner countries and is now about twice as much as in 2000.

Figure 6. Indexed time trends for EU trade in environmental goods, by type of trade relationship (2000 = 100)



Notes: Trade data comes from UN Comtrade. Authors' calculations. If at any point between 2000 and 2020 the bilateral country pair has an RTA (with environmental goods provisions) in place, it is added to the "RTA (with EGP)" group for the entire time period of the figure. Similarly, trade between countries of which both are members of the EU at any time between 2000 and 2020 are classified as "Intra-EU" trade. All other bilateral country pairs are in the "No RTA" classification.

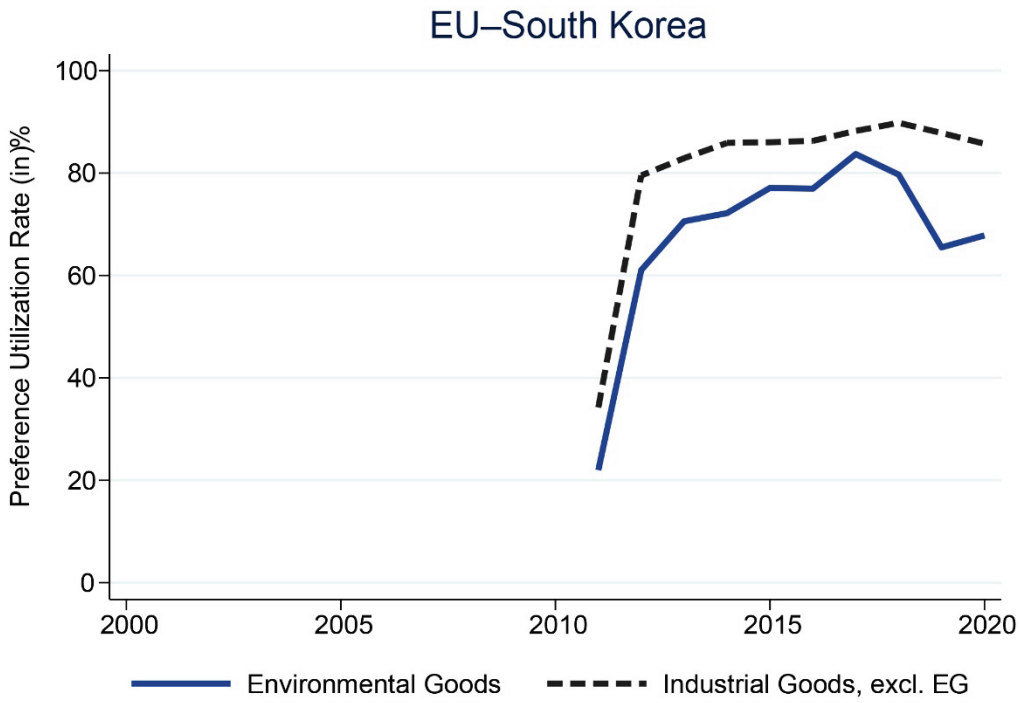
Once an RTA is in place, and tariffs are reduced or eliminated, importers can decide whether to provide the necessary documentation to trade under this preferential treatment. A finding of National Board of Trade (2022a) is that not all EU importers use the preferential tariffs that RTAs provide.[21] For the EU – South Korea FTA,

[21] See NBTS (2022a) for a complete discussion of potential reasons why this may be the case.

Figure 7 shows the preference utilisation rate (PUR) for environmental goods and all other industrial goods. The preference utilisation rate for other EU RTAs are presented in the appendix.[22]

The results in the figure show that the preference utilisation rate for environmental goods is generally lower than for other industrial goods. While a deep analysis of this finding is beyond the scope of this report, several speculative hypotheses could lie behind these results. One explanation for this could be that the MFN tariffs on EU imports are lower for environmental goods than for industrial goods, as shown in **Figure 5**. This makes the benefits of using the preferences lower for environmental goods than for other goods. Another potential explanation for the relatively lower preference utilisation rates could be that the economic structure of the value chains for environmental goods make it harder to comply with the rules of origin. Newly developed environmental goods may potentially be subject to strategic industrial policies as a means to achieve domestic green transition goals.

Figure 7. Preference utilisation rate (in %) for South Korean imports into the EU



Notes: data comes from Eurostat. Authors' calculations. The Preference Utilisation Rate (PUR) is the share of imports under trade preferences (reduced or eliminated tariffs) as a share of the total value of imports eligible for preferences.

[22] The Preference Utilisation Rate (PUR) is the share of imports under trade preferences (reduced tariffs) as a share of the total value of imports eligible for preferences. Goods for which the MFN tariff is zero are excluded from the calculation. About half of the total imports of environmental goods happen under an MFN-zero regime for the years covered in this report.

3 Data

This section introduces the four types of data we will use for the empirical analysis, their sources, and some key descriptive insights.

3.1 Trade data

Trade in goods data is obtained from the UN Comtrade database and includes all reporters and all partners in the dataset between 2000 and 2020. Country pairs tend to report different trade values for the same trade flow. We therefore take the average of the export value and the mirrored import value of the same trade flow if both values are reported, and otherwise we use the non-missing one.[23] In the end, our dataset contains 208 countries and regions for 21 years, with a total of 883,778 country-pair-year observations.[24]

UN Comtrade data is reported using the Harmonized System (HS) nomenclature. Since the HS nomenclature is regularly updated by the World Customs Organization to accommodate modifications, merges and divisions of existing codes and the introduction of new codes, our data requires conversion of earlier and later classification schemes at the product level. To do this, we apply the methodology developed by the United Nations Statistics Division to convert all trade data to the HS2012 classification scheme.[25] Following the suggestion of Yotov et al. (2016), we complement international trade goods flows with domestic trade flows to account for the trade-off of producers to sell to domestic or international consumers (see section 4.2). Domestic trade flows are calculated following a novel approach explained in the methodology section in the Appendix.

3.2 RTA data

Our RTA data is compiled by Dur et al. (2014), the Design of Trade Agreements (DESTA) Database.[26] It maps all international trade agreements since 1945, and the latest version contains more than 710 RTAs. The share of country-pair-year observations covered by RTAs increased from 10.5 percent in 2000 to 19.3 percent in 2020, and the value of global trade covered by RTAs was 25–30 percent between 2000 and 2020. The RTAs included in this analysis are diverse in terms of depth, and some may still only be provisionally applied. Some cover solely tariffs schedules, others have extensive side agreements on a variety of issues. Our analysis does not

[23] This follows the methodology of Baier et al. (2019).

[24] We drop dependent territories (from New Zealand, the UK, and the US) and similar entities (from Australia, Denmark, France, the Netherlands) from the dataset. Not every year has the same number of observations in the dataset, as countries may not report trade data for the entire period (this gives us an unbalanced dataset).

[25] For further information on HS-conversion, see explanations by the United Nations Statistics Division (2017).

[26] To be precise, we use version 2.1 (updated in January 2022). Accessible here: https://www.designoftradeagreements.org/

account for differences in RTAs aside from the inclusion of environmental goods provisions.

3.3 Environmental goods provisions

Data on RTAs containing provisions in support of trade in environmental goods comes from the TREND database, created by Morin et al. (2018). This database contains data on 300 different types of environmental provisions for each RTA in the DESTA database (see section 3.1.2), ranging from general provisions not to lower levels of environmental protection to specific clauses on sustainable trade in forestry products. For our purposes, we only use data on the three provisions that deal with the encouragement of production, trade, or investment in environmental goods and services.[27] The number of RTAs with environmental goods provisions increased from 1 in 2005 to 39 in 2020, as **Figure 3** shows.

3.4 Environmental goods

As discussed in the second chapter above, we use two separate lists of environmental goods for our analysis. These lists are developed by the OECD and the World Economic Forum, respectively. In the analysis, the OECD Combined List of Environmental Goods will be referred to as OECD Environmental Goods, and the WEF Reference List of Climate goods will be referred to as WEF Climate Goods. The OECD list consists of 243 HS 6-digit codes and the WEF list of 146 codes.[28] There is an overlap of 97 codes that are present on both lists. The pairwise correlation between these two lists (based on absolute bilateral trade flows) is 98.7 percent, indicating that large exporters of goods on the OECD list are very likely to be large exporters of goods on the WEF list too.

[27] The exact provisions in the DESTA database are: Encourage production of environmental goods and services (7.01.01); Encourage trade or investment in environmental goods and services – general encouragement (7.01.02.01), and Encourage trade or investment in environmental goods and services – specific encouragement (7.01.02.02).

Codebook and data are available here: https://www.chaire-epi.ulaval.ca/en/trend

[28] These numbers include ex-out codes for the WEF list.

4 Methodology

The purpose of this chapter is to briefly introduce the methodology used in this report. Readers looking for a complete discussion on the empirical strategy and econometric approach in more detail, we refer to the Appendix. Readers mainly interested in the results can skip to the next chapter without losing the thread of the report.

4.1 Gravity model of international trade

We use the gravity model of international trade to answer these questions. The underlying principle of the gravity model is based on Newton's theory of gravity, and builds on the assumption that larger, richer, and closer countries trade more with each other. The gravity model has been used extensively in the empirical international trade literature.[29]

The main outcome of the gravity model is an estimate of how much trade is affected by a reduction in trade costs due to the implementation of a trade agreement. Trade flows are determined by several factors, not all of which are relevant to answer our research questions. Therefore, we follow the academic literature and implement a strategy that allows us to isolate the effect of lower trade costs on trade flows. This strategy uses a large number of fixed effects, which allow us to remove variation in trade flows that we are not interested in. For instance, we include bilateral country-pair fixed effects.[30] These fixed effects take care of the influence of characteristics on trade flows that do not fluctuate over time between countries, such as distance, common language, common history.

We further include exporter-time and importer-time fixed effects. Both exporter-time and importer-time fixed effects capture time-varying characteristics such as domestic policies, income, population, and production capacities. Filtering out the effects that these characteristics have on trade flows allows us to estimate the effect of variation in the trade policy of interest, the introduction of a trade agreement with environmental goods provisions.

4.2 Our estimation strategy

The questions this report aims to answer require two distinct estimation strategies. A short explanation of our modelling choices is discussed here, and we refer to the appendix for a more detailed discussion. One element that both strategies have in common is the inclusion of domestic trade flows. Producers can sell their goods to domestic and foreign consumers, and trade policy likely influences this decision for

[29] For an intellectual journey through the development of the gravity model of international trade, see Anderson (1979), Eaton & Kortum (2002), Anderson & van Wincoop (2003) and Baier & Bergstrand (2007).

[30] Fixed effects are dummy variables which take the value 1 if certain conditions are fulfilled. In the case of bilateral country-pair fixed effects, the fixed effect of Sweden-United Kingdom takes the value 1 if the trade flow is from Sweden to United Kingdom and takes the value 0 for all other observations (incl. trade from the United Kingdom to Sweden).

firms. Therefore, we follow the academic literature on empirical international trade and include domestic trade flows into our analysis.[31]

In the first question, we are interested in estimating the effect of trade agreements with environmental goods provisions on *absolute* trade in environmental goods. For this, we follow the literature and estimate the gravity model using the PPML (Poisson Pseudo-Maximum Likelihood) estimator.[32] We estimate the following model:

$$\text{AbsoluteEG}_{ijt} = \exp\left(\alpha_1 \text{EGP}_{ij,t} + \beta_1 \text{RTA}_{ij,t} + \beta_2 \text{IntraEU}_{ij,t} + \pi_{ij} + \pi_{i,t} + \pi_{j,t}\right) + \nu_{ijt}$$

Here, $AbsoluteEG_{ij,t}$ is the absolute value of environmental goods exports from country *i* to country *j* in year *t*. *EGP*, *RTA*, *IntraEU* are dummy variables that take the value 1 if the trade flow is between countries that have a trade agreement with environmental goods provisions, a trade agreement in general, or are both EU member states, respectively. The π-terms are the bilateral country-pair, exporter-year, and importer-year fixed effects introduced above. Coefficients estimated by PPML are a first order approximation of the trade effect we are interested in.[33] Standard errors are clustered at the (non-directional) country-pair level to account for shocks to bilateral relations.

For the second question, we estimate the effect of trade agreements with environmental goods provisions on *relative* trade in environmental goods. As RTAs aim to reduce trade barriers across the board, the specific attention paid to environmental goods may also become visible as a larger share of environmental goods exports in total industrial goods exports. For our modelling choices, this means that the dependent variable is now, by construction, between 0 and 1, and we can therefore use the OLS estimator. We estimate the second model:

$$\text{RelativeEG}_{ij,t} = \alpha_1 \text{EG}_{ij,t} + \beta_1 \text{RTA}_{ij,t} + \beta_2 \text{IntraEU}_{ij,t} + \pi_{ij} + \pi_{it} + \pi_{j,t} + \upsilon_{ij,t}$$

Here, $\text{RelativeEG}_{ij,t}$ is the share of environmental goods in total industrial goods exports from country *i* to country *j* in year *t*. The other variables and fixed effects are defined as above, and standard errors are clustered at the (non-directional) country-pair level.

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[31] Yotov et al. (2016) lay out several reasons why the inclusion of domestic trade is important. See the Appendix for further discussion.

[32] In this, we follow Santos Silva & Tenreyro (2006) and many follow-up papers. For a more detailed discussion, see the Appendix.

[33] To be correct, one needs to do the following manipulation: Partial effect in percentages = $(e^{\gamma} - 1) \times 100$, where γ is any coefficient of the model. For small coefficients, the coefficient itself is a close approximation. In the results section below, the reported coefficients have already been transformed to percentages.

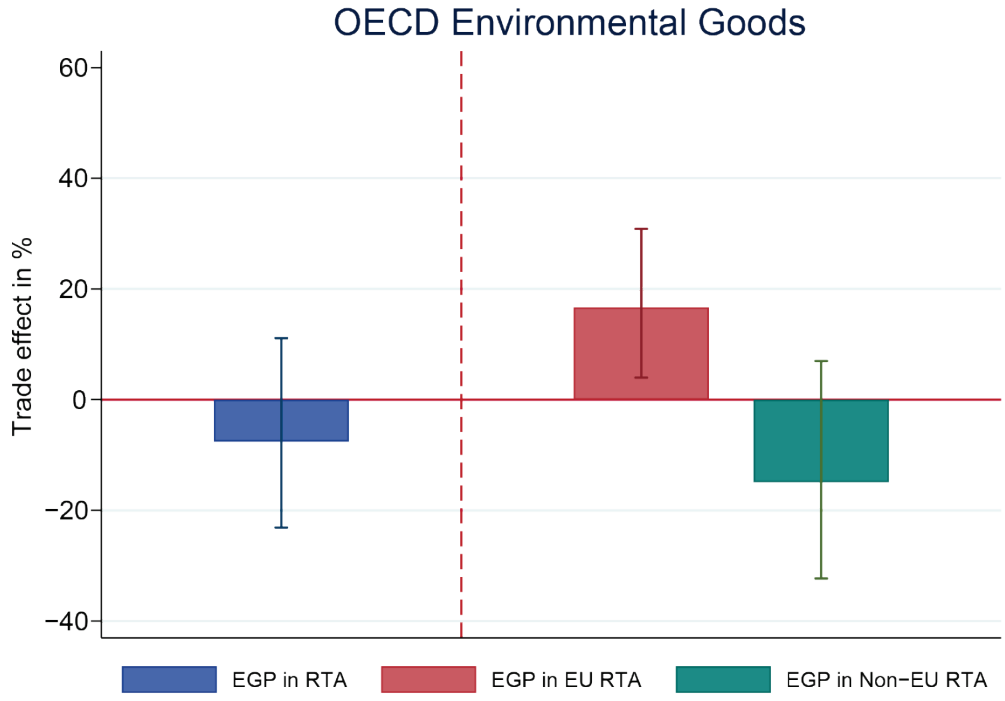
5 Results

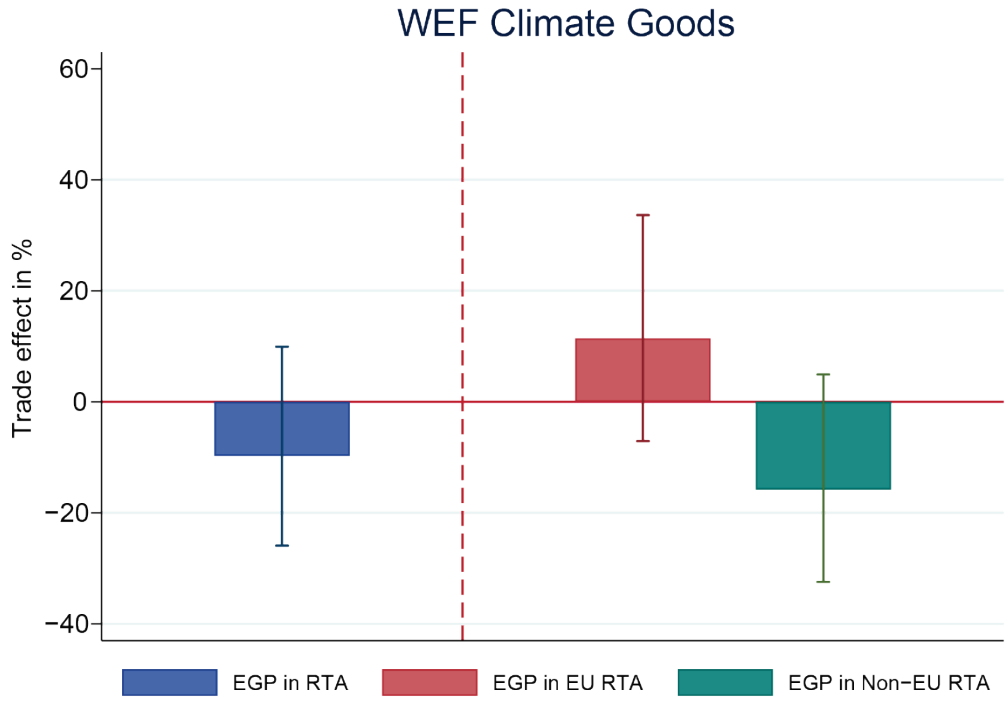
This chapter presents the results, following the methodology outlined in the previous chapter. All results are presented as figures, with the corresponding table analogues presented in the appendix. The interpretation of these figures is as follows: the bars present the estimated trade effect, and the vertical lines for each bar indicate the 95 percent confidence interval. This means that the values between the upper and lower limit of this confidence interval are not statistically different from the point estimate of the trade effect. Moreover, if the vertical lines cross the horizontal line at 0, it means that the results are not statistically different from zero (or insignificant).

5.1 Absolute environmental goods trade

The trade effect of RTAs with environmental goods provisions on absolute environmental goods trade flows is presented in **Figure 8**, for the OECD Environmental Goods list and the WEF Climate Goods list. For both lists, the blue bar on the left presents the overall effect. The red and green bars present the results when we divide the RTAs into two categories, EU-RTAs and non-EU RTAs, respectively.

Figure 8. Effect of RTAs with Environmental Goods Provisions on absolute environmental goods trade





Notes: Estimated results as per strategy outlined in chapter 4. Dependent variable is the absolute environmental goods trade. The bars present the estimated trade effect, and the vertical lines for each bar indicate the 95 percent confidence interval. See Appendix for more detail.

5.1.1 Overall effect of environmental goods provisions in RTAs

The overall effect of RTAs with environmental goods provisions on absolute trade in environmental goods is shown in **Figure 8**. This effect is not statistically significant from zero. Therefore, absolute trade flows in environmental goods are not higher between countries that have an RTA with environmental goods provisions in place than it is between countries that do not. This implies that concluding an RTA with environmental goods provisions does not lead to more trade in environmental goods. These results hold for both the OECD and WEF lists.

5.1.2 Specific effect of EU RTAs

The red and green bars in **Figure 8** show the specific trade effects of EU RTAs and non-EU RTAs with environmental provisions on absolute trade in environmental goods, respectively. Despite the estimated effect for EU RTAs on trade in *OECD Environmental Goods* being significant and positive, we should not draw too strong conclusions from this single positive estimate. This finding is not robust to different specifications (see for instance the weighted regression results in the appendix) and may be a statistical artifact through the multiple hypothesis testing problem.[34] As the EU RTA dummy is insignificant for the WEF list, the positive result for the OECD list could also indicate that there are a couple of goods exclusively on the OECD list that

[34] The multiple hypothesis testing problem stipulates that the more hypotheses one tests, the more likely it becomes that one of the hypotheses leads to an erroneous conclusion by *chance*. In this case, we test at least 12 specifications in the main part of the report and use a significance level of 95%, in which case this probability of a mistaken is 45% = (1 – 0,95^12).

drive these positive results for the EU RTAs. The effect of environmental goods provisions in non-EU RTAs is consistently indistinguishable from zero, indicating no effect.

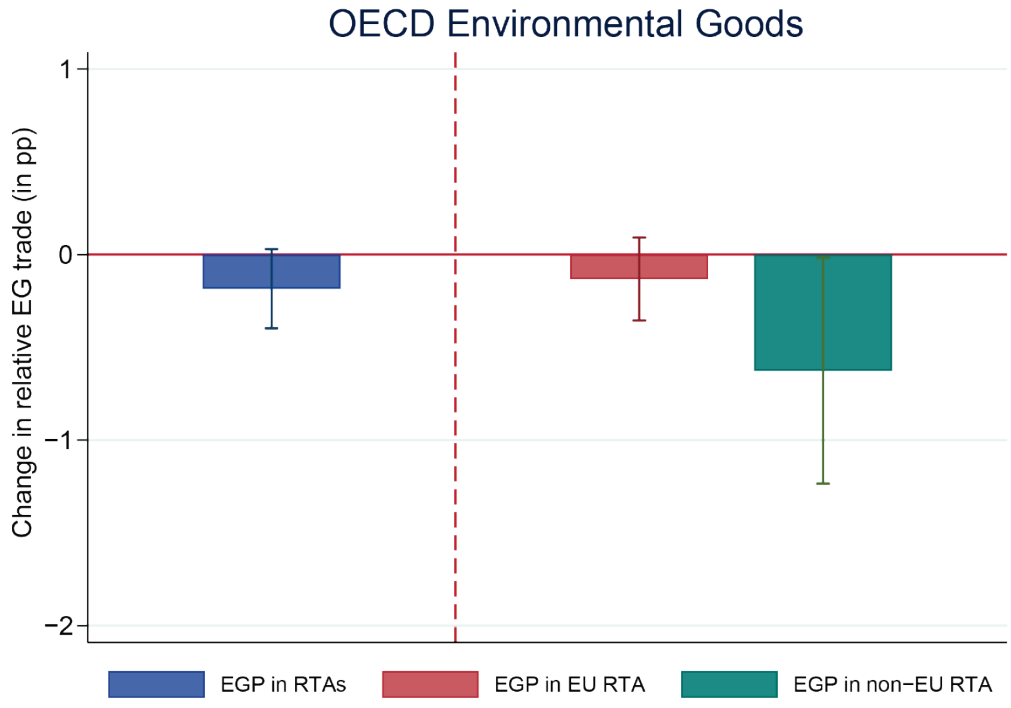
5.2 Relative environmental goods trade

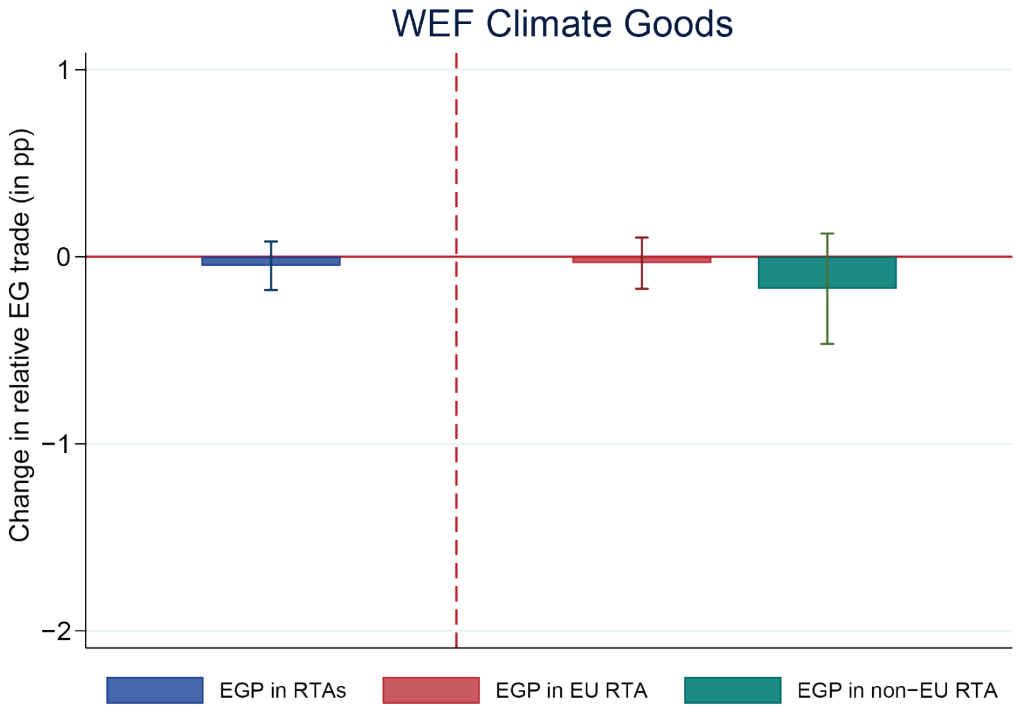
The second hypothesis is that the aim of the environmental goods provisions is to increase trade in environmental goods more than trade in other goods. This relative trade flow in environmental goods is defined as the share of environmental goods exports in total bilateral industrial goods exports. The results presented below answer the second research question.

5.2.1 Overall effect of environmental goods provisions in RTAs

The effect of the inclusion of environmental goods provisions in RTAs on the share of environmental goods in total bilateral trade is shown in **Figure 9**. The overall effect (in blue) is not significantly different from zero for both goods lists, indicating that these provisions have no effect on the relative share of environmental goods in total exports. Therefore, after the entry into force of a trade agreement with environmental goods provisions, we do not see a change in the composition of exports. This is a natural consequence of the weak results from the analysis of the absolute trade flows. A positive effect on relative trade in environmental goods would under these circumstances most likely have required a reduction in trade in other industrial goods, which is unlikely to be the intention of policy makers.

Figure 9. Effect of RTAs with Environmental Goods Provisions on relative environmental goods trade





Notes: Estimated results as per strategy outlined in chapter 4. Dependent variable is the relative environmental goods trade. The bars present the estimated trade effect, and the vertical lines for each bar indicate the 95 percent confidence interval. See Appendix for more detail.

5.2.2 Specific effect of EU RTAs

Just as for RTAs in general, we find no evidence of a differential effect of EU RTAs with environmental goods provisions on relative trade in environmental goods (see **Figure 9**). There seems to be no change in the composition of exports after an RTA with environmental goods provisions is applied. In similar fashion, RTAs concluded by two (or more) non-EU partners also have no significant impact on the share of environmental goods.

6 Conclusions and discussion

Environmental goods can facilitate the transition towards a greener economy and introducing efficient tools to promote the diffusion of these goods is a relevant question within trade policy. However, due to the lack of progress at the multilateral level, many countries, including the EU, have included environmental goods provisions with the aim to encourage trade in these goods in their (bilateral) RTAs. No studies have comprehensively assessed the trade effects of RTAs with such provisions on trade flows in environmental goods. The purpose of this report is therefore to empirically assess if RTAs that include environmental goods provisions affect trade flows of environmental goods, with a specific focus on the EUs RTAs.

The analysis shows that, in general, RTAs with environmental goods provisions do not have a statistically significant effect on absolute or relative trade flows in environmental goods. Trade flows between countries that have an RTA with environmental goods provisions are not larger than trade flows between countries without such an RTA. There is some weak evidence that within EU RTAs, trade in environmental goods on the OECD list is slightly larger than it would have been without these provisions, but this finding is not robust. In all other specifications, we find that RTAs with environmental goods provisions do not boost absolute or relative trade in environmental goods.

There are a number of potential explanations behind the lack of significant trade effects. As discussed in sections 2.2.3 and 2.3, MFN tariffs on environmental goods are generally lower than MFN tariffs on other industrial goods, and preference utilisation rates tend to be lower for environmental goods. On top of that, around half of environmental goods are traded under MFN-zero regime. Therefore, the realized reduction in trade costs contained within the RTAs may not be sufficiently large to boost trade in environmental goods.

In addition, two other potential explanations may lie behind the predominantly insignificant results of our analysis. As shown in **Figure 1**, global trade has stagnated since 2011. Therefore, RTAs that have been concluded since then may not have the same positive trade effect as previous studies have found.

A last potential explanation is the selection of partner countries for the RTAs that include these provisions. As there is no indication that the EU chose these 13 partners for their relevance in environmental goods production, this could be another plausible explanation of the absence of statistically significant effects. For instance, the partner countries of the 13 RTAs with environmental goods provisions that the EU concluded became less important in global trade in environmental goods over time. Although these countries represented 28 percent of global environmental goods trade in 2000, this number decreased to 21 percent by 2020.

There are also at least two limitations to our analysis. The first limitation is that most RTAs with environmental goods provisions have (provisionally) entered into force in very recent years, with the majority since 2014. If we combine the phasing in of trade agreements with the empirical finding that it takes time for trade effects to become visible in the data, this could be an explanation of the insignificant results above. We

may simply need to wait a few years before the true trade effects become visible in the data.

The second limitation is more technical in nature. We only observe 39 RTAs with EGP in our dataset, and these correspond to about 2 percent of the non-directional-bilateral-pair-year observations. Therefore, statistical power may be limited to detect small effect sizes.

Nevertheless, the findings suggest that the inclusion of environmental goods provisions in RTAs is not a particularly effective method to achieve the objectives of diffusing environmental goods and *greening trade* with trade policy.

7 Policy recommendations

Our conclusions leave us with the question of what can be done to further encourage trade in environmental goods. In this section, we introduce recommendations on the way forward. These recommendations are predominantly based on the structure of EU trade policy but could equally apply to other trading partners. We base our recommendations on the findings in this report, but also on extensive work on this topic done previously by the National Board of Trade.

The best solution would be to create a multilateral or plurilateral agreement within the WTO with the aim to globally remove trade barriers to environmental goods and services. This should then be coupled with the removal of other environmentally distortionary policies, such as fossil fuel subsidies. Such an agreement would create the best preconditions for more sustainable global trade and facilitate the green transition through trade policy. We refer the interested reader to our comprehensive report on such a trade-and-climate agreement from 2021, where we outline the legal design, selection of goods and services, handling of non-tariff barriers, and include a proposal for fossil fuel subsidy reform (NBT, 2021). To enable the development of such an agreement, the EU should be proactive and act as a leader in the discussions within the Trade and Environmental Sustainability Structured Discussions to help transform these discussions to active negotiations or join and help expand current initiatives such as the Agreement on Climate Change, Trade and Sustainability.

However, as it is unclear if and when such an agreement can be in place, countries with higher environmental sustainability ambitions could step up their efforts within bilateral and regional trade policy. Below, we will provide concrete recommendations of what the EU and other countries could do before negotiations, during negotiations, and after the conclusion of an RTA to further encourage trade in environmental goods. These recommendations aim to ensure good governance and to encourage mainstreaming of environmental goods in RTAs. We do not suggest replacing the existing environmental goods provisions with the recommendations below, we view these recommendations as a complement to the existing environmental goods provisions in RTAs.

7.1 Ensure good governance

Currently, the objective and expected impact of environmental goods provisions in RTAs is not clear. A first step should be to specify the definition of an environmental good. Ultimately, the EU should, just as in the FTA with NZ, provide an open-ended list of goods that they aim to promote. Second, the EU should also specify what the goal of the provisions is. Does the policy aim to increase trade in environmental goods, or increase trade in environmental goods more than other industrial goods? Without such a specification, assessments and reviews of the policy will be hard to conduct, and thus also complicate accountability. Third, the EU should also better communicate through which measures they intend to reach the policy goal of promoting trade in environmental goods. More clarity regarding the intended mechanism to reach the policy goal increases transparency and enables a better understanding and review of the policy by stakeholders. These stakeholders could also assist in improving the policy through contributing with their expertise. Lastly, the EU should conduct more detailed ex-post analyses of developments within environmental goods trade between the EU and partner countries and adjust their approach if policy goals are not fulfilled.

7.2 Mainstream the promotion of environmental goods in EU RTAs

7.2.1 During negotiations

To promote trade in environmental goods, the EU could choose two approaches during the negotiations. The first choice requires strengthening environmental goods provisions in the TSD chapter. This can be done by explicitly stating that the purpose of the environmental goods provision should be considered throughout all negotiation phases. For instance, explicitly stating how other chapters should consider environmental goods would strengthen the provision. A second approach involves looking beyond market access and TSD-chapters. Previous studies have suggested a menu of options of what can be done to facilitate and encourage trade in environmental goods in other chapters. These include:

Liberalise non-core, indirect and indispensable environmental services to a further extent

Apart from the climate benefits that liberalisation of certain services could achieve by themselves, liberalisation of services can also facilitate, or even be indispensable to, trade in environmental goods (NBT, 2014). Therefore, to maximise the potential for increased trade in environmental goods, the EU should always integrate an "encouragement of environmental goods perspective" in negotiations of services chapters in its RTAs.

Prioritise environmental goods within regulatory cooperation and/or TBT chapters

The prioritization of environmental goods within EU RTAs could include more far-reaching regulatory cooperation commitments for environmental goods. Several options stand out. First, more could be done to exchange research and regulatory impact assessments in sectors producing environmental goods. So-called policy labs could be set up for regulators and businesses from the RTA parties to jointly discuss and propose technical requirements or agree on common measurement methods. RTA partners with similar conformity assessment procedures could negotiate mutual recognition agreements and sectoral annexes for environmental goods.[35]

Consider more liberal rules of origin for environmental goods

Relaxed rules of origin for environmental goods could enable enhanced utilisation of preferential tariffs within EU RTAs. The EU has already adopted more generous rules of origin for other sustainability purposes, for example to facilitate imports from least-developed countries in the Everything But Arms agreement and to support products produced by Syrian refugees in the EU-Jordan Compact (NBT, 2020b). This could also be extended to raw materials and intermediate inputs used for environmental goods further up the value chain. A second suggestion would be to assure that the rules of origin do not disfavour environmental goods compared to other industrial goods, as has been shown in other studies (NBT, 2020a). A more ambitious approach would be to actively encourage trade in environmental goods within RTAs via the design of rules of origin. This could be done via a higher allowance of non-originating inputs among the product specific rules, cumulation, or tolerance rules. An example is the recently agreed Singapore-Australia Green Economy Agreement, in which there is an article on rules of origin for environmental goods.[36]

Regulate subsidies to encourage environmental goods trade and production

Domestic production and consumption subsidies can affect cross-border trade in environmental goods. RTA partners could reaffirm that local content requirements for government support are forbidden within the WTO framework and distort the diffusion of environmental goods. On top of that, fossil fuel subsidies make a subset of environmental goods less attractive to domestic and foreign consumers. RTA partners could therefore agree that these subsidies should be phased out (along the lines of the provisions of the EU-Singapore and EU-New Zealand agreements). However, depending on the scope and type of the subsidy, the risk of leakage and competitiveness considerations need to be considered when designing the phase-out provisions.[37]

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[35] For a deeper discussion on policy labs and best practices within regulatory cooperation on TBT, see NBTS (2022b)

[36] Singapore-Australia Green Economy Agreement Article 9a(xi):
"Explore principles and proposals put forward by either side on the rules of origin (ROOs) for environmental goods which facilitate trade, recognise modern sustainable production methods and logistics, and take into consideration supply chain realities and evidence-based analysis."

[37] For a complete overview of how subsidies chapters in RTAs can affect trade in environmental goods, we refer to the excellent overview in the OECD report by Yamaguchi (2020)

7.2.2 After negotiations (implementation of the agreement)

After the completion of the agreement, trade in environmental goods can be further encouraged via focused work within committees and bilateral dialogues that are a part of every EU RTA. As the EU members states do not normally take part in these meetings, and the meeting reports drafted by the European Commission tend to be brief, it is not clear if encouragement of trade in environmental goods is prioritised within these committees. We conclude that more needs to be done to promote trade in environmental goods, and the Commission should take the opportunity to broaden its work during the implementation of the agreement, to maximise the potential of environmental goods trade. Our proposals are to:

Actively search for remaining barriers to environmental goods trade

The EU could create a system through which lingering barriers are proactively mapped as opposed to a reactive approach where assistance is requested from firms and associations. Stakeholders, together with the European Commission could work on mapping and identifying barriers to environmental goods trade in an active manner. A review of the progress made every two years would promote targeted efforts to resolve barriers.

Provide a mandate to address environmental goods in committee meetings

Include environmental goods discussions in the terms of reference for committees and regulatory cooperation forums, to enable committee members to focus on barriers to environmental goods trade. If multiple issues are equally important to address in these committee meetings, prioritise those related to environmental goods to facilitate the green transition.

Highlight environmental goods in other international (environmental) agreements

Trade barriers themselves may not be the largest sources of barriers to trade for environmental goods. For instance, in the case of li-ion batteries, the international agreement that regulates transport of these batteries constitutes a barrier to trade (NBT, 2023). Thus, the EU should aim to simplify and streamline rules in other international environmental agreements that affect cross-border trade in environmental goods.

7.3 Concluding remarks

This section provided a way forward to use trade policy more effectively as a tool in the green transition and to boost trade in environmental goods. In the absence of multilateral or plurilateral progress, we build on the findings in this report and earlier work of trade policy experts at the National Board of Trade to put forward a number of recommendations. Ensuring good governance and mainstreaming a discussion on trade in environmental goods during the negotiation and implementation phases of the agreement could facilitate the diffusion of environmentally friendly goods.

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9 Sammanfattning på svenska
Summary in Swedish

Att främja spridning av klimat- och miljövänliga varor och teknologier har länge setts som handelspolitikens viktigaste bidrag till övergången mot en miljömässigt hållbar världsekonomi. Men nuvarande handelshinder gör den gröna omställningen dyrare än nödvändigt, vilket förvärrar en redan enorm utmaning. I ett försök att minska dessa hinder har flera länder inkluderat explicita åtaganden om miljövaror i sina (bilaterala) regionala handelsavtal. Dessa åtaganden syftar till att främja, underlätta eller på olika sätt stödja handel med miljövaror. Men vilken effekt får den här typen av åtaganden? I den här utredningen har vi empiriskt undersökt om regionala handelsavtal med åtaganden om miljövaror påverkar handel med miljövaror.

Vår utredning visar att regionala handelsavtal som inkluderat åtaganden om miljövaror näst intill uteslutande inte har någon statistiskt signifikant effekt på handel med miljövaror. Med andra ord: handelsflödena mellan länder som har tecknat ett regionalt handelsavtal med åtaganden om miljövaror är, allt annat lika, inte större än handelsflöden mellan länder utan sådana avtal. När vi analyserar EU:s regionala handelsavtal specifikt är resultaten detsamma. Detta betyder att de angivna målen för miljövaror inte uppfylls.

Resultaten till trots kan åtaganden om miljövaror fortfarande vara ett sätt att skapa medvetenhet och främja diskussionen om spridning av dessa varor. Men så som åtagandena är utformade i dess nuvarande form verkar inte vara en särskilt effektiv metod för att uppnå målen om att sprida miljövaror.

Våra policyrekommendationer

För att öka handeln med miljövaror inom regionala handelsavtal bör länder:

- **Säkerställa så kallad ’good governance’:**
  - Definiera vad en miljövara är.
  - Specificera målet med åtaganden om miljövaror.
  - Kommunicera tydligt hur dessa politiska mål ska nås.
  - Utvärdera effektiviteten av åtagandena och justera vid behov.
- **Hitta en modell för främjandet av miljövaror i regionala handelsavtal:**
  - Liberalisera kringtjänster som är viktiga för att stödja klimatomställningen i större utsträckning.
  - Prioritera miljövaror inom regulativt samarbete och/eller i kapitel om tekniska handelshinder.
  - Överväg mindre strikta ursprungsregler för miljövaror.
  - Reglera subventioner för att främja miljövaruhandel och dess produktion.
  - Sök aktivt efter kvarvarande hinder för handel med miljövaror.
  - Ge mandat att ta upp miljövaror vid kommittémöten.
  - Lyft fram miljövaror i andra internationella (miljö)avtal.

Vi hoppas att de här rekommendationerna kan bidra till att handelspolitiken mer effektivt används som ett verktyg i den gröna omställningen.

10 Appendix

10.1 List of free trade agreements with environmental goods provisions

Table 1. Bilateral trade agreements with EGP (no EU/EFTA)

Partner 1	Partner 2	Applied (provisionally) since
Japan	Mexico	2005
Morocco	United States	2006
Canada	Peru	2009
Japan	Switzerland	2009
Canada	Colombia	2011
India	Japan	2011
Peru	South Korea	2011
Colombia	United States	2012
Panama	United States	2012
South Korea	United States	2012
Canada	Panama	2013
Australia	South Korea	2014
Canada	Honduras	2014
China	Switzerland	2014
China	South Korea	2015
New Zealand	South Korea	2015
Canada	Korea	2017

Source: DESTA database compiled by Morin et al. (2018)

Table 2. Bilateral trade agreements with EGP (EU only)

Partner 1	Partner 2	Applied (provisionally) since
EU	Cariforum	2008
EU	South Korea	2011
EU	Central America	2013
EU	Colombia, Ecuador, Peru	2013
EU	Georgia	2014
EU	Moldova	2014
EU	Ukraine	2016
EU	Kazakhstan	2016
EU	Canada	2017
EU	Armenia	2018
EU	Japan	2019
EU	Singapore	2019
EU	Vietnam	2020

Source: DESTA database compiled by Morin et al. (2018)

Table 3. Bilateral trade agreements with EGP (EFTA only)

Partner 1	Partner 2	Applied (provisionally) since
EFTA	Hong Kong	2012
EFTA	Montenegro	2012
EFTA	Central America	2014
EFTA	Bosnia and Herzegovina	2015
EFTA	Georgia	2017
EFTA	Philippines	2018

Source: DESTA database compiled by Morin et al. (2018)

Table 4. Plurilateral trade agreements with EGP

Name	Partner countries	Applied (provisionally) since
Central American Free Trade Agreement (**CAFTA**)	United States, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Dominican Republic	2006
Comprehensive and Progressive Agreement for Transpacific Partnership (**CPTPP**)	Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, and Vietnam	2018
US Mexico Canada Agreement **(USMCA)**	United States, Mexico, Canada	2020

Source: DESTA database compiled by Morin et al. (2018)

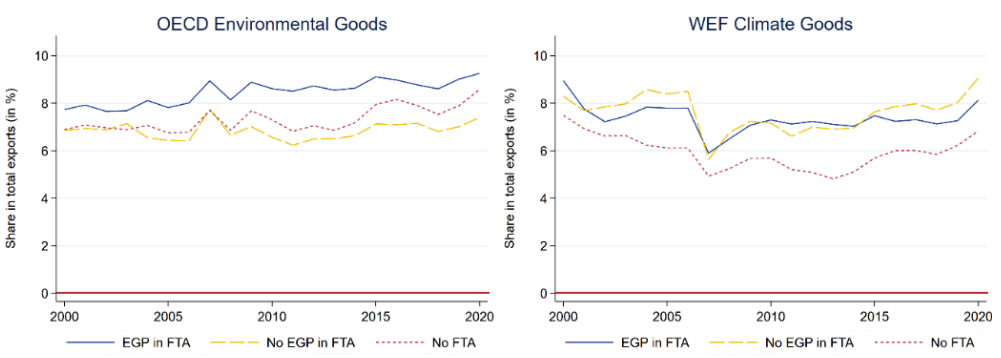
10.2 Additional descriptive statistics

The purpose of this section is to provide additional background statistics into trade in environmental goods in the context of RTAs. It adds to the descriptive statistics in chapter 2 of the main report.

10.2.1 Global developments, by trading relationship

Environmental goods make up about 8 percent of global trade in industrial goods, see **Figure 10**. This finding is relatively stable in the period 2000–2020. While the share of environmental goods in total industrial exports is slightly higher for goods on the OECD list between countries with an RTA with environmental goods provisions, this is not the case for goods on the WEF list. Moreover, for countries that have no RTA between them, the share is around 1 percentage point lower. The main take-away from this figure is that regardless of the type of trading relationship, the share of environmental goods exports in total exports follows a similar time trend.

Figure 10. Share of environmental goods exports in total industrial goods exports over time, by trading relationship

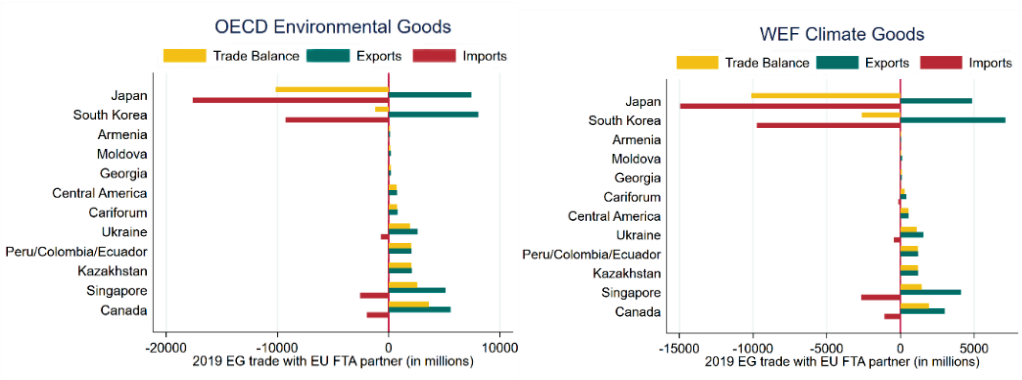


Notes: Trade data comes from UN Comtrade. Authors' calculations. If at any point between 2000 and 2020 the bilateral country pair has an RTA with EG provisions in place, it is added to the "RTA with EGP" group from the start. The same applies to the "RTA without EGP" group. For each type of trading relationship, the shares are calculated at the directional country pair level, and then weighted by total directional bilateral exports.

10.2.2 EU trade agreements and environmental goods

Trade relations between the EU and its partners with RTAs with environmental goods provisions are diverse. **Figure 11** shows the trade balance of the EU with these partner countries for the year 2019. The yellow bar displays the trade balance between the EU and the respective partner. The trade deficit with Japan is largest, regardless of the environmental goods list, where imports are about 10 billion USD larger than exports. The only other country with which the EU has a sizeable trade deficit in environmental goods is South Korea. The EU has a trade surplus in environmental goods with the other trading partners (Ukraine, Andean countries, Kazakhstan as well as Canada and Singapore).

Figure 11. Trade balance with trading partners with which the EU has an RTA with environmental goods provisions, 2019 data

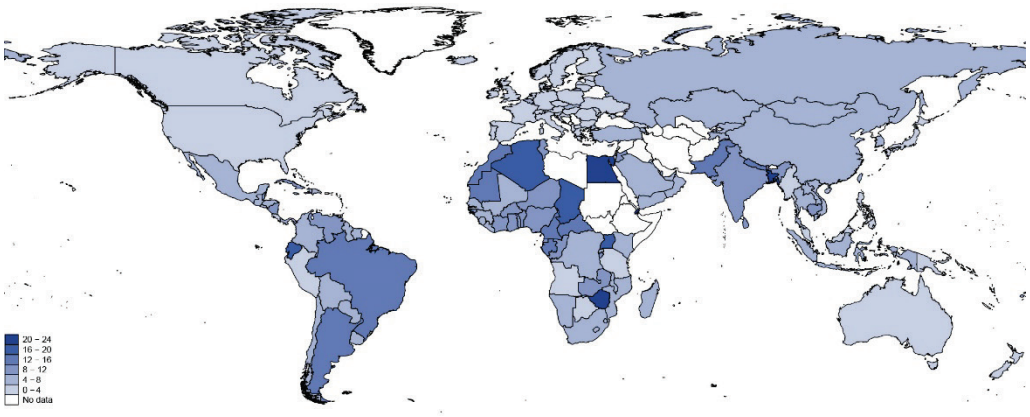


Notes: Trade data comes from UN Comtrade. Authors' calculations.

10.2.3 Trade barriers

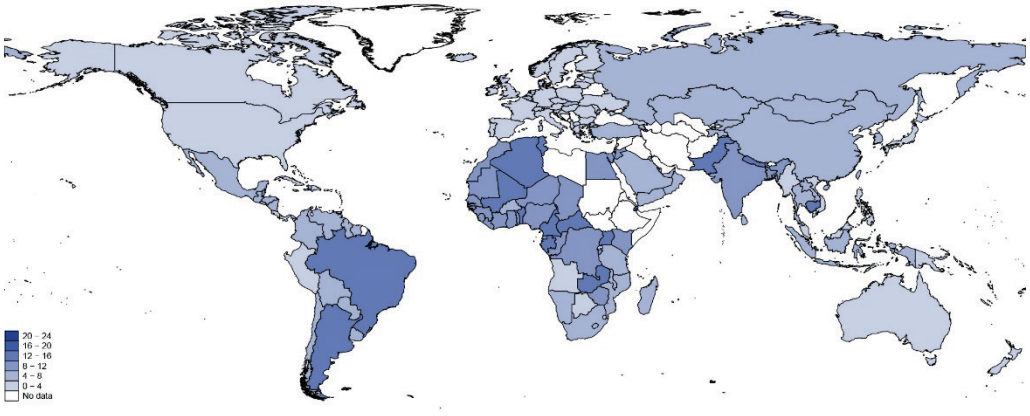
Figure 12 and **Figure 13** plot the trade-weighted MFN tariff on environmental goods. A trade weighted image may provide a better view on how substantial these tariff barriers are for consumers in each country. It seems that generally, the trade weighted MFN tariffs are already low on environmental goods for most of the developed countries, with trade-weighted MFN tariffs of less than 4 percent. In the middle- and low-income countries, MFN tariffs are substantially higher, though large variation exists across countries. The highest trade weighted MFN tariffs for environmental goods are found in Africa, South America, and South Asia.

Figure 12. Trade weighted MFN tariffs on OECD Environmental Goods, in percentage points



Notes: data for each country is from the latest year available.

Figure 13. Trade weighted MFN tariffs on WEF Climate Goods, in percentage points

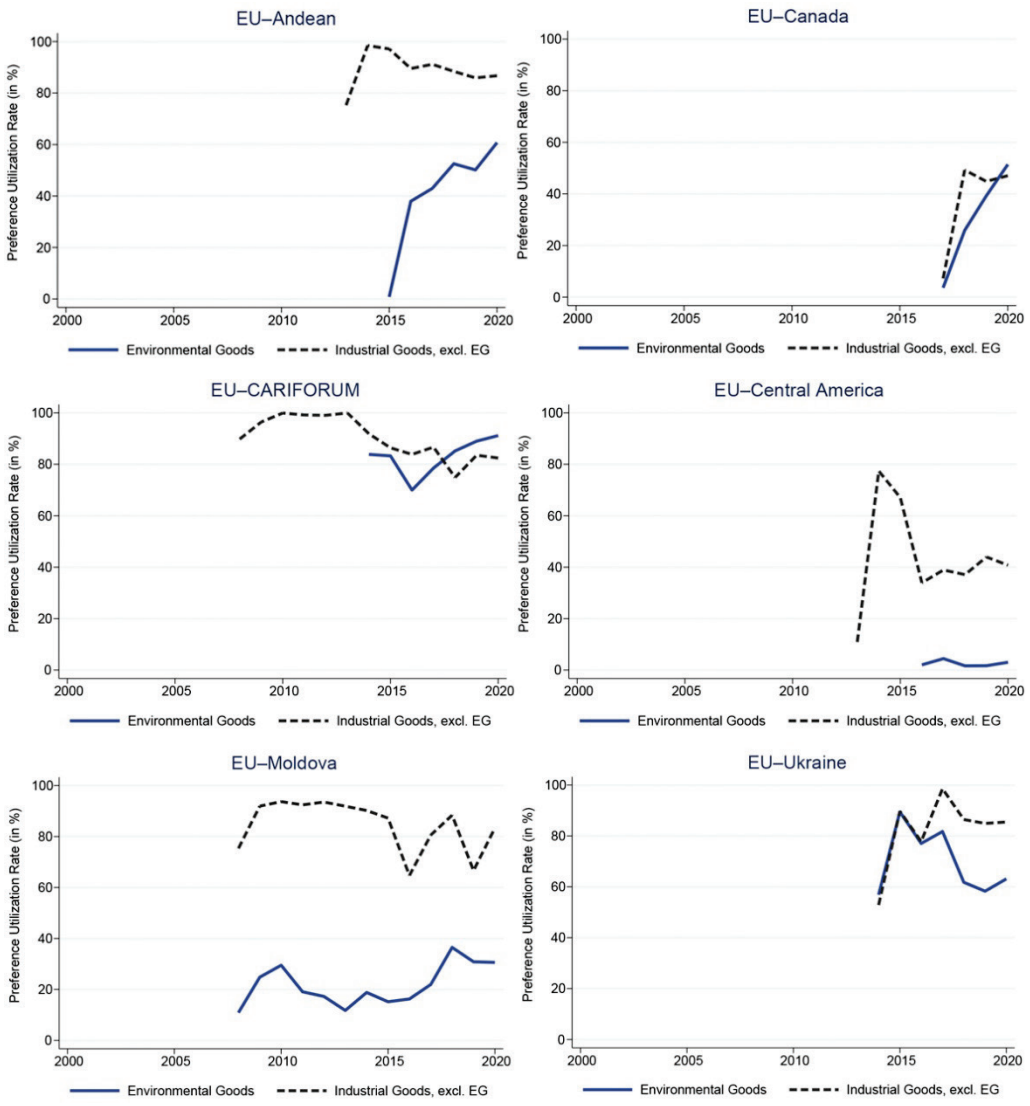


Notes: data for each country is from the latest year available.

10.2.4 Preference Utilisation Rates for other EU RTAs

Figure 14 shows the PUR of EU RTAs with environmental goods provisions not presented in the main report. Only EU RTAs with more than 2 years of data are included. See **Figure 7** for more details. Just as for the EU – Republic of Korea FTA, the PUR for environmental goods tends to be lower than the PUR for other industrial goods.

Figure 14. Preference Utilisation Rate for EU imports by RTA partner

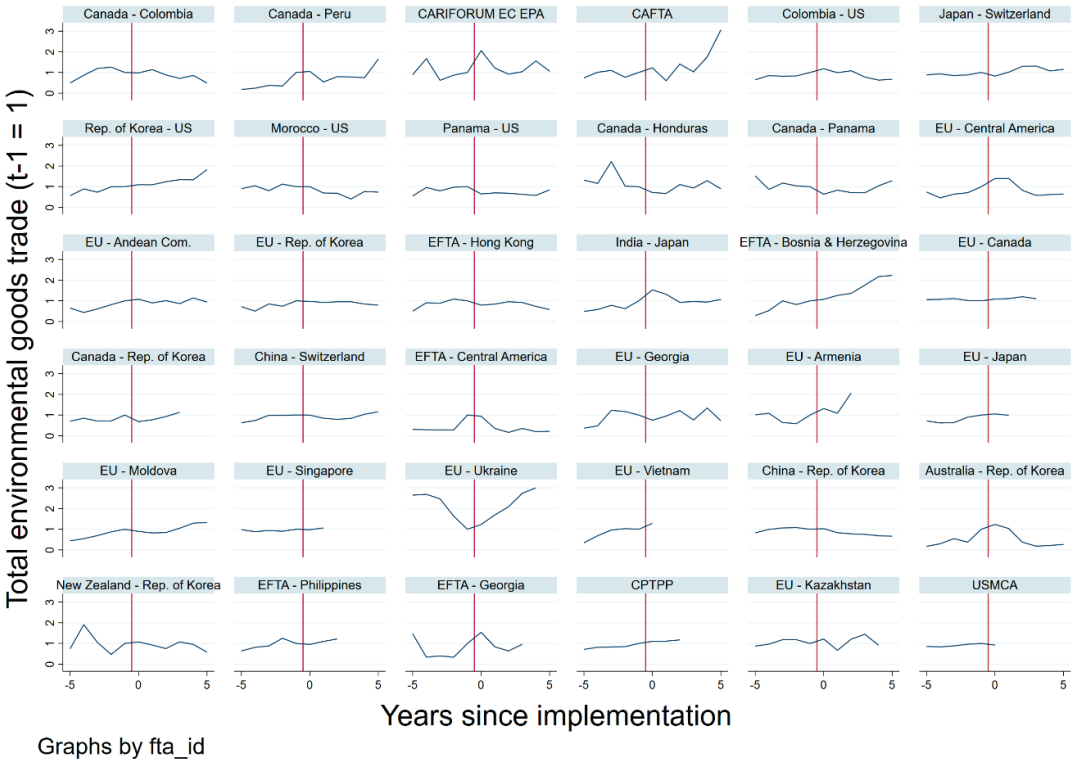


Notes: data comes from Eurostat. Authors' calculations. The Preference Utilisation Rate (PUR) is the share of imports under trade preferences (reduced or eliminated tariffs) as a share of the total value of imports eligible for preferences.

10.2.5 Trade in environmental goods in specific RTAs

The development of trade in environmental goods between partners of an RTA in the decade around the (provisional) application can be found in **Figure 15**. For each RTA, we indexed the total trade in environmental goods in the year prior to application as 1. We find that for most RTAs, total trade in environmental goods is relatively flat in the five years prior to, and after, application of the RTA.

Figure 15. Trade in environmental goods in the decade around application of the RTA



Notes: UN Comtrade data for trade values, Morin et al. (2018) for data on RTAs with EGP. The figure shows the total trade values for five years prior to application of an RTA, and the five years after. The year before application (t-1) is indexed at 1, such that a value of 2 means that total trade between the RTA partners has doubled. Two RTAs are not presented here, due to their volatile nature and small total trade values.

10.3 Empirical strategy in more detail

10.3.1 Gravity model of international trade

The gravity model is the workhorse model for empirical international trade analysis and is the obvious choice for this study. The gravity model of trade was first proposed by Tinbergen (1962), and since then developed into a widely accepted and well-established starting point for trade policy analyses.[38] Following the two distinct

[38] For an intellectual journey through the development of the gravity model of international trade, see Anderson (1979), Eaton & Kortum (2002), Anderson & van Wincoop (2003), and Baier & Bergstrand (2007).

research questions introduced in chapter 4, the main analysis will be split up in two sections. Both analyses will use a version of the gravity model. In the first part, we aggregate bilateral trade flows of all environmental goods, and estimate the effect of EGP on absolute trade flows. In the second part, we look at the share of environmental goods in total bilateral industrial goods exports and instead estimate the impact of EGP on the relative importance of environmental goods in bilateral trade. Both approaches fit within the methodology outlined in Yotov et al. (2016)[39] and are further explained below in the empirical approach section.

Structural gravity, a theory

The theoretical underpinning of the structural gravity model builds on the following equation (as derived in Yotov et al. (2016)) that takes the following form:

$$X_{ij} = \frac{Y_i E_j}{Y}\left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma}$$

which can be decomposed into two terms that determine trade flows (X_{ij}) from country *i* to country *j*. The first part of the right-hand-side is the size term, which stipulates that trade flows are determined by the economic size of country *i* (Y_i) and aggregate expenditure in country *j* (E_j), all relative to the size of the global economy (Y). The second part denotes the trade cost element of the gravity model. Trade costs are determined by a bilateral trade cost element (t_{ij}), and multilateral resistance terms for both the exporter (Π_i) and importer (P_j). The latter terms can be considered theoretical constructs but could potentially be seen as a measure of market access (see Anderson & van Wincoop (2003) for a discussion). The bilateral trade cost term (t_{ij}) is an aggregation of various elements, such as distance, historical ties, common language, but also tariffs and non-tariff barriers. It is precisely this last term that trade policy can influence. Free trade agreements can lower bilateral trade costs by removing tariffs or reducing costs related to non-tariff barriers.

Taking the above as a starting point, we are interested in estimating the effect of lowering this trade cost term on trade flows. This requires the introduction of a time dimension to the structural gravity model above, and the trade cost term becomes $t_{ij,t}$, where trade costs are now allowed to differ over time. More precisely, we can write the trade cost term to be a function of several time-invariant characteristics (distance, common border, common language, common history) and a time-varying trade relationship (such as RTAs or the EU).

Empirical approach

Taking this theoretical underpinning to an empirical specification allows us to estimate the effect of a reduction in trade costs on trade flows. Since there are other factors that influence trade, in addition to trade agreements, we want to control for these other factors and isolate the effect of the specific set of trade agreements with

[39] We depart from this methodology only in as far as time interval data is concerned. As most of the RTAs with relevant EG provisions are concluded fairly recently, we would lose valuable information if we implemented included lags in the analysis or transformed the data to intervals as these RTAs would be dropped from the analysis.

provisions. We do this by following the empirical international trade literature and implement a fixed-effects specification (see Baier & Bergstrand (2007)). In particular, we use three sets of fixed effects to deal with different factors that also influence trade flows (as per theoretical model above). The first set of fixed effects are (directional) country-pair fixed effects[40]. These fixed effects account for the time-*invariant* bilateral relationship between two countries, think of the geographical distance and common language. The second set of fixed effects are the exporter-time fixed effects, which will capture time-*varying* characteristics such as income levels, population, production capacities, and domestic policies for the exporting country. Importer-time fixed effects are the last set of fixed effects and account for the same characteristics, but for the importer. The exporter- and importer-time fixed effects properly deal with the multilateral resistance terms Π_i and P_j.

A final component that all specifications in the empirical analysis have in common is a set of dummy variables. First and foremost, we are interested in the effect of a specific set of RTAs that contain provisions in support of trade in environmental goods. This dummy, $EGP_{ij,t}$, takes on the value 1 if in year *t*, there is such an RTA in place between exporter *i* and importer *j*. In similar fashion, there are many RTAs in place that do not have such a provision but may regardless have an impact on trade patterns in environmental goods. To control for this impact, we include a second dummy variable $RTA_{ij,t}$. Lastly, being a EU member state may have a distinct impact on trade flows and therefore all baseline specifications include an intra-EU dummy variable too. These last two dummies also take on the value 1 if the criteria that their name suggests is met.

We then end up with a baseline specification that is further developed in the sections below:

$$X_{ij,t} = \alpha_1 EGP_{ij,t} + \beta_1 RTA_{ij,t} + \beta_2 IntraEU_{ij,t} + \pi_{ij} + \pi_{i,t} + \pi_{j,t} + \varepsilon_{ijt}$$

The specification above lends itself to the estimation of the average treatment effect on the treated (ATT). However, the estimated effect itself is only partial, as it is likely that the application of an RTA with EG provisions also affects the exporter-time and importer-time fixed effects (Baier et al. (2019)). Regardless, the coefficient of interest (α_1) provides an indication of the trade effect. In all the estimations in this report, the standard errors are clustered at the non-directional country pair.

RTA heterogeneity

The approach above helps us find a partial and average effect of the RTAs with EGP on exports. However, it is unlikely that all RTAs have an equal effect on EG exports and therefore this approach masks interesting heterogeneity. We are interested in heterogeneity along two dimensions; we estimate a specific effect for EU RTAs, and we follow the methodology of Kohl (2014) and Baier et al. (2019) to find RTA specific effects.

[40] Explain what "directional" is.

The former category of heterogeneity is found by interacting the EGP dummy variable with a dummy indicating whether the bilateral pair contains one EU member state, an Extra-EU dummy. More precisely, the specification becomes:

$$X_{ij,t} = \alpha_1 EGP_{ij,t} + \beta_1 RTA_{ij,t} + \gamma_1 ExtraEU_{ij,t} + \gamma_2\left(EGP_{ij,t} \times ExtraEU_{ij,t}\right) + \pi_{ij} + \pi_{i,t} + \pi_{j,t} + \varepsilon_{ijt}$$

where the EU specific effect is the linear combination of the two estimated coefficients α_1 and γ_2. Note that in this specification, the *Intra-EU* dummy cannot be included due to collinearity.

The second dimension of heterogeneity is conducted by estimating the EGP effect for each individual RTA with EGP. That is to say, we estimate individual α_1's, specific for each of the 39 included RTAs, called $\alpha_{1,A}$ below. The specification for this analysis is:

$$X_{ij,t} = \sum_A \alpha_{1,A} EGP_{ij,t} + \beta_1 RTA_{ij,t} + \beta_2 IntraEU_{ij,t} + \pi_{ij} + \pi_{i,t} + \pi_{j,t} + \varepsilon_{ijt}$$

These heterogeneity analyses should be interpreted with care, as they have been less academically scrutinised and tested in alternative settings but could shed light on potentially heterogeneous effects.

10.3.2 Estimation strategy

Our estimation strategy is twofold, as each sub-question requires its own strategy. The baseline specifications outlined above need to be tailored to answer the research question. As such, each research question is dealt with in specific sections below. We first introduce the strategy where we use absolute environmental goods trade values. The second section below elaborates on the specification using the *relative* dependent variable.

Absolute trade in environmental goods

The empirical trade literature has settled on PPML (Poisson Pseudo Maximum Likelihood) as the go-to estimator for a standard gravity estimation with aggregate trade flows as dependent variable. Santos Silva & Tenreyro (2006) point out that the PPML estimator is able to deliver consistency, even if the variance of the error term is not independent from the regressors. On top of that, the PPML estimator has another advantage over log-linearised OLS specifications as it can handle zero trade flows.[41][42]

[41] Zero-flows in trade data mainly occur for two reasons: i) Countries simply do not trade with each other every year (this is probably even more prevalent in our analysis since we analyse specific goods and not total trade flows). ii) A zero can represent a missing value due to unreliable reporting of data (which makes it impossible distinguish it from zero trade).

[42] If an estimator is unable to handle zero values and simply drop such observations, as is the case in log-linearised OLS, it will result in a systematic selection bias (Head & Mayer, 2014).

For each of the specifications introduced in the sections above, this means transforming the equation to fit the PPML estimator. This means:

$$EGexports_{ij,t} = \exp\left(\alpha_1 EGP_{ij,t} + \beta_1 RTA_{ij,t} + \beta_2 IntraEU_{ij,t} + \pi_{ij} + \pi_{i,t} + \pi_{j,t}\right) + \nu_{ijt}$$

In this setting, $EGexports_{ij,t}$ are the aggregated exports of environmental goods from country *i* to country *j* in year *t*. *EGP*, *RTA*, *IntraEU* are dummies and the π terms are the fixed effects introduced above. All other specifications introduced above take a similar transformation. Coefficients estimated by PPML are a first order approximation of the trade effect we are interested in.[43] Standard errors are clustered at the (non-directional) country-pair level to account for shocks to bilateral relations.

An important addition to this part of the analysis is the inclusion of domestic trade. In line with the theoretical underpinnings of the gravity model, any firm producing and exporting a good has a set of outside partners. This set of outside partners needs to include the domestic market, as this firms can decide to sell to domestic consumers if trade policy makes exporting too costly. Therefore, many papers have included measures of domestic trade in their gravity analysis (for example Dai et al. (2014), Yotov et al. (2016), and Baier et al. (2019)). However, as these papers look at total bilateral trade flows, it is relatively easy to calculate domestic trade.[44] As our analysis requires domestic sales (the equivalent of exports within a country) of environmental goods alone, calculating domestic trade is not straightforward. We therefore propose an approximation of domestic sales in a three-step approach. First, we estimate the share of environmental goods exports in total exports. Second, we calculate a measure of non-exported domestic production (GDP – total exports).[45] Third, we multiply the share of environmental goods exports by the measure of domestic production to arrive at a measure of domestic trade in environmental goods.[46]

Relative trade in environmental goods

As outlined in chapter 4, our interpretation of the research question uses a different angle than is standard in the literature. As RTAs aim to reduce trade barriers across the board, the specific attention to environmental goods may also become visible as a larger share of environmental goods exports in total exports. We therefore estimate the effect of EG provisions in an RTA on the share of EG in total bilateral exports using a linear probability model (OLS). While the dependent variable is between 0 and 1,

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[43] To be correct, one needs to do the following manipulation: Partial effect = $(e^{\gamma} - 1) \times 100$, where γ is any coefficient of the model. For small coefficients, the coefficient itself is a close approximation.

[44] See for instance Campos et al. (2021) for three methods to calculate domestic trade. Their conclusion is that, empirically, it does not matter how one calculates domestic trade. Estimates of trade effect of agreements are similar regardless of calculation method of domestic trade.

[45] We acknowledge that GDP is a measure of value added, while exports are generally reported in gross terms.

[46] A numerical example follows to illustrate our approach. 10 percent of Country A's exports are in environmental goods. Country A has a GDP of 1000 and exports 400. Our measure of domestic trade for country A is then: (1000 – 400) * 0.10 = 60. For countries with higher exports than GDP, the domestic trade is set to 0 to avoid negative values for domestic trade.

OLS is preferred over limited dependent variable models due to the easier interpretation of coefficients.[47]

The linear specification takes the form:

$$ShareEG_{ij,t} = \alpha_1 EG_{ij,t} + \beta_1 FTA_{ij,t} + \beta_2 IntraEU_{ij,t} + \pi_{ij} + \pi_{it} + \pi_{j,t} + \upsilon_{ij,t}$$

where *ShareEG* is the share of EG goods in total bilateral exports between countries *i* and *j* in year *t*, and therefore between 0 and 1 by construction. The measure of total bilateral exports excludes trade in mineral fuels and agricultural products. The former are defined as HS 2-digit code 27, while the latter are all goods covered by the WTO Agriculture Agreement. Standard errors are clustered at the (non-directional) country-pair level to account for potential shocks to the bilateral relationship.

Econometric considerations regarding TWFE models

Several new methodological papers have recently come out on the use of difference-in-differences designs.[48] The equations above require the assumption of homogenous treatment effects to reliably estimate the average treatment effect on the treated (ATT) in settings with variation in treatment timing. The findings of these papers indicate that a violation of this assumption may, in some extreme cases, lead to a reversal of the sign of the estimated coefficient. This problem, so-called negative weights, is more likely the case if the predicted probability of treatment is high, which is not the case for our setting as only 5 percent of the bilateral pairs in the dataset ever have an EGP, for a total of 2 percent of the bilateral pair-year observations.[49] To ensure that our specification does not suffer from these potential problems, we conduct two diagnostic tests and provide results from one alternative estimator. For both diagnostic tests, we need to alter the dataset to create a balanced panel. This means dropping country pairs for which not all years are reported (e.g. South Sudan, but also Serbia). Moreover, these diagnostic tests do not allow for the multitude of fixed effects in our specifications, and therefore the tests are conducted with country-pair and year fixed effects only. OLS results with these 'less comprehensive' fixed effects yield estimates that are not statistically different from the results presented in the main report.

The first diagnostic test is the Goodman-Bacon decomposition (Goodman-Bacon, 2021), which allows us to determine the source of underlying variation of the results. To be precise, the variation comes from different weights attached to bilateral pair-year comparisons of standard 2x2 estimates. Using the Goodman-Bacon et al. (2019) Stata command,[50] we find that approximately 1 percent of the treatment effects are caused by differences in treatment timing (which could potentially be problematic if it uses earlier treated units as a control group for later treated units). The results from

[47] On top of that, the recent developments in Two-Way Fixed-Effects models (see below) all rely on linear probability models for the diagnostic tests and solution packages to correct for the identified issues.

[48] For an overview, see Roth et al. (2022).

[49] Five percent, or 2088 out of a total 40,401 country pairs, have at least one year with a trade agreement that includes EGP in our dataset. 18,378 country pair-year observations out of a total of 848,421 observations are "treated" with an EGP, or roughly 2.2 percent.

[50] Goodman-Bacon, A., Goldring, T., & Nichols, A. (2019). BACONDECOMP: Stata module to perform a Bacon decomposition of difference-in-differences estimation.

this test also indicate that about half of the treatment effect comes from comparing treated units (e.g. bilateral pairs with EGP) to never-treated country pairs. The other half comes from comparing the same country pair before and after the EGP trade agreement was applied. A preliminary result is therefore that our baseline specifications above may provide valid estimates.

The second diagnostic test is that of de Chaisemartin and D'Haultfoeuille (2019), who claim that one cannot retrieve the average treatment effect in case of negative weights. Using their Stata command (de Chaisemartin et al., 2020)[51], we find that none of the 18,378 ATTs in our dataset have a negative weight. Therefore, our results presented in the main report (and below) should not be significantly different from the average treatment effect that we intend to estimate. Lastly, we re-estimate the equation relative trade in environmental goods as the dependent variable using the Stata command developed by Callaway & Sant'Anna (2021) in order to verify that the parallel trend assumption holds despite the multitude of fixed effects (covariates). Using their doubly robust ATT estimator, we find that this is not significantly different from the baseline result either. Therefore, we conclude that there is no reason to suspect that our results are driven by any underlying mechanism that would cause problems in the interpretation.

[51] de Chaisemartin, C., D'Haultfoeuille, X., & Deeb, A. (2020). TWOWAYFEWEIGHTS: Stata module to estimate the weights and measure of robustness to treatment effect heterogeneity attached to two-way fixed effects regressions.

10.4 Additional results

This section shows the results of the baseline analysis in the main text, but instead weights the regression by total bilateral trade. While this analysis is less grounded in theory, it should give an indication of the economic effect. More concretely, the trade effect of larger trade flows weighs more in the estimation of the overall coefficient than the trade effect of smaller flows.

Figure 16. Absolute EG trade – weighted by total bilateral trade

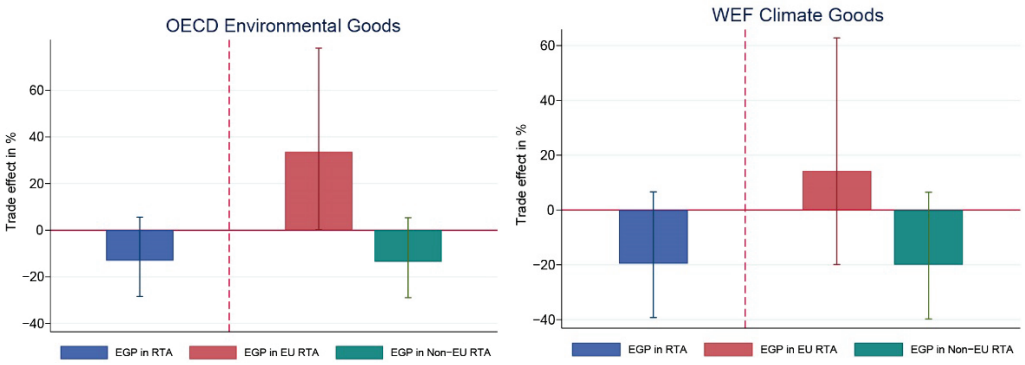


Figure 17. Relative EG trade – weighted by total bilateral trade

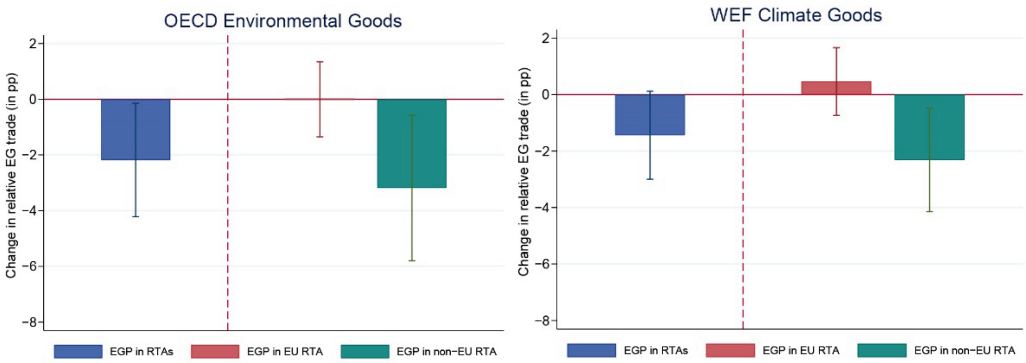
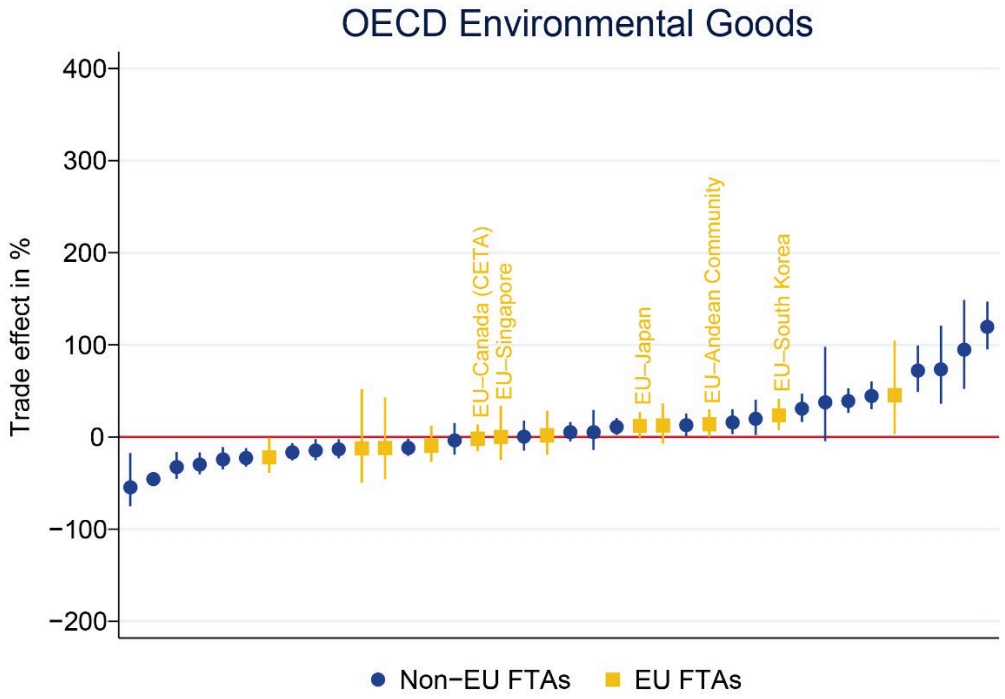


Figure 18. RTA specific effects – absolute trade in environmental goods



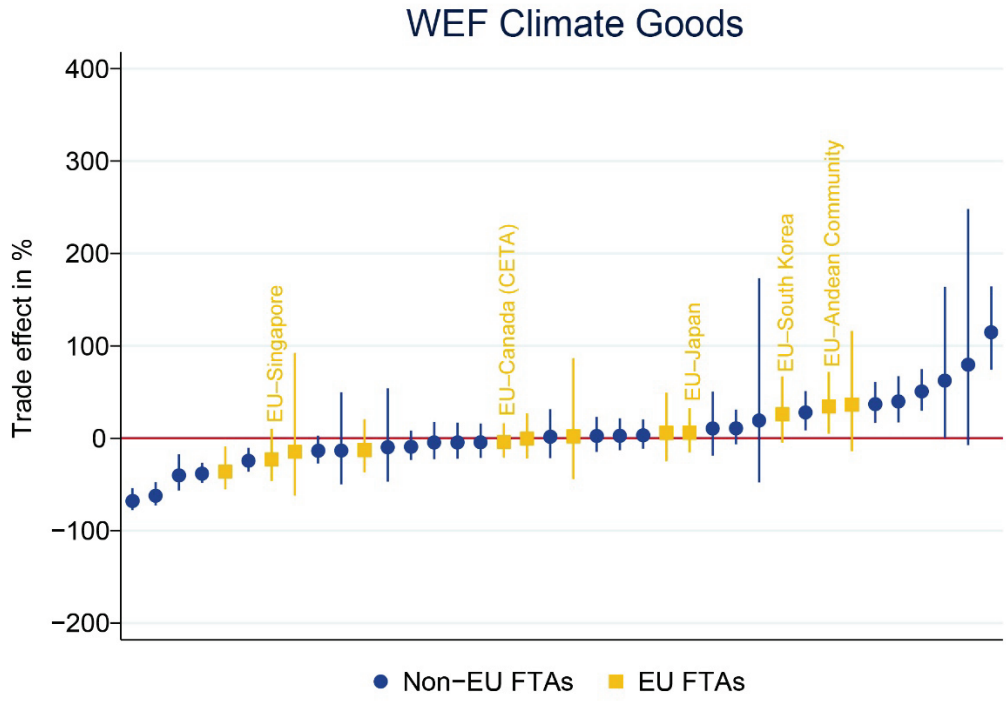
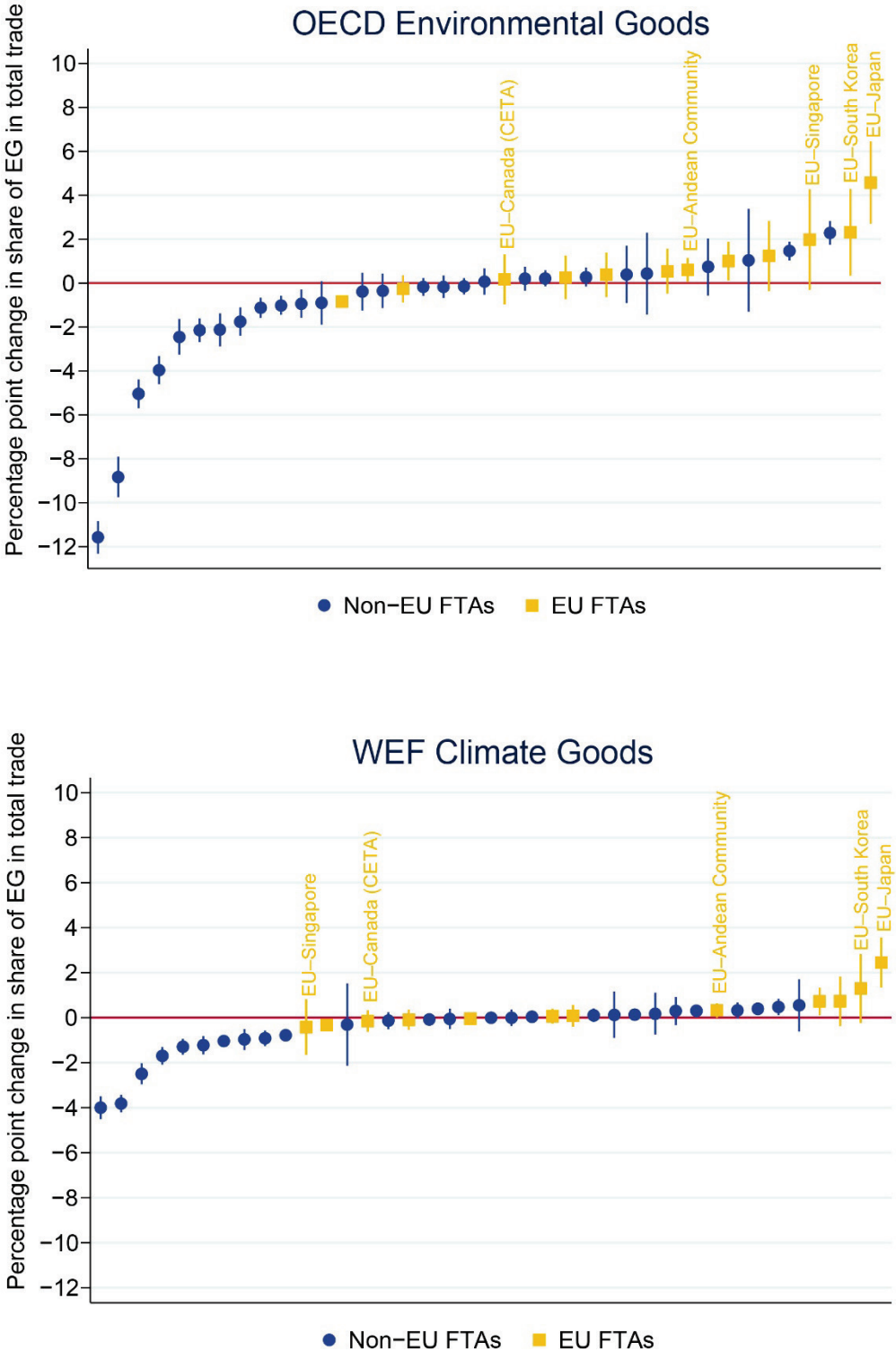


Figure 19. RTA specific effects – relative trade in environmental goods



10.5 Results in table form

Dependent variable: Absolute OECD list environmental goods trade		
	All RTAs	**Interaction EU RTAs**
EGP in RTA	-7.556 (8.684)	-14.905 (9.937)
Extra-EU		-1.527 (3.663)
EGP in RTA × Extra-EU		37.081** (19.593)
Control mean		
Observations	602.566	602.566
Fixed effects	Bilateral-pair, exporter-year, importer-year	

Notes: This table presents the regression results with the trade effect of an RTA with environmental goods provisions on absolute trade in climate goods on the WEF list. The results are presented in percentage and correspond to the figures in the main report. The (non) EU-specific coefficients are the linear combination of the EGP in RTA and EGP in RTA × Extra-EU coefficients. The coefficients for the control variables IntraEU and RTA are not reported. Clustered standard errors in parentheses. * indicates p < 0.10, **p < 0.05, and ***p < 0:01.

Dependent variable: Absolute WEF list climate goods trade		
	All RTAs	**Interaction EU RTAs**
EGP in RTA	-9.758 (9.082)	-15.807 (9.457)
Extra-EU		-8.994** (4,296)
EGP in RTA × Extra-EU		32.348** (17.579)
Control mean		
Observations	602.566	602.566
Fixed effects	Bilateral-pair, exporter-year, importer-year	

Notes: This table presents the regression results with the trade effect of an RTA with environmental goods provisions on absolute trade in climate goods on the WEF list. The results are presented in percentage and correspond to the figures in the main report. The (non) EU-specific coefficients are the linear combination of the EGP in RTA and EGP in RTA × Extra-EU coefficients. The coefficients for the control variables IntraEU and RTA are not reported. Clustered standard errors in parentheses. * indicates p < 0.10, **p < 0.05, and ***p < 0:01.

Dependent variable: Relative OECD list environmental goods trade		
	All RTAs	**Interaction EU RTAs**
EGP in RTA	-0.184* (0.109)	-0.627** (0,310)
Extra-EU		-0.441*** (0.147)
EGP in RTA × Extra-EU		0.495 (0.324)
Control mean		
Observations	602.566	602.566
Fixed effects	Bilateral-pair, exporter-year, importer-year	

Notes: This table presents the regression results with the trade effect of an RTA with environmental goods provisions on absolute trade in climate goods on the WEF list. The results are presented in percentage and correspond to the figures in the main report. The (non) EU-specific coefficients are the linear combination of the EGP in RTA and EGP in RTA × Extra-EU coefficients. The coefficients for the control variables IntraEU and RTA are not reported. Clustered standard errors in parentheses. * indicates p < 0.10, **p < 0.05, and ***p < 0:01.

Dependent variable: Relative WEF list climate goods trade		
	All RTAs	**Interaction EU RTAs**
EGP in RTA	-0.049 (0.066)	-0.171 (0.150)
Extra-EU		-0.288*** (0.065)
EGP in RTA × Extra-EU		0.137 (0.158)
Control mean		
Observations	602.566	602.566
Fixed effects	Bilateral-pair, exporter-year, importer-year	

Notes: This table presents the regression results with the trade effect of an RTA with environmental goods provisions on absolute trade in climate goods on the WEF list. The results are presented in percentage and correspond to the figures in the main report. The (non) EU-specific coefficients are the linear combination of the EGP in RTA and EGP in RTA × Extra-EU coefficients. The coefficients for the control variables IntraEU and RTA are not reported. Clustered standard errors in parentheses. * indicates p < 0.10, **p < 0.05, and ***p < 0:01.

The National Board of Trade Sweden is the government agency for international trade, the EU internal market and trade policy. Our mission is to facilitate free and open trade with transparent rules as well as free movement in the EU internal market.

Our goal is a well-functioning internal market, an external EU trade policy based on free trade and an open and strong multilateral trading system.

We provide the Swedish Government with analyses, reports and policy recommendations. We also participate in international meetings and negotiations.

The National Board of Trade, via SOLVIT, helps businesses and citizens encountering obstacles to free movement. We also host several networks with business organisations and authorities which aim to facilitate trade.

As an expert agency in trade policy issues, we also provide assistance to developing countries through trade-related development cooperation. One example is Open Trade Gate Sweden, a one-stop information centre assisting exporters from developing countries in their trade with Sweden and the EU.

Our analyses and reports aim to increase the knowledge on the importance of trade for the international economy and for global sustainable development. Publications issued by the National Board of Trade only reflect the views of the Board.

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Kommerskollegium
National Board of Trade Sweden

Box 6803, S-113 86 Stockholm, Sweden
Phone +46 8 690 48 00
E-mail registrator@kommerskollegium.se
www.kommerskollegium.se