

# Trade Effects of Environmental Agreements: Uncovering *De Facto* Environmental Clubs

The creation of environmental clubs is a prominent policy proposal for addressing global environmental problems. By generating exclusive “club goods” for their members, environmental clubs provide incentive to join them and accept their environmental obligations. Yet, the existing literature often considers intergovernmental environmental clubs as a promising theoretical idea that still lacks empirical manifestations. This paper asks whether the numerous International Environmental Agreements (IEAs) containing trade-related provisions provide club goods to their parties. This is the first study to investigate the effect of these provisions on trade flows among parties to an IEA compared to non-parties. Making use of a novel dataset on IEAs’ trade provisions and a panel of worldwide bilateral trade flows, it finds that *de facto* environmental clubs are more prevalent than previously thought. The positive effect of certain trade provisions in an IEA can turn the trade-decreasing effect of the agreement into an overall trade-increasing effect. The paper also identifies specific trade provisions that show particular potential to contribute to the creation of a club good for the parties to the IEA. Studying actual effects of IEAs’ trade provisions is important to assess the potential for generating additional environmental clubs through trade incentives.

**Keywords:** International environmental agreements (IEAs); trade and environment; climate clubs; club goods; treaty design.

## 1. Introduction

An increasing number of scholars, and most notoriously the Nobel laureate William Nordhaus (2015), argue that intergovernmental climate clubs can be an effective means to reduce global greenhouse gas (GHG) emissions. In particular, climate clubs can solve the ambition-participation dilemma that plagues international climate lawmaking. The history of the negotiations of the Kyoto Protocol and the Paris Agreement suggests that climate agreements can either set ambitious GHG reduction targets or attract broad participation, but they can hardly achieve both (Tørstad 2020).

A potential solution to this dilemma is the creation of a club by a group of states with high mitigation ambitions. Such a climate club would have two essential features. First, member states would agree to reduce their GEG emissions, for example by putting a price on carbon (carbon taxes or cap and trade). Second, member states would create a “club good” that generates benefit for them but that is unavailable to non-members<sup>1</sup>. For example, they can give each other privileged access to their market while maintaining higher tariffs on imports from non-members. By linking ambitious climate commitments with the provision of an exclusive club good, a climate club would create incentives for members to implement their commitments and for non-members to join and accept its obligations. Under this logic, trade discrimination can induce greater cooperation and serve the purpose of climate mitigation.

Clubs can potentially contribute to the governance of several other environmental issues, including deforestation, biodiversity conservation, dangerous waste and fisheries. The

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<sup>1</sup> For the purpose of this paper, we define intergovernmental clubs as associations of states providing club goods for their members. Some authors use the term more broadly, to include any form of minilateral associations, whether or not they provide club goods (e.g. Andresen 2015).

ambition-participation dilemma is not unique to climate. Bernauer and his colleagues (2013) have found that the specificity of obligations is associated with reduced participation in various international environmental agreements (IEAs). However, with a few exceptions (e.g. DeSombre 2008; Green and Rudyk 2020), the literature has overlooked the potential of clubs in environmental issues other than climate.

Trade discrimination is arguably the simplest and most effective way to generate club goods (Nordhaus 2020).<sup>2</sup> Some IEAs include trade provisions alongside environmental commitments and these trade provisions can potentially be used as incentives to join these agreements due to discriminatory effects against non-parties. The most notorious IEAs with trade provisions include the Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes, and the Cartagena Protocol on Biosafety. Several scholars have discussed trade provisions in these IEAs and analyzed their compatibility with World Trade Organization (WTO) agreements and other trade agreements (e.g. Gehring and Oberthür 2009; Young 2009; Zelli et al. 2013). However, these trade provisions' actual effects on trade flows have not been thoroughly researched. No large-N study has investigated whether trade provisions in IEAs provide club goods to their members.

If IEAs' trade provisions do not affect trade flows, one can be doubtful about the effectiveness of these agreements. If they restrict trade flows across the board, one can wonder if they serve protectionist motivations. However, if they actually increase trade flows among parties relative to non-parties, these IEAs can be conceptualized as *de facto* environmental clubs and their experiences can be enlightening for the design of future environmental clubs, including climate clubs.

This paper is the first large-n study to investigate the effects of IEAs' trade provisions on trade flows. It does so by making use of the Trade and Investment Provisions in Environmental Agreements (TIPEA) dataset, a new resource documenting the occurrence of 48 types of trade provisions in 2,097 IEAs. Some of these provisions are meant to restrict trade (for example on dangerous waste) while other liberalize trade (for example on environmental goods). The paper finds that trade liberalizing provisions are likely to privilege trade flows among IEAs' co-signatories, generating substantial club goods. Trade restrictive provisions, however, do not generate a club good effect. Based on these results, almost one fourth of all IEAs can be characterized as environmental clubs. Our findings contribute to the burgeoning literature on intergovernmental environmental clubs (e.g. Hovi et al. 2016, Keohane and Victor 2016) and the literature on the effect of varying IEA design features (cf. Mitchell et al. 2020).

The remainder of this paper is organized as follows. Section 2 outlines the relevant literature before Sections 3 and 4 introduce our data and empirical approach, respectively. Section 5 presents and discusses the results of the analysis before the final section outlines policy implications and avenues for future research.

## **2. From club goods to IEAs' trade provisions**

According to the economic theory of clubs, club goods are goods that entail non-rival but excludable benefits, i.e. benefits that can be restricted to members only (Buchanan 1965; Glazer et al. 1997). A free trade agreement is the “quintessential example” of an international club (DeSombre 2008: 187): Only parties to a free trade agreement can enjoy privileged trade access to other parties, while third parties are excluded from this benefit. In the context of an IEA, the

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<sup>2</sup> Other possible forms of club goods in the context of intergovernmental environmental governance include a licensing pool to use intellectual property on renewable technologies and a mutual assistance pact in case of extreme weather events (Kemfert 2004)

provision of a similar club good can serve environmental objectives. If an IEA generates trade benefits for its parties but raises trade barriers for non-parties, it can potentially increase incentives for joining the IEA. This policy idea generates increasing enthusiasm in the academic community (e.g. Victor 2011; Weischer et al. 2012; Andersen 2015; Nordhaus 2015; Hovi et al. 2016; Falkner 2016; Keohane et al. 2017; Green and Rudyk 2020; Pihl 2020). A number of theoretical inquiries, survey experiments, numerical simulations and agent-based models suggest that such environmental clubs could indeed become a powerful instrument for environmental protection (e.g. Kemfert 2004; Lessmann et al. 2009; Cirone and Urpelainen 2013; Eichner and Pethig 2015; Hagen and Schneider 2018; Sælen 2016. Gampfer 2016; Sprinz et al. 2018; Hovi et al. 2019; Montagna et al. 2019).

However, there are very few empirical studies on actual international environmental clubs. While some empirical studies have investigated environmental clubs created by or for non-state actors (Potoski and Prakash 2005; Prakash and Potoski 2007; Green 2017), hardly any have documented the existence of intergovernmental environmental clubs. The idea of an institutionalized cooperation among states providing club goods to its members to achieve environmental goals is often treated as a theoretical proposal deprived of empirical manifestation. Yet, only intergovernmental clubs can potentially create incentives for states to accept ambitious environmental obligations.

One of the few well-known intergovernmental environmental clubs is the Montreal Protocol on Substances that Deplete the Ozone Layer. By restricting imports from and export to non-parties of chlorofluorocarbons and other controlled substances, the Montreal Protocol created an incentive for ratification (Werksman 1992; Barrett 1997). In particular, several developing countries with nascent industry using ozone-depleting substances did not want to be excluded from this trade and opted for ratifying the Montreal Protocol rather than being excluded from the club. As a result, the Montreal Protocol has successfully attracted nearly universal participation while continuously raising its ambition level.

There are potentially several lesser-known IEAs that create club-good benefits for their co-signatories. According to Mitchell and colleagues (2020), more than 2,000 IEAs have been concluded since 1945 and more than 73 percent of them are bilateral or trilateral. The negotiating process and the content of these “minilateral” agreements differ significantly from multilateral ones. For example, states might be more inclined to include trade concessions in a regional IEA with neighboring countries than in a multilateral IEAs negotiated under the auspices of the United Nations. This paper explores the possibility that some of these IEAs generate club goods by increasing trade flows among their parties relative to trade flows with non-parties, accounting for partner-country specific characteristics.

In spite of their number, we know little about how IEAs relate to international trade. Some studies suggest that trade openness promotes the conclusion of IEAs (Neumayer 2002; Egger et al. 2011 and 2013). Others find that the credible threat of trade sanctions against a party that fails to comply with an IEA reduces the risk of free riding (Barrett 1997). Yet, there is little empirical research on the effects of IEAs on international trade flows. Exceptions include a study of the Kyoto Protocol, which finds that exports are reduced due to Kyoto commitments (Aichele and Felbermayr 2013) and a case study of the International Tropical Timber Agreement (ITTA), which finds that co-signatories exhibit an increase in trade values (Borsky et al. 2018). Studying 13 different IEAs, Ederington et al. (2018) find that the ratification of these IEAs has negative effects on exports. To our knowledge, no study investigates the trade effects of a high number of IEAs.

Furthermore, since IEAs are highly heterogeneous, there is no reason to expect that they should have similar trade effects across the board. Some IEAs might offer discriminatory trade privileges to their co-signatories while others do not. The most likely variable to determine the

generation of a club good is the design of the agreement itself, and more particularly its inclusion of trade provisions. DeSombre (2008), for example, notes that some regional fisheries management organizations appear to provide club goods to their members thanks to their trade provisions.

The legal literature describing IEA's distinguished two broad categories of trade-related provisions (UNEP 2007; WTO 2017). *Trade-liberalizing provisions* cover rules whose purpose is to encourage trade flows. For example, the 1972 Agreement between Brazil and the United States concerning shrimps states that "Parties shall examine the possibilities of cooperating in [...] the expansion of the international trade of fishery products." (article 8). *Trade-restrictive provisions* are rules that seek to restrict certain imports or exports. For instance, the 1994 Agreement between Germany and Poland concerning environmental cooperation provides that "Parties shall vigorously oppose the export and import of waste and environmentally hazardous materials to the extent that it is contrary to the law of one of the Contracting Parties." (article 8). A single IEA can include a combination of trade-liberalizing and trade-restrictive provisions.

We expect trade-liberalizing provisions in IEAs to privilege parties and have discriminatory effect against non-parties. There is little interest by states in formalizing a trade-liberalizing concession in a treaty and extend this privilege to all states, including non-parties. If a state wants to liberalize its imports of certain goods, irrespective of their origin, it can easily do so unilaterally and there is nothing to gain by locking-in this policy in an IEA. It is more likely for states to include trade-liberalizing provisions in their IEA in order to extract similar concessions from other parties. By automatically multilateralizing this commitment to non-parties, states would give away a bargaining chip that might be useful for future negotiations. In light of this, we hypothesize that:

*H<sub>1</sub>: The more trade-liberalizing an IEA is, the more trade flows are likely to increase between two parties relative to trade flows between a party and a non-party.*

We also expect trade-restrictive provisions to have discriminatory effect against non-parties. In the context of an IEA, these rules typically apply to goods for which trade is deemed potentially harmful to the environment, such as engaged species, genetically modified organisms, dangerous waste, or pollutants. IEAs might impose trade-restrictive measures for the trade of these goods, such a labeling requirement, trade permits, mandatory quarantine, or quotas. Non-parties to the IEAs are likely to face measures that are even more restrictive or even entail trade prohibitions for these specific goods. Thus, while the implementation of IEAs with trade-restrictive rules might decrease trade among parties, we expect trade with non-parties to decrease even more. In other words:

*H<sub>2</sub>: The more trade-restrictive an IEA is, the more trade flows are likely to increase between two parties relative to trade flows between a party and a non-party.*

WTO agreements prohibit discrimination between WTO members. However, WTO agreements also include exceptions for the protection of "animal or plant life or health" and for "the conservation of exhaustible natural resources" (GATT art. XX). Arguably, these exceptions are sufficiently broad to authorize the discriminatory measures included in environmental agreements (Charnovitz 2015; Horn and Mavroidis 2010). For example, the Basel Convention restricts trade in hazardous wastes with non-parties, including the United States. Yet, the United States – one of the most litigious WTO members – has not contested the implementation of the Basel Convention under the WTO dispute settlement mechanism. In fact, the United States did not contest any IEAs with discriminatory trade provisions. This suggests that IEAs benefit from some political – if not legal – immunity at the WTO. Therefore, despite some uncertainty relative to the scope of WTO environmental exceptions, we do not expect that WTO law significantly influences how states implement IEAs' trade-related provisions.

To be clear, we do not make any assumption regarding states' motivations for introducing trade-related provisions in their IEAs. States create a *de facto* intergovernmental environmental club when their IEA generates a club good, even if discrimination against non-members was not their initial intention. Likewise, we do not investigate whether trade discrimination against non-parties provides sufficient incentives for them to accede to IEAs or to create their own clubs. The question regarding the mere existence of intergovernmental clubs is distinct from the question of their consequences, which is beyond the scope of this study. This article tackles the former question and analyzes whether IEAs with trade provisions create club goods for their parties.

### **3. A new Dataset on trade provisions in IEAs**

With this article, we make public a new dataset of trade provisions in environmental agreements, our main explanatory variable. We call this dataset the Trade- and Investment-related Provisions in Environmental Agreements (TIPEA). It is available at [www.ZZZ.yyy](http://www.ZZZ.yyy).

TIPEA covers 2,097 IEAs concluded from 1945 to 2015. All these IEAs share three defining characteristics: 1) they are binding treaties under international law; 2) they were concluded by two or more sovereign states; 3) their primary purpose is the protection of the natural world or the sustainable exploitation of natural resources. The full text of these IEAs as well as information on their parties were drawn from the International Environmental Agreements Database Project (Mitchell 2002-2020), supplemented by additional searches where necessary.

We conducted a detailed content analysis to identify specific trade-related clauses provided in each of these 2,097 IEAs. We instructed a team of trained coders to read each IEA using the software Nvivo and a detailed codebook. The TIPEA codebook defines 48 types of provision that are expected to affect trade flows (See Appendix A for a full list). They include provisions favorable to trade, such as the principle that domestic environmental measures should not hamper trade or the commitment to develop the ecotourism industry. Other provisions are trade-restrictive, for example import bans on certain products or restrictions on foreign investments in certain sectors.

Manual coding was preferred over automatic coding insofar as it facilitates the classification of ambiguous provisions worded differently across IEAs. We weeded out false positive results by using different coders to double-checked the selected provisions. We assessed the frequency of false negatives by asking a different coder to code 10 percent of the IEAs a second time. Inter-coder reliability for this double coding, as measured by Cohen's kappa, is 0.784, which is considered a substantial level of agreement (Landis and Koch 1977).

Using this method, we found 1,279 IEAs with at least one trade-related provision from the TIPEA codebook, which correspond to 61% of the overall population of IEAs. Figure 1 presents the frequency of these IEAs by subject areas. For four out of ten subject areas, a majority of IEAs have trade-related provisions. These subject areas are: weapons (mainly on nuclear weapon tests), fisheries (including several regional fishery management agreements), biodiversity (most of them on specific species), and agriculture (including on pest control and plant quarantine). Since there are more IEAs governing fisheries (696 in total) than any other subject matters, 44% of all IEAs with at least one trade-related provision govern fisheries.

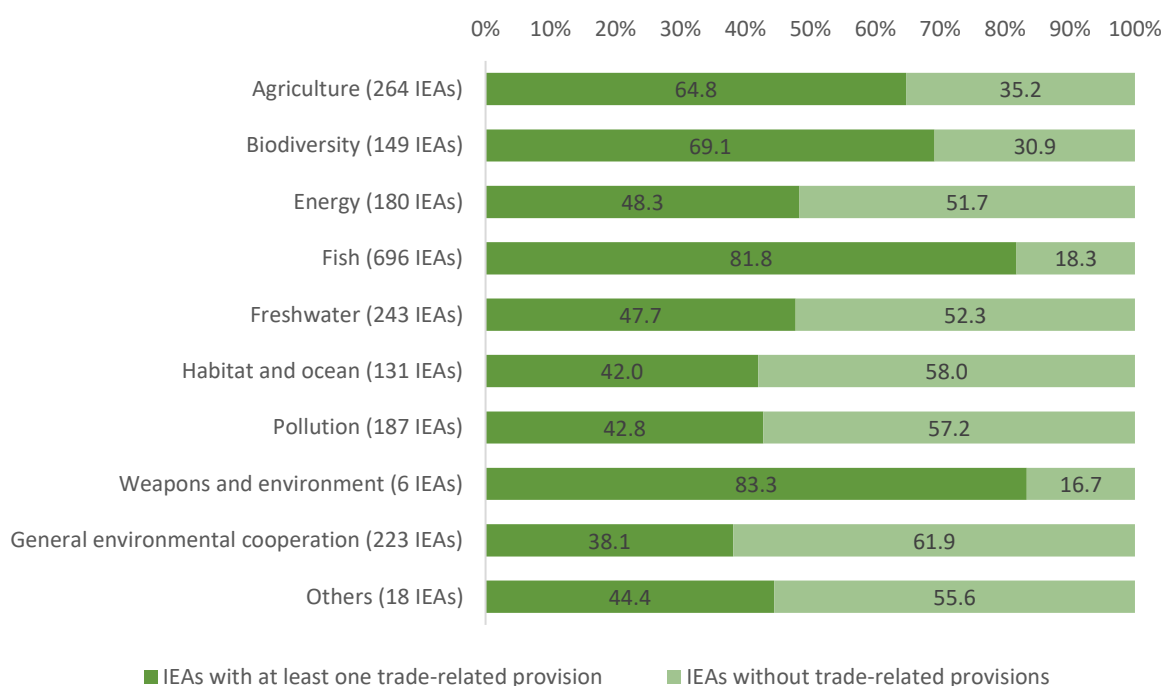


Figure 1 : Share of IEAs containing at least one trade-related provision by IEA subject area.

Figure 2 present three categories of IEAs, according to the development status of their co-signatories. Some are concluded among high-income countries (North/North agreements); others are concluded among developing countries (South/South agreements); and still other unite developing and developed countries (North/South agreement). Although IEAs with at least one trade-related provision appear in all three categories , they are most prevalent among IEAs concluded between high-income countries.



Figure 2 : Share of IEAs containing at least one trade-related provision by development status of IEA parties.

Figure 3 groups IEA in different categories based on their number of parties and presents the share of IEAs containing at least one trade-related provision for each category. All categories include a substantial share of IEAs with trade-related provisions. IEAs with at least one trade provision are particularly frequent (65%) among bilateral IEAs. Since most IEAs are bilateral

(TIPEA includes 1450 bilateral IEAs), 948 bilateral IEAs include a trade provision. Another way to put it, 74% of all IEAs with at least one trade provisions are bilateral.



Figure 3 : Share of IEAs containing at least one trade-related provision by number of IEA parties.

Entities that have signed the highest number of IEAs with at least one TIPEA provision are the European Union, the United States, France, and Russia. Overall, states that have signed a high number of IEAs with trade provisions tend to be high-income countries, which largely echoes participation to IEAs in general. Some states, however, have a greater share of their IEAs that include at least one trade-related provision. Several states that have an above average (61.6%) share of the IEAs with at least one trade-related provision are sub-Saharan and low-income countries. On average, these countries have concluded a small number of IEAs. In contrast, only 53% of IEAs signed by the United States and 50% signed by France include at least one trade-related provisions.

The ratio of IEAs with trade-related provisions over the total number of IEAs has remained relatively constant over time. Even some of the oldest IEAs included trade provisions. For example, the 1878 *Convention on Measures to Be Taken Against Phylloxera Vastatrix* included several imports and exports restrictions to protect European grapevines from a North American pest. The overall number of IEAs with at least one provision from the TIPEA codebook increased substantially in the 1970s, grew more slowly in the 1980s and then rose again faster in the 1990s, which is reflective of the conclusion of IEAs in general (see Figure 4). The cumulative share of IEAs with at least one TIPEA provision period has remained around 60% during the last five decades.

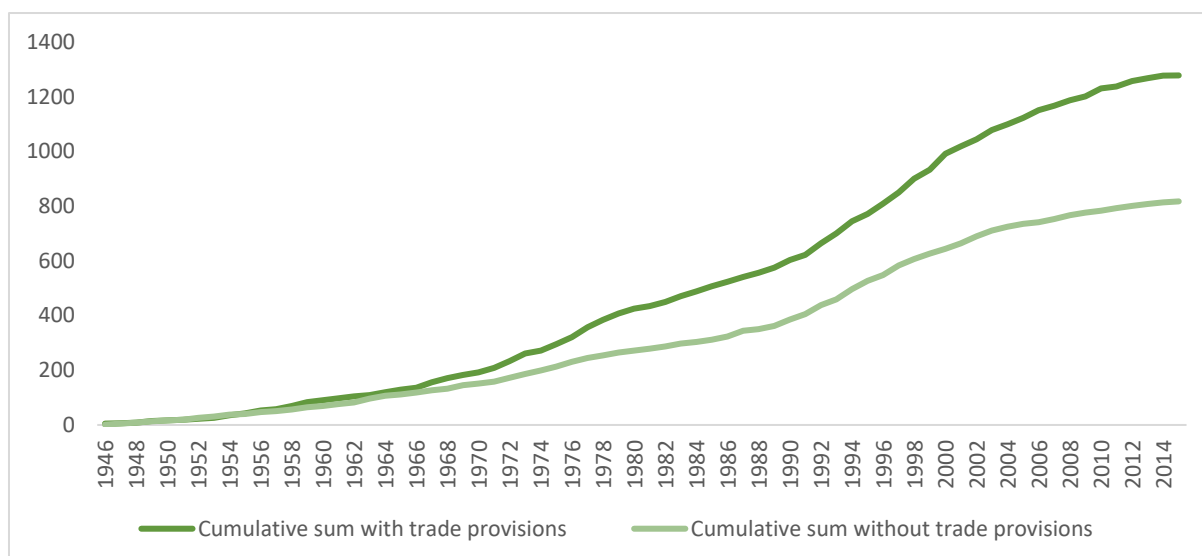


Figure 4 : Number of IEAs signed globally by presence of trade provisions.

The most frequent provisions of the TIPEA codebook refer to restrictions on the extraction of natural resources (618 IEAs), references to a preferential trade agreement (378 IEAs), access to natural resources (323 IEAs) and restriction on the consumption of specific goods (226 IEAs). On average, IEAs include 1.5 provisions from the TIPEA codebook but a number of agreements contain multiple of them. For instance, the 1994 Energy Charter Treaty includes 17 TIPEA provisions and the 1994 Protocol on Environment to the Treaty for the Establishment of the East African Community includes 14.

To test our hypotheses, we use TIPEA to measure how trade-liberalizing and trade-restrictive IEAs are. One variable is not the opposite of the other, as a single IEA can promote trade for certain goods while simultaneously restricting trade for other goods. In order to disentangle the two variables, we create two distinct indices based on IEAs' trade-related provisions. We recognize that some provisions are more relevant than others for trade and we created indices of the liberalizing and restrictive nature of IEAs by weighting their components.<sup>3</sup> Our weighting process involves two steps (Goertz 2006). First, each index was decomposed into dimensions. The trade-liberalizing index, for example, includes dimensions such as "Non-discrimination", "Promoting trade activities", "Promoting economic activities", and "Acknowledgment of trade institutions", which constitute subindices of the overall index. Second, each dimension is measured by a number of indicators, each corresponding to the presence of a specific type of trade-related provisions in the measured IEA. For example, the dimension "Acknowledgment of trade commitments" includes four indicators: "Cooperation with the WTO", "Cooperation with a preferential trade agreement", "Reference to the WTO", and "Other reference to a preferential trade agreement". These indicators are then assigned a weight within their dimension. For instance, since cooperating with the WTO is a stronger indication that international trade commitments are acknowledged than a mere reference to the WTO, the former indicator is assigned the double of the weight of the latter. We measure most subindices by adding their weighted indicators. When the indicators are substitutes, we keep only the one with the greatest weight as the measure of the subindex. If an IEA includes a commitment to cooperate with the WTO and a reference to the WTO, we consider these two provisions as

<sup>3</sup> Although this weighting exercise involves arbitrary decisions, not actively weighting indicators is equally arbitrary as it would implicitly give equal weight to each component. As imperfect as a weighted index is, it remains a better approximation of our measured concept.



substitute and we keep only the score associated with the commitment to cooperate with the WTO. Appendix A details the formula for the computation of these indices. The overall indices for the trade-liberalizing and trade-restrictive nature of an IEA range between 0 and 1.<sup>4</sup>

According to these indices, the most trade liberalizing IEAs are the 1994 Energy Charter Treaty, the 1998 Agreement on Energy Integration between Argentina and Bolivia, the 1977 Agreement in the Field of Marine Fisheries between Cote d’Ivoire and Senegal, and the 1994 International Tropical Timber Agreement. The most trade restrictive IEAs include the 2013 Minamata Convention on Mercury, the 1989 Convention On The Control Of Transboundary Movements Of Hazardous Wastes And Their Disposal and the 1998 Protocol to the Kuwait Regional Convention For Cooperation On The Protection Of The Marine Environment From Pollution.

The trade-liberalizing and trade-restrictive nature of IEAs vary with their characteristics. Figures 5 to 7 show the average score on the Liberalizing and Restrictive Indices by subject area, development status of their parties, and number of parties. IEAs on fisheries tend to be more liberalizing than others, while IEAs on agriculture and biodiversity score on average high on the trade-restrictive index. North-North IEAs are more liberalizing whereas South-South agreement are more restrictive. Bilateral and large multilateral IEAs score higher on both the Liberalizing and the Restrictive Indices than plurilateral IEAs with 3 to 30 co-signatories.

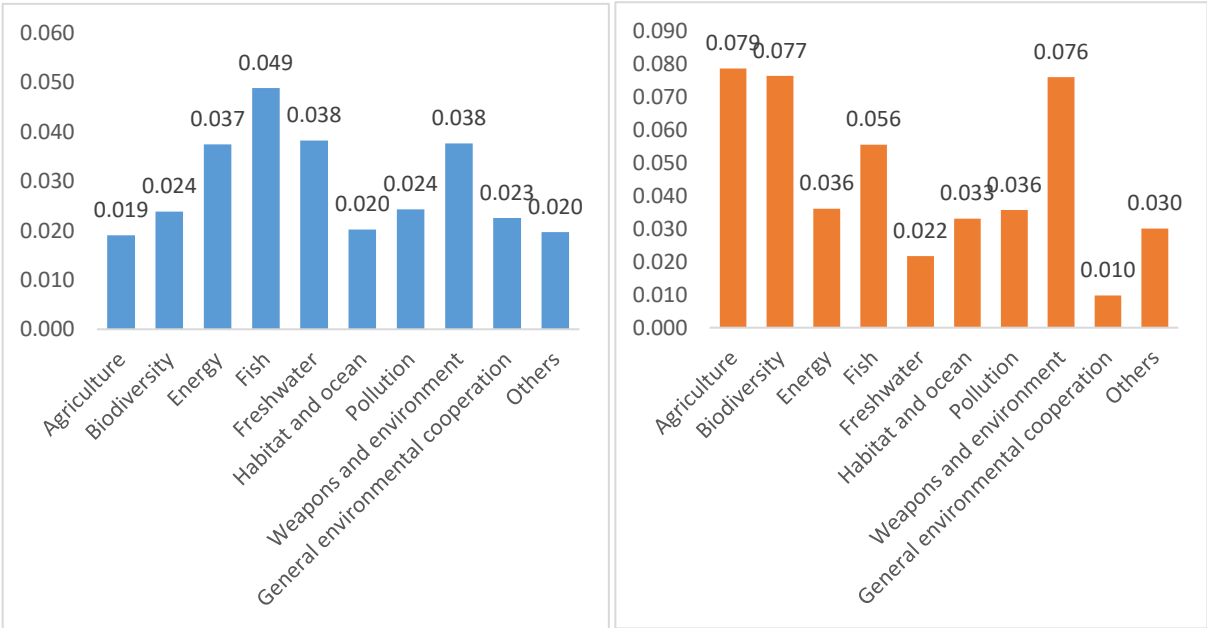


Figure 5A : Liberalizing Index by IEA Subject Area

Figure 5b : Restrictive Index by IEA Subject Area

<sup>4</sup> The absolute scores of the two indices cannot be compared directly as they refer to different dimensions.

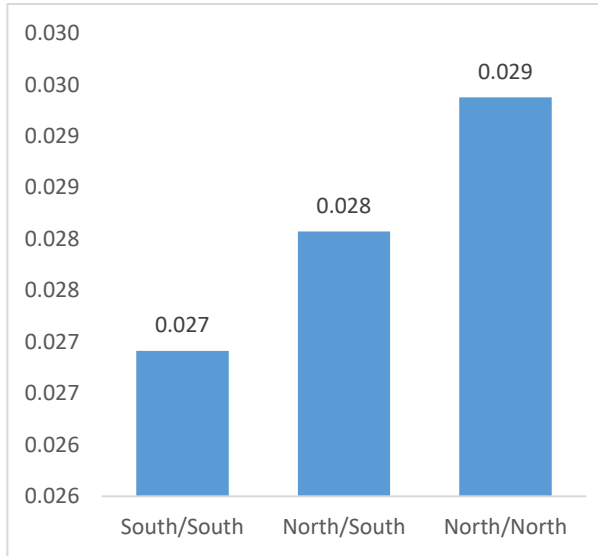


Figure 6a : Liberalizing Index by development status of IEA parties.

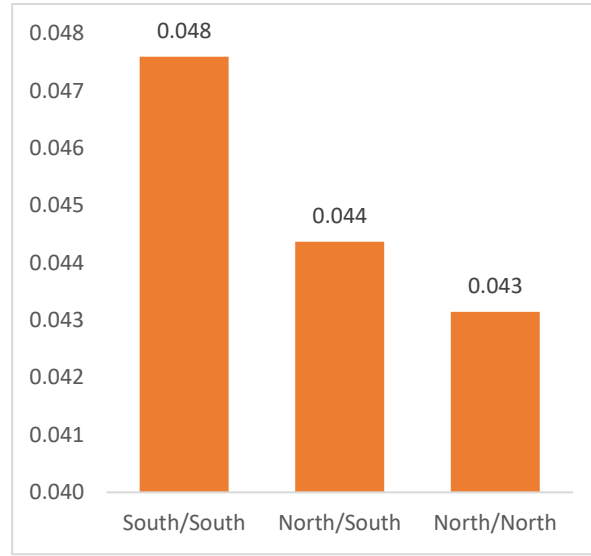


Figure 6b : Restrictive Index by development status of IEA parties

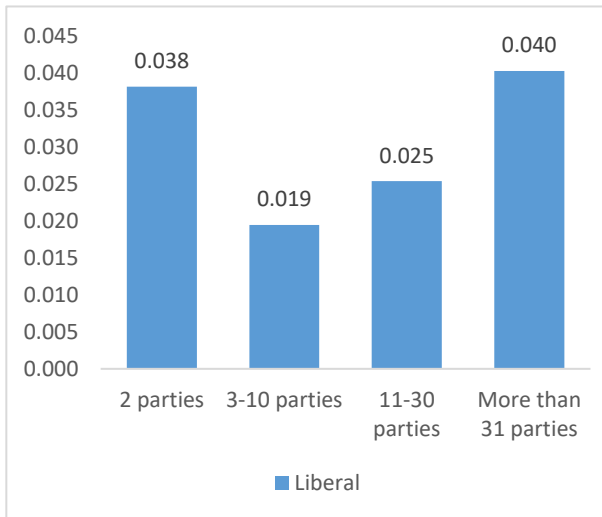


Figure 7a : Liberalizing Index by number of IEA parties.

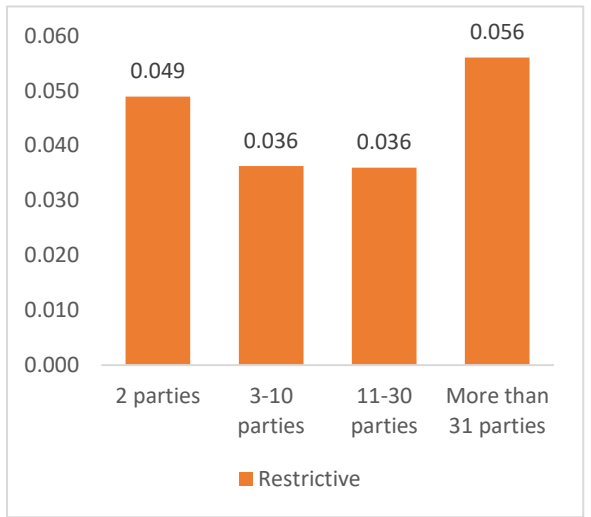


Figure 7b : Restrictive Index by number of IEA parties.

## 4. Empirical Approach

We aim at identifying the difference between trade among parties to a specifically designed IEA and trade with non-parties. To this end, we follow the literature on the trade effects of preferential trade agreements' (PTAs) design features by employing a gravity model in the panel (see Baier & Bergstrand 2007; Dür et al. 2014). Using a panel dataset of sectoral bilateral merchandise exports of more than 150 countries from 1984 to 2017 (UN Comtrade),<sup>5</sup> we regress the yearly exports from exporter  $e$  to importer  $i$ , on whether an IEA is in force between the two countries, and on the respective Liberalizing or Restrictive Index. Note that the analysis is restricted to the 1,539 IEAs from the TIPEA dataset that entered into force before or in the sample period. Table B1 in the appendix shows the descriptive statistics of these IEAs.

We control for the level of complexity of the IEA and for whether there is a PTA in place between the two countries in the same year, since both may be correlated with the trade-related

<sup>5</sup> Although it would also be interesting to analyze the effect on services trade, due to limited data availability we remain in line with the majority of studies on the trade effects of PTAs, which restrict the analysis to merchandise trade.

content of an IEA. Furthermore, we include country-pair and exporter- and importer-year effects to control for most forms of endogeneity. Our main regression equation thus reads:

$$EXPORTS_{eit} = \beta * TRIndex_{eit} + \gamma * IEA_{eit} + \delta * Complexity_{eit} + \lambda * PTA_{eit} + \alpha_{ei} + \alpha_{et} + \alpha_{it} + \varepsilon_{eit} \quad (1)$$

*EXPORTS* are the log of exports of exporter *e* to importer *i* in year *t*. *TRIndex* is the respective Index of trade-liberalizing or trade-restrictive IEA provisions in place between the two countries. *IEA* is a dummy for whether an IEA is in place. The variable *Complexity* is the number of words of the IEA, standardized relative to all observations under an IEA in order to facilitate interpretation of the effect on *IEA*.<sup>6</sup> If two states are parties to more than one IEA in a given year, all variables are assigned the maximum characteristic of any of these. The respective trade-liberalizing or trade-restrictive index on the country-pair level is thus the maximum index contained in any IEA between two countries, not necessarily the same one. *PTA* is a dummy for whether a PTA is in place between the two states in year *t*. Appendix B reports the summary statistics on the exporter-importer level (Table B2) and the respective correlations (Table B3).

The exporter-importer fixed effects  $\alpha_{ei}$  capture all time-invariant characteristics of a trading relationship which may be correlated with both the likelihood of signing an IEA with certain types of trade-related provisions and the level of exports between the states, such as regional or cultural distance. They also capture the initial level of exports. The exporter- and importer-year fixed effects  $\alpha_{et}$  and  $\alpha_{it}$  capture all time-variant individual country characteristics that may be correlated with the decision to join certain IEAs, such as the level of GDP, demand structures, production capacities, or overall developments of trade costs. The resulting estimates on the explanatory variables (including the Liberal and Restrictive Indices) derive from the within-variation in trade flows over time between country pairs.

Thus, the empirical strategy compares the changes of bilateral export flows among states that have entered into IEAs (with varying degree in their trade-restrictive or trade-liberalizing nature) to bilateral export flows between parties and non-parties to these IEAs. This comparison allows us to estimate the causal effect of IEAs' trade-related provisions on trade flows.

## 5. Empirical Findings

We estimate Equation (1) and include the trade-liberalizing or the trade-restrictive character of trade provisions. Both indices are positively correlated. We therefore include them in the regression both at once, and each separately. The former excludes the common variation of the indices and its effect and thus gives a lower bound estimate. The latter ascribes it to the respectively included feature and thus gives an upper bound estimate. Table 2 presents the results.<sup>7</sup>

	(1)	(2)	(3)
	EXPORTS	EXPORTS	EXPORTS
Liberalizing Index	0.418*** (0.072)	0.405*** (0.071)	

<sup>6</sup> Since both *TRIndex* and *Complexity* only display positive numbers if an IEA is in place, these variables are isomorphic to an interaction term of the respective measure with the *IEA*-dummy.

<sup>7</sup> The positive correlation of the independent variables may give rise to concerns of multicollinearity. We therefore report in Table A5 of the Appendix the Variance Inflation Factors (VIFs) from the estimation when both trade indices are included in the regression. None of the variables exhibits a problematic error correlation with the others (VIFs are below 10), so that multicollinearity is of no concern in the estimations presented.

Restrictive Index	-0.040 (0.056)		0.042 (0.055)
IEA	-0.122** (0.060)	-0.123** (0.060)	-0.089 (0.060)
Complexity	-0.040*** (0.014)	-0.041*** (0.014)	-0.017 (0.013)
PTA	0.136*** (0.027)	0.136*** (0.027)	0.140*** (0.027)
Constant	7.619*** (0.056)	7.610*** (0.054)	7.647*** (0.055)
Exporter-Importer Fixed Effects	Yes	Yes	Yes
Exporter- and Importer-Year Fixed Effects	Yes	Yes	Yes
Observations	712006	712006	712006
R <sup>2</sup>	0.882	0.882	0.881

Table 1 : The Effect of IEAs and Trade-related Provisions on Exports between parties.

**Notes:** This table shows the results from estimating Equation (1). The dependent variable is the log of exports from one country to another. *IEA* and *PTA* are dummies for whether either is in place. *Liberalizing* and *Restrictive Indices* are indices about the trade-restricting or liberalizing character of trade provisions within an IEA between the countries. *Complexity* is the standardized number of words contained therein. Robust standard errors clustered at the exporter-importer level are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

We find a trade reducing effect of entering into an IEA between co-signatories. Export flows are reduced by the signing of an IEA by roughly 12.2 percent, which is economically significant. This finding confirms the negative trade effect found by Ederington et al. (2018) for a small sample of 13 IEAs. However, due to the large number of IEAs counted as treatment in our analysis, identification of the effect of being in an IEA stems from a relatively small fraction of exporter-importer pairs which are not subject to any IEA between them. Overall, 88 percent of all trade flow observations take place between parties to a joint IEA. At the same time, this issue is of no concern for the estimation of the effects of IEAs provisions, which vary substantially between country pairs and over time due to the conclusion of additional IEAs.

Concerning the design of IEAs, we find that including trade provisions can counter the trade reducing tendency of IEAs. However, we find this effect only for the inclusion of liberalizing provisions. The estimated coefficients for the Liberalizing Index is positive and significant. An IEA with a maximum score of 1 on the Liberalizing Index would be associated to a 40.5 to 41.8 percent higher level of trade between its parties than an IEA with a score of 0. Provisions that restrict trade, however, do not seem to increase trade among parties relative to trade between parties and non-parties. We thus find evidence for H<sub>1</sub>, but not for H<sub>2</sub>.

The positive effect of liberalizing trade provisions is such that including them in an IEA can turn the trade-decreasing effect of the agreement into an overall trade-increasing effect. A

hypothetical agreement that would combine the highest values in our sample for the Liberalizing Index, holding all other variables than IEA and the Liberalizing Index constant at their mean of all active IEAs, would increase trade between its parties by 30 percent (significant at the 1 percent level).<sup>8</sup> Figure 5 shows the combined effect of *IEA* and *Liberalizing Index* on trade between co-signatories depending on the trade-liberalizing character of the IEA. The effect of signing an IEA turns positive at a value of the Liberalizing Index of 0.274. As such, several IEAs with trade-liberalizing provisions do provide club goods for their parties and provide strong incentive for non-parties to accede to the IEA or create their own club.<sup>9</sup>

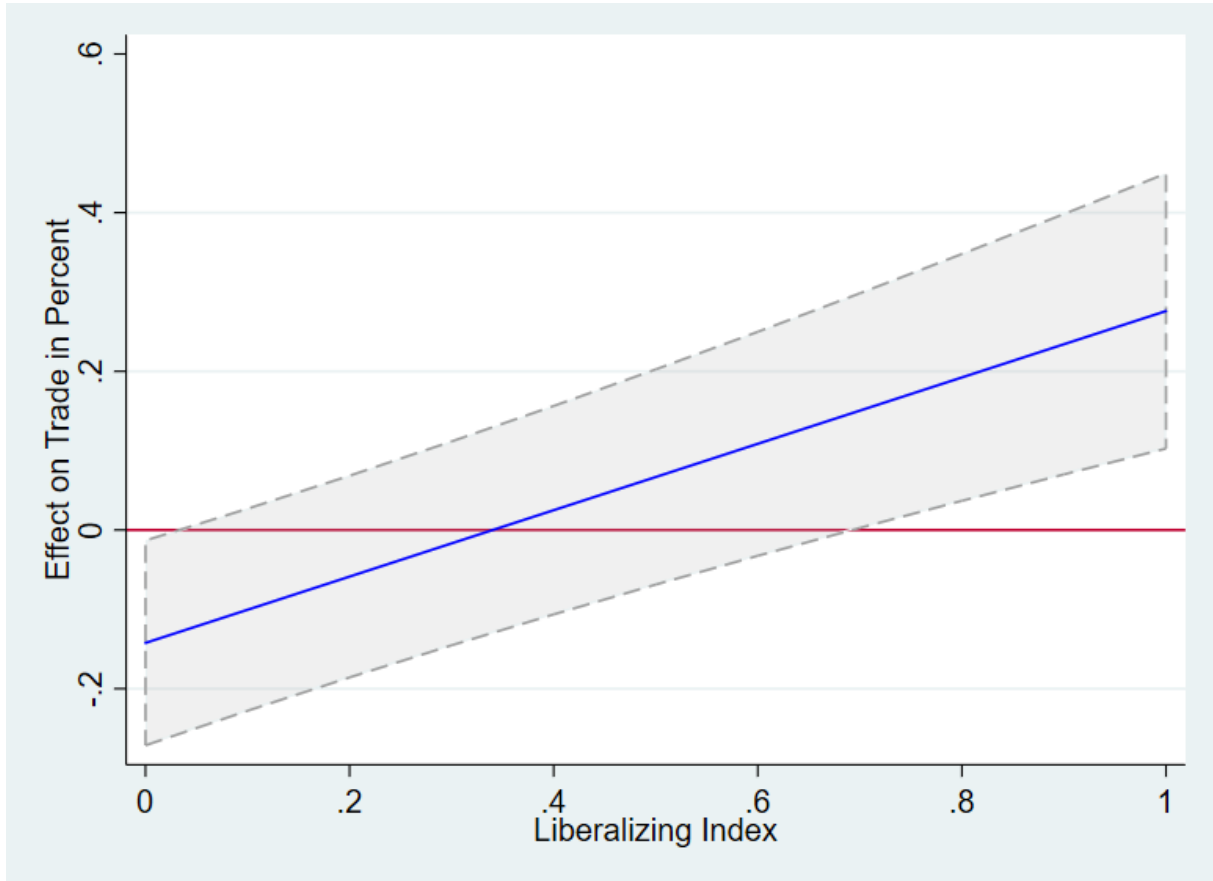


Figure 8: Combined Effect of IEA and Liberalizing Index on Trade between Parties

**Notes:** This figure shows the linear combination of the estimated effects of *IEA* and *Liberalizing* on the log of export values from the estimation of Equation (1) with including both *Liberalizing* and *Restrictive* as shown in Column 1 of Table 1, for different values of the *Liberalizing index*. The shaded area depicts the 95 percent confidence interval.

For our control variables, we find the expected effects. The level of complexity of IEAs, measured by its number of words, is a proxy for its degree of legalization or “depth”. As such, it is not surprising to find that the *Complexity* variable has a negative impact on trade. On the other hand, *Complexity* of an IEA is positively correlated with trade-related provisions, so that those IEAs that have positive trade-increasing effects also tend to be the more complex ones.

<sup>8</sup> For this and all other predictions we use the estimates from the regressions including both *Liberalizing* and *Restrictive* as reported in Column 1 of Table 2.

<sup>9</sup> The focus of our argument is on trade-based club goods that generate incentives to join IEA rather than on the direct environmental effects of larger trade flows, which are ambivalent, as existing evidence suggests. While the more direct environmental impact of liberalizing trade provisions in IEAs have not been studied yet, we know that liberalizing environmental provisions in trade agreements increase trade in environmentally-friendly goods and reduce trade in “dirty” goods (Brandt et al., 2020).

The estimated effect of having a PTA in force between two countries is similar to typical estimates in the literature (see Baier & Bergstrand, 2007), even after taking the potentially confounding effect of IEAs into account. It is to be noted that the estimated negative effect of an IEA without any trade-related provisions is equally strong as the effect of a PTA, only in the opposite direction. In contrast, an IEA scoring high on the Liberalizing Index exceeds the average effect of a PTA in its impact to increase trade between co-signatories.

When we take together all effects of the different features of IEAs, our estimates predict that 461 out of 2 097 IEAs included in the TIPEA dataset, have the combined characteristics to actually increase trade. This includes both IEAs that are in force and included in our empirical analysis (of which 291 out of 1,539 are estimated to increase trade) as well as those that are not (170 out 558 are estimated that they would increase trade).

#### *Extensions and Robustness checks*

The results presented so far provide a general picture on the potential (hitherto undisclosed) effects of trade provisions in IEAs. In the following, we detail these results and test their robustness against different specifications of the estimation. We conduct one extension at a time in order to better compare the results.

First, the specification of the Liberalizing and Restrictive Indices is somewhat subjective. To test whether the results presented above depend on the specific definition of the respective indices, we re-run the estimations with the simple count number of trade-relevant provisions. Column 1 of Table 2 shows the results when including the overall number of trade-related provisions as explanatory variable. The result is slightly positive. However, Column 2 of Table 2 shows that differentiating between the two types of trade provisions is important, as the positive result is driven by liberalizing provisions.

Next, we have noted that much of the within-variation in the Liberalizing and Restrictive Indices comes from the entering into force of IEAs between co-signatories additional to already existing ones. Thus, we might be worried that the estimated positive effect of the Liberalizing Index actually picks up the effect of signing additional IEAs. Column 3 of Table 2 shows the results of estimating Equation (1) including a count variable for the overall number of IEAs between co-signatories. Although the estimated positive effect of the Liberalizing Index becomes slightly smaller and a higher number of IEAs between co-signatories moderates the still significant and negative effect of being in an IEA, the effect on the Liberalizing Index is still statistically and economically significant.

	(1)	(2)	(3)	(4)	(5)
	EXPORTS	EXPORTS	EXPORTS	EXPORTS	EXPORTS
# of Trade Provisions	0.007*** (0.002)				
# of Liberalizing Provisions		0.027*** (0.004)			
# of Restrictive Provisions		0.000 (0.002)			
Liberalizing Index			0.238*** (0.073)	0.418*** (0.072)	
Liberalizing Index X PTA					0.721*** (0.110)

Liberalizing Index X NO_PTA					0.328*** (0.077)
Restrictive Index			-0.031 (0.056)	-0.040 (0.056)	
Restrictive Index X PTA					-0.144 (0.109)
Restrictive Index X NO_PTA					-0.014 (0.058)
IEA	-0.099* (0.060)	-0.103* (0.060)	-0.110* (0.060)	-0.122** (0.060)	
IEA X PTA					0.016 (0.123)
IEA X NO_PTA					-0.126** (0.061)
# of IEAs			0.022*** (0.002)		
Complexity	-0.020 (0.013)	-0.023* (0.013)	-0.043*** (0.014)	-0.040*** (0.014)	
Complexity X PTA					-0.071*** (0.022)
Complexity X NO_PTA					-0.032** (0.014)
PTA	0.139*** (0.027)	0.134*** (0.027)	0.108*** (0.027)	0.137*** (0.028)	-0.048 (0.112)
Depth of PTA				-0.002 (0.019)	
Constant	7.611*** (0.056)	7.582*** (0.056)	7.359*** (0.061)		7.633*** (0.056)
Exporter-Importer Fixed Effects	Yes	Yes			Yes
Exporter- and Importer-Year Fixed Effects	Yes	Yes			Yes
Observations	712006	712006			712006
R <sup>2</sup>	0.881	0.882	0.882		0.882

Table 2 : Extensions and Robustness Checks

**Notes:** This table shows the results from estimating variants of Equation (1). The dependent variable is the log of exports from one country to another. *IEA* and *PTA* are dummies for whether either is in place. The # of *IEAs* and # of Trade Provisions, Liberalizing Provisions, and Restrictive Provisions are count variables, respectively. The *Liberalizing* and the *Restrictive Index* are indices about the trade-restricting or liberalizing character of trade provisions within an *IEA* between the countries. *Complexity* is the standardized number of words contained therein.

Robust standard errors clustered at the exporter-importer level are reported in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Furthermore, we investigate more closely the role the PTA status of partner countries in IEAs. First, we control for the regulatory depth of PTAs in place between countries in order to exclude the possibility that the estimated effects of the trade-related content of IEAs captures the effects of the characteristics of the PTAs (rather than the IEAs) between two signatories. The results, presented in Column 4 of Table 2, show that the estimated effect on the Liberalizing Index of IEAs does not change when accounting for the depth of PTAs between countries. Second, it is conceivable that PTA and IEA characteristics are not only correlated, but that it matters for the strength of the effect of trade provisions in IEAs whether they are effective between countries that have a PTA in force between them or not. This could theoretically go into both directions. Trade-related provisions could substitute for those in PTAs, or they could complement them. Column 5 of Table 2 shows the results of interacting all IEA-variables of interest with whether countries have a PTA or not in force between them. They show that in both cases, including liberalizing provisions in an IEA increases trade between co-signatories. However, this effect is stronger if there already is a PTA in place between the countries (the difference also being statistically significant).

For an additional robustness test, we also run a Poisson pseudo maximum likelihood estimation (PPML, Santos Silva and Tenreyro 2010). We estimate this using the non-logarithmized volume of exports as dependent variable, as this estimation procedure can better handle zeros of trade flow observations, which are therefore also included in the sample. The results of the PPML estimations are presented in Table C1 in the appendix. Although the estimates of the effects of *IEA* turn insignificant, the effect of the *Liberalizing Index* is positive and significant in this estimation, confirming our main results. We report the estimates of the log-linear estimation in the main text as the point estimates of the PPML estimation are less straightforwardly interpretable.

In order to see more specifically which provisions are particularly effective in fostering trade between the parties of an IEA, we also estimate the effects at the subindex- and provision-level. The results of including either as main explanatory variables are shown in Table C2 and C3, respectively. Column 1 reports for each subindex/provision the estimates when included alone (i.e. one regression for each subindex/provision), while Column 2 reports the results of the estimation when all subindices/provisions are included jointly. Including them individually generates a strong risk of an omitted variable bias, whereas including all at the same time raises issues of multicollinearity, given that the subindices and provisions are positively correlated within the data. Thus, the results given in Tables C2 and C3 need to be interpreted with caution and can only provide upper and lower bound estimates for the effects of individual subindices or provisions. Taking into account the combined effect of trade provisions, using an index such as the Liberalizing and Restrictive ones in the main results, provides a clearer picture of the overall effects of including trade-liberalizing or trade-restrictive provisions. The analysis on the more fine-grained level of subindices or even provisions may nonetheless give an indication for researchers and policy makers of which provisions are particularly opportune to contribute to the club nature of IEAs.

At the subindex-level, the results in Table C2 suggest that Subindex 1.5, “Promotion of a liberal market economy”, is particularly effective in fostering trade between parties of IEAs relative to non-parties. Among the liberalizing subindices, only Subindex 1.1, “Liberal Principles” is not found to have any significant effect. This might be related to the fact the provisions covered by Subindex 1.1 typically have a low degree of precision and obligation. Of the restrictive subindices, none has a significant effect in the estimations at this level of analysis when all



others are accounted for.

The picture is similar at the provision level. Provisions which restrict monopolistic practices are the provisions most definitely found to increase trade between parties of a IEA. Of the trade-restrictive provisions, the provisions which restrict the extraction of specific natural resources and those that restrict the consumption of specific goods have discriminatory effect. The results generally confirm the discriminatory effects of trade provisions and show that provisions which only indirectly address trade flows are at least as effective at favoring trade among co-signatories.

In a similar vein, we analyze whether the effects of the trade-liberalizing or trade-restrictive nature of IEAs differs across issue areas. To do so, we compute, for each index, the highest score by issue-area between two countries and include these in the regressions. Table C4 in the Appendix shows the results. We find that general IEAs with many liberalizing provisions have the largest positive trade effects, followed by IEAs that govern freshwater and fisheries. The overall positive findings from the main analysis are driven by IEAs in these three issue areas. We also find that IEAs with many restrictive provisions that focus on freshwater and biodiversity can increase trade between parties relative to non-parties.

As mentioned above, we control for selection into IEAs and their trade-specific characteristics in all estimations by the use of country-pair and exporter- and importer-year fixed effects. As a last robustness test, we model the selection process explicitly by estimating two two-stage regressions. First, we run a Heckman (1976) selection model. We predict selection into an IEA by characteristics found in the literature to determine partnership in an IEA (see Wangler et al., 2013). These variables include the geographical distance between the two countries, contiguity, common historical ties and common language, and their GDP (Mayer & Zignago, 2011) as well as their domestic environmental standards (Wendling et al., 2018), level of democracy (Polity V project), degree of corruption (Transparency International Corruption Perceptions Index in 2019), and number of NGOs (Roberts et al., 2004).<sup>10</sup> In the second stage, we use the residuals from a regression on country-pair fixed effects as dependent variable, and control for the Complexity of the IEAs and whether a PTA is in place. The results are reported in Table C5 in the appendix.<sup>11</sup>

In a second Heckman selection model, we predict the trade-liberalizing and -restrictive nature of IEAs between two countries in the first stage rather than the membership in an IEA. The explanatory variables are the same as in the first model. The results of this first stage regression are shown in Table C6 in the appendix. The fit of this model gives the expectation of how trade-liberalizing and trade-restrictive an IEAs in place between two countries should be given their characteristics in a certain year. The residual of the first stage estimation is the “unpredicted” liberalization or restriction through IEAs between the countries, and can thus be viewed as exogenous, given the characteristics of the country-pair. The second stage then regresses the trade flows on this unpredicted liberalization or restriction. The results are shown in Table C7 in the appendix. The results of the Heckman selection model and the two stage regression support our main findings.

## 6. Conclusion

In Molière’s satirical play *The Bourgeois Gentleman*, Mr. Jourdain is delighted to learn that he has been speaking prose all his life without knowing it. In a way, this paper shows that global

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<sup>10</sup> The variables are available for different time periods but the time variation remain small .

<sup>11</sup> The explanatory variables for selection do not provide perfect exclusion restrictions, as they are correlated with the outcome variable of trade flows.

environmental governance has generated club goods for decades without acknowledging them as such.

The academic literature is burgeoning with calls to create climate clubs and other intergovernmental environmental clubs. Most of these calls are rooted in normative considerations, deductive reasoning, or agent-based modeling rather than empirical investigations, as if environmental clubs were an abstract idea deprived of empirical manifestations. This paper provides strong evidence that several IEAs with trade provisions generate club goods for their parties and, as such, are *de facto* environmental clubs. In doing so, this paper reveals that environmental clubs are more numerous than previously thought.

These findings open new avenues for future empirical research on intergovernmental environmental clubs. Three questions appear particularly important. First, even though this paper shows that several IEAs have strong and significant discriminatory trade effects against non-parties, it remains unclear if non-parties react to these effects by joining environmental clubs. Better understanding the range of conditions that lead non-participatory states to accede existing IEAs is essential to assess the full potential of environmental clubs. Second, non-parties can react to their exclusion from club goods by creating their own club instead of joining existing ones, contributing to the proliferation of environmental clubs. Such a domino effect is a well-documented consequence of trade diversion induced by trade agreements (Baldwin and Jaimovich 2012), but it remains unknown whether a similar pattern is occurring for environmental clubs. Third, the consequences of club goods for participatory states are underexplored. Does the provision of club goods reduce withdrawals from IEAs, increase compliance levels, and induce the adoption of amendments, annexes or protocols? By uncovering the existence of club goods in global environmental governance, this paper accomplishes the necessary first step in answering these important empirical questions.

Our findings are also relevant for research on the interplay between trade and the environment. While IEAs can reduce trade flows, we find that trade-liberalizing provisions in these agreements can generate trade benefits for their signatories. They can even turn IEAs' trade-decreasing effect into an overall trade-increasing effect. This finding has important policy implications: it points to specific design features that can make IEAs more palatable to stakeholders and policymakers concerned about their economic consequences. Since only 17 percent of all IEAs (365 IEAs) include more than one trade-liberalizing provisions, IEAs negotiators can leverage these win-win potentials much more strongly.

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## Appendix A. Indices

For the two indices, we sum the dimensions and we divide them such as the value is between 0 and 1.

### A.1 Liberalizing Index

#### Dimension 1.1: Liberal principles

<i>Indicators</i>	<i>Weight</i>	<i>Nb of IEAs</i>
General commitment towards liberalized trade	1	120
Environmental measures should not hamper trade	1	19

Sum of the indicators. Score of this dimension between 0 and 2.

#### Dimension 1.2: Non-discrimination in trade

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Most favored nation treatment	3	15
National treatment	3	22
Other references to non-discrimination in trade	1	105

Sum of the indicators. Score of this dimension between 0 and 7.

#### Dimension 1.3: Non-limitation of trade

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Non-prohibition or non-limitation of importations	3	127
Non-prohibition or non-limitation of exportations	3	69

Sum of the indicators. Score of this dimension between 0 and 6.

#### Dimension 1.4: Promotion of trade

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Ecotourism	1	24
Trade in environmental goods or services	1	20
Promotion of ecolabel or certifications	1	24
Emissions trading schemes	1	12

Sum of the indicators. Score of this dimension between 0 and 4.

#### Dimension 1.5: Promotion of a liberal market economy

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Open access to natural resources	2	323
Liberalize foreign investment	2	43
Restrict subsidies	2	4
Restrict monopolistic practices	2	4
Liberalize public procurement	2	9

Sum of the indicators. Score of this dimension between 0 and 10.

#### Dimension 1.6: Acknowledgment of international trade commitments

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Cooperation with GATT-WTO	2	1
Reference to GATT-WTO	1	31
Cooperation with another trade institution	2	18
Reference to another trade institution	1	378

Maximum of the indicators. Score of this dimension between 0 and 2.

## A.2 Restrictive Index

### Dimension 2.1: Import restrictions

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Prohibition to import without a permit	3	14
Other import prohibition	3	67
Importer can require information	3	54
Importer can require quarantine	2	49
Other import restriction of general application	3	137
Ad hoc refusal of importations	2	38
Non-tariff duties or import taxes	3	7

Maximum of the indicators. Score of this dimension between 0 and 3.

### Dimension 2.2: Export restrictions

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Prohibition to export without a permit	3	26
Other export prohibitions	3	40
Exporter must notify the importer	2	17
Information requirement for exporter	2	121
Other export restrictions of general application	3	123
Ad hoc refusal of exportations	2	20
Export taxes	3	4

Maximum of the indicators. Score of this dimension between 0 and 3.

### Dimension 2.3: Trade with non-members

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Regulation of imports from non-parties	4	23
Regulation of exports to non-parties	4	32

Sum of the indicators. Score of this dimension between 0 and 8.

### Dimension 2.4: Restriction on economic activities

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Restrictions on the production of specific goods	2	26
Restrictions on the extraction of specific natural resources	2	618
Restrictions on the selling of specific goods	2	72
Restrictions on the consumption of specific goods	2	226
Restrictions on the transportation of specific products	2	19
Restrictions on construction activities	1	25

Sum of the indicators. Score of this dimension between 0 and 11.

### Dimension 2.5: Restrictions on a liberal market economy

<i>Indicator</i>	<i>Weight</i>	<i>Nb of IEAs</i>
Access to natural resources is restricted	2	30
Foreign investment is restricted	2	3
Monopolistic practices are authorized	2	1
Public procurement is protected	2	0
Subsidies are authorized	2	1

Sum of the indicators. Score of this dimension between 0 and 10.

## Appendix B. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
No. of Partners	2,097	9.19	25.33117	2	199
Liberalizing Index	2,097	0.0340733	0.0584494	0	0.7096774
Restrictive Index	2,097	0.0462293	0.0692161	0	0.6285715
Number of Words	2,097	3174.78	4087.296	0	81555

Table B1: International Environmental Agreements

Variable	Obs	Mean	Std. Dev.	Min	Max
EXPORTS	712,006	7.601841	3.868097	0.0009995	20.29332
Liberalizing Index	712,006	0.2016312	0.1509947	0	0.7096774
Restrictive Index	712,006	0.3231143	0.1852371	0	0.6285715
IEA	712,006	0.8903155	0.3124963	0	1
Complexity	712,006	0	0.9435652	-1.507808	1.247983
PTA	712,006	0.146128	0.3532347	0	1

Table B2: Trade Flow Observations

	Liberalizing index	Restrictive index	IEA	Complexity	PTA
Liberalizing Index	1				
Restrictive Index	0.6443	1			
IEA	0.4687	0.6123	1		
Complexity	0.5487	0.3343	0	1	
PTA	0.1454	0.1267	0.1065	0.0868	1

Table B3: Correlations

**Notes:** This table shows the Pearson correlation coefficients of the dependent variables used in the estimations.

Variable	VIF	1/VIF
Liberalizing index	9.20	0.108738
IEA	8.98	0.111329
Restrictive index	6.64	0.150516
Complexity	1.67	0.598922
PTA	1.20	0.834372
Mean VIF	5.54	

Table B4: Variance Inflation Factors

**Notes:** This table shows the variance inflation factors from the estimation of Equation (1) with including both *Liberalizing* and *Restrictive* as shown in Column 1 of Table 1.



## Appendix C. Additional Tables

	(1)	(2)	(3)
	EXPORTS	EXPORTS	EXPORTS
Liberalizing Index	0.137* (0.079)	0.148* (0.079)	
Restrictive Index	0.074 (0.112)		0.097 (0.111)
IEA	0.198 (0.127)	0.201 (0.130)	0.203 (0.127)
Complexity	-0.099*** (0.021)	-0.098*** (0.021)	-0.092*** (0.019)
PTA	-0.041 (0.054)	-0.042 (0.055)	-0.041 (0.054)
Exporter-Importer Fixed Effects	Yes	Yes	Yes
Exporter- and Importer-Year Fixed Effects	Yes	Yes	Yes
Observations	1095017	1095017	1095017
R <sup>2</sup>	0.989	0.989	0.989

Table C1: PPML Estimations

**Notes:** This table shows the results from estimating Equation (1) with a Poisson pseudo maximum likelihood estimation. The dependent variable is the (linear) total value of exports from one country to another. The estimations include zeros in the dependent variable. *IEA* and *PTA* are dummies for whether either is in place. *Liberalizing* and *Restrictive Indices* are indexes about the trade-restricting or liberalizing character of trade provisions within an IEA between the countries. *Complexity* is the standardized number of words contained therein. Robust standard errors clustered at the exporter-importer level are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

	(1)	(2)		(1)	(2)
	EXPORTS	EXPORTS		EXPORTS	EXPORTS
1.1: Liberal Principles	0.004 (0.014)	-0.009 (0.014)	2.4: Restriction on economic activities	0.007 (0.005)	0.003 (0.005)
1.2: Non-discrimination in trade	0.010** (0.005)	0.001 (0.005)	2.5: Restrictions on a liberal market economy	0.027*** (0.008)	0.002 (0.009)
1.3: Non-limitation of trade	0.004 (0.004)	0.003 (0.004)	IEA	-0.098 to -0.084 (0.060)	-0.093 (0.060)
1.4: Promotion of trade	0.033*** (0.010)	0.012 (0.011)	Complexity	-0.025 to -0.015 (0.013) to (0.014)	-0.021 (0.014)
1.5: Promotion of a liberal market economy	0.042*** (0.005)	0.038*** (0.007)	PTA	0.134*** to 0.140*** (0.027)	0.134*** (0.027)
1.6: Acknowledgment of intern. trade comm.	0.041** (0.016)	0.002 (0.017)	Constant	7.597*** to 7.663*** (0.054) to (0.058)	7.583*** (0.058)
2.1: Import restrictions	-0.003 (0.006)	-0.002 (0.008)	Exporter-Importer Fixed Effects	Yes	Yes
			Exporter- and Importer-Year Fixed Effects	Yes	Yes
2.2: Export restrictions	-0.001 (0.006)	-0.004 (0.009)	Observations	712006	712006
			R <sup>2</sup>	0.881 to 0.882	0.882
2.3: Trade with non-members	0.004* (0.002)	0.002 (0.002)			

Table C2: Estimations by Subindices

**Notes:** This table shows the results from estimating Equation (1), using the subindices listed in table A1 and A2 as explanatory variables. Column 1 shows the results from different regressions, including each subindex at a time. Column 2 shows the results from a regression including all subindices jointly. The dependent variable is the log of exports from one country to another. *IEA* and *PTA* are dummies for whether either is in place. *Complexity* is the standardized number of words contained therein. Robust standard errors clustered at the exporter-importer level are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

	(1)	(2)		(1)	(2)		(1)	(2)		(1)	(2)
	EXPORTS	EXPORTS		EXPORTS	EXPORTS		EXPORTS	EXPORTS		EXPORTS	EXPORTS
Gen. commit. twrds. liberal. trade	-0.007 (0.017)	-0.026 (0.018)	Restrict subsidies	0.046** (0.018)	0.097* (0.052)	Non-tariff duties or import taxes	-0.069 (0.048)	-0.232 (0.175)	Restrictions on the cons. of specific goods	0.052*** (0.016)	0.054*** (0.019)
Envir. measures should not hamper trade	0.007 (0.019)	0.008 (0.021)	Restrict monopolistic practices	0.417*** (0.041)	1.838*** (0.313)	Prohibition to export without a permit	0.012 (0.019)	-0.030 (0.030)	Restrictions on the transportation of specific products	0.031** (0.016)	0.033* (0.018)
MFN treatment	0.339*** (0.042)	-0.050 (0.076)	Liberalize public procurement	0.412*** (0.041)	-0.300 (0.284)	Other export prohibitions	0.014 (0.016)	0.031 (0.030)	Restrictions on construction activities	0.090*** (0.029)	-0.187*** (0.066)
National treatment	-0.004 (0.019)	-0.005 (0.022)	Cooperation with GATT-WTO	-0.091** (0.038)	-0.096** (0.039)	Exporter must notify the importer	0.024 (0.015)	0.026 (0.020)	Access to natural resources is restricted	0.002 (0.019)	0.020 (0.025)
Other references to non-discrim. in trade	-0.001 (0.018)	-0.002 (0.020)	Reference to GATT-WTO	0.026 (0.023)	-0.064*** (0.031)	Information requirement for exp.	0.010 (0.017)	0.081* (0.042)	Foreign investment is restricted	0.414*** (0.041)	-1.202*** (0.123)
Non- limitation of import.	0.014 (0.022)	0.119** (0.049)	Cooperation with another trade institution	0.301*** (0.030)	0.207*** (0.037)	Other export restrictions of gen. application	0.008 (0.017)	-0.033 (0.028)	Monopolistic practices are authorized	0.029 (0.028)	0.015 (0.029)
Non- limitation of export.	0.027 (0.022)	-0.122*** (0.047)	Ref. to another trade institution	-0.036* (0.020)	-0.048** (0.021)	Ad hoc refusal of exportations	-0.018 (0.022)	-0.019 (0.026)	Public procurement is protected	/	/
Ecotourism	0.112*** (0.027)	0.257*** (0.060)	Prohibition to import without a permit	0.063** (0.028)	0.092** (0.040)	Export taxes	-0.068 (0.048)	0.134 (0.182)	Subsidies are authorized	0.417*** (0.041)	0.000 (.)
Trade in envir. goods or services	0.062*** (0.020)	-0.005 (0.026)	Other import prohibition	-0.002 (0.017)	-0.024 (0.028)	Regulation of imp. from non-parties	0.034* (0.018)	0.057 (0.041)	IEA	-0.105 to -0.054 (0.060)	-0.052 (0.064)
Promotion of ecolabel or certifications	0.071*** (0.017)	0.032* (0.019)	Importer can require information	0.004 (0.016)	-0.088** (0.043)	Regulation of exports to non-parties	0.025 (0.017)	-0.036 (0.040)	Complexity	-0.030 to 0.010 (0.013) to (0.021)	0.007 (0.022)
Emissions trading schemes	0.039** (0.019)	-0.063 (0.054)	Importer can require quarantine	-0.003 (0.022)	0.032 (0.027)	Restrictions on the production of specific goods	-0.008 (0.017)	-0.025 (0.019)	PTA	0.127*** to 0.141*** (0.027)	0.119*** (0.027)
Open access to natural resources	0.004 (0.018)	-0.046* (0.025)	Other import restriction of general application	0.003 (0.017)	0.017 (0.024)	Restrictions on the extraction of specific natural resources	0.061*** (0.016)	0.061*** (0.017)	Constant	7.615*** to 7.682*** (0.053) to (0.055)	7.604*** (0.061)
Liberal. foreign investment	0.076*** (0.022)	0.038* (0.023)	Ad hoc refusal of importations	0.008 (0.019)	0.003 (0.024)	Restrictions on the selling of specific goods	0.022 (0.022)	-0.029 (0.024)	Observations R <sup>2</sup>	712006 0.881 to 0.882	712006 0.882

Table C3: Estimations by Provisions

**Notes:** This table shows the results from estimating Equation (1), using the individual provisions listed in table A1 and A2 as explanatory variables. Column 1 shows the results from different regressions, including each provision at a time. Column 2 shows the results from a regression including all provisions jointly. The dependent variable is the log of exports from one country to another. Robust standard errors clustered at the exporter-importer level are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

	(1)	(2)	(3)	(4)
	EXPORTS	EXPORTS	EXPORTS	EXPORTS
<i>-- LIBERALIZING</i>				
Agriculture	-0.242 (0.180)	-0.229 (0.179)	-0.120 (0.142)	
Pollution	0.154 (0.145)	0.116 (0.145)	0.208 (0.135)	
Fish	1.313*** (0.501)	1.146** (0.500)	0.326 (0.258)	
Energy	0.559*** (0.201)	0.262 (0.200)	0.530*** (0.060)	
Weapons	-2.100* (1.078)	-2.406** (1.146)	-1.650* (0.982)	
Freshwater	2.520*** (0.733)	1.234* (0.723)	1.870*** (0.665)	
Biodiversity	-0.099 (0.121)	-0.135 (0.120)	0.029 (0.104)	
Ocean	-0.106 (0.155)	-0.103 (0.159)	-0.152 (0.145)	
General	5.373*** (0.498)	3.418*** (0.502)	3.643*** (0.493)	
Others	0.036 (0.686)	0.146 (0.684)	0.141 (0.685)	
<i>-- RESTRICTIVE</i>				
Agriculture	0.183 (0.194)	0.177 (0.193)		0.019 (0.153)
Pollution	0.084* (0.044)	0.082* (0.044)		0.093** (0.041)
Fish	-0.768** (0.386)	-0.741* (0.386)		0.068 (0.198)
Energy	0.339 (0.539)	0.704 (0.534)		1.636*** (0.159)
Weapons	0.376 (0.253)	0.330 (0.253)		0.077 (0.220)

Freshwater	3.090*** (0.702)	1.413** (0.704)		3.027*** (0.637)
Biodiversity	0.152*** (0.054)	0.149*** (0.054)		0.129*** (0.047)
Ocean	-0.025 (0.174)	-0.102 (0.176)		-0.048 (0.155)
General	-0.085 (0.633)	0.063 (0.607)		0.622 (0.586)
Others	0.734*** (0.175)	0.568*** (0.174)		0.617*** (0.174)
IEA	-0.090 to -0.070 (0.060) to (0.062)	-0.050 (0.064)	-0.052 (0.063)	-0.085 (0.062)
Complexity	-0.017 to -0.003 (0.013) to (0.019)	0.009 (0.022)	0.007 (0.021)	-0.016 (0.018)
PTA	0.117*** to 0.140*** (0.027)	0.106*** (0.027)	0.107*** (0.027)	0.118*** (0.027)
Constant	7.624*** to 7.659*** (0.053) to (0.055)	7.567*** (0.059)	7.618*** (0.057)	7.578*** (0.057)
Observations	712006	712006	712006	712006
R <sup>2</sup>	0.881 to 0.882	0.882	0.882	0.882

*Table C4: Estimations by Issue Area*

**Notes:** This table shows the results from estimating Equation (1) with the Liberalizing and Restrictive Indices. Column 1 shows the results from different regressions, including each characteristic by issue area at a time. Columns 2-4 show the results from a regression that includes all issue areas jointly. Column 2 shows the results when the Liberalizing and Restrictive Indices are included at once, Columns 3 and 4 include only the Liberalizing and Restrictive Indices, respectively. The dependent variable is the log of exports from one country to another. *IEA* and *PTA* are dummies for whether either is in place. *Complexity* is the standardized number of words contained therein. Robust standard errors clustered at the exporter-importer level are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

	(1)		(1)		(1)
	EXPORTS				
<b>EXPORTS</b>		<b>IEA</b>			
Liberalizing Index	0.088*** (0.014)	DISTANCE	0.058*** (0.022)	EPI(IMP)	-0.003 (0.002)
Restrictive Index	0.029 (0.018)	CONTIGUITY	0.448 (0.516)	DEMOCRACY (EXP)	0.029*** (0.002)
Complexity	-0.004** (0.002)	COMMON LANGUAGE	0.338*** (0.065)	DEMOCRACY (IMP)	0.029*** (0.003)
Constant	-0.031*** (0.009)	COLONY	-0.160 (0.115)	CORR(EXP)	-0.006*** (0.001)
		COMMON COLONY	0.030 (0.074)	CORR(IMP)	-0.009*** (0.002)
		GDP(EXP)	0.000 (0.000)	CIVIL(EXP)	0.001*** (0.000)
		GDP(IMP)	-0.000 (0.000)	CIVIL(IMP)	0.001*** (0.000)
		POP(EXP)	0.000 (0.000)	Constant	3.187*** (0.308)
		POP(IMP)	0.000 (0.000)	Mills / Lambda	-0.531 (0.504)
		EPI(EXP)	-0.004** (0.002)	Observations	330067

Table C5: Heckman Selection Model Estimations

**Notes:** This table shows the results from a Heckman-regression, where in the first stage, IEA membership is predicted by a number of exporter-importer, exporter- and importer-year, and exporter and importer variables. The dependent variable is the log of exports, corrected for exporter-importer fixed effects. *Liberalizing* and *Restrictive indexes* are indexes about the trade-restricting or liberalizing character of trade provisions within an IEA between the countries. *Complexity* is the standardized number of words contained therein. Bootstrapped standard errors are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

	(1)	(2)		(1)	(2)
	Liberalizing Index	Restrictive Index		Liberalizing Index	Restrictive Index
IEA	0.237*** (0.003)	0.384*** (0.002)	POP(IMP)	0.000*** (0.000)	-0.000*** (0.000)
Complexity	0.072*** (0.001)	0.029*** (0.001)	EPI(EXP)	0.001*** (0.000)	0.000** (0.000)
PTA	0.004** (0.002)	0.007*** (0.002)	EPI(IMP)	0.001*** (0.000)	-0.000** (0.000)
DISTANCE	-0.031*** (0.001)	-0.000 (0.001)	DEMOCRACY (EXP)	0.002*** (0.000)	0.002*** (0.000)
CONTIGUITY	-0.013* (0.007)	-0.003 (0.004)	DEMOCRACY (IMP)	0.001*** (0.000)	0.001*** (0.000)
COMMON LANGUAGE	-0.020*** (0.002)	0.008*** (0.002)	CORR(EXP)	0.000*** (0.000)	-0.000*** (0.000)
COLONY	-0.010 (0.006)	-0.011** (0.005)	CORR(IMP)	-0.000*** (0.000)	0.000*** (0.000)
COMMON COLONY	0.021*** (0.003)	0.011*** (0.003)	CIVIL(EXP)	-0.000*** (0.000)	0.000** (0.000)
GDP(EXP)	0.000*** (0.000)	0.000*** (0.000)	CIVIL(IMP)	0.000*** (0.000)	0.000*** (0.000)
GDP(IMP)	0.000 (0.000)	0.000*** (0.000)	Constant	0.111*** (0.013)	-0.005 (0.010)
POP(EXP)	-0.000*** (0.000)	-0.000*** (0.000)	Observations	330067	330067
			R <sup>2</sup>	0.361	0.108

Table C6: First Stage Estimations for Liberal and Restrictive Index

**Notes:** This table shows the results from regressing the scores for the Liberalizing (Column 1) and Restrictive (Column 2) Indices as dependent variables on a range of exporter-importer, exporter- and importer-year, and exporter and importer variables. The residuals of this regression are used as explanatory variables in a second stage regression, results reported in Table C6. Robust standard errors clustered at the exporter-importer level are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01

	(1)	(1)	(3)
	EXPORTS	EXPORTS	EXPORTS
Liberalizing Index (residual)	0.349*** (0.085)	0.340*** (0.084)	
Restrictive Index (residual)	-0.037 (0.078)		0.021 (0.078)
IEA	-0.142 (0.141)	-0.133 (0.139)	-0.173 (0.140)
Complexity	-0.000 (0.017)	-0.000 (0.017)	-0.006 (0.017)
PTA	0.045 (0.035)	0.045 (0.035)	0.047 (0.035)
Constant	8.424*** (0.141)	8.414*** (0.140)	8.455*** (0.141)
Observations	330041	330041	330041
R <sup>2</sup>	0.894	0.894	0.894

*Table C7: Second Stage Estimations on the Excess Liberal and Restrictive Indexes*

**Notes:** This table shows the results when using the residuals of a regression of the liberalizing and restrictive indexes on a number of explanatory variables (results reported in Table C6) as explanatory variables. The dependent variable is the log of exports from one country to another. *IEA* and *PTA* are dummies for whether either is in place. *Complexity* is the standardized number of words contained therein. Robust standard errors clustered at the exporter-importer level are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01



	(1)	(2)	(3)	(4)
	North-North	South-North	North-South	South-South
	EXPORTS	EXPORTS	EXPORTS	EXPORTS
Liberalizing Index	0.025 (0.156)	0.413** (0.175)	0.362*** (0.128)	-0.060 (0.134)
Restrictive Index	0.105 (0.173)	-0.323** (0.128)	-0.047 (0.098)	0.121 (0.085)
IEA	0.126 (0.146)	-0.157 (0.109)	0.009 (0.090)	-0.150 (0.135)
Complexity	-0.053 (0.037)	0.005 (0.029)	-0.044** (0.022)	-0.024 (0.021)
PTA	0.054 (0.068)	0.034 (0.048)	0.188*** (0.073)	0.130*** (0.043)
Constant	10.208*** (0.106)	8.059*** (0.095)	8.428*** (0.081)	6.701*** (0.132)
Observations	56880	154571	155195	345354
R <sup>2</sup>	0.946	0.893	0.912	0.834

Table C8: The Effect of IEAs and Trade-related Provisions on Exports by Development Status of the Parties.

**Notes:** This table shows the results from estimating Equation (1) separately for the groups of developed country exporter and importer (Column 1), developing country exporter and developed country importer (Column 2), developed country exporter and developing country importer (Column 3), and developing country exporter and importer (Column 4). The dependent variable is the log of exports from one country to another. *IEA* and *PTA* are dummies for whether either is in place. *Liberalizing* and *Restrictive Indices* are indices about the trade-restricting or liberalizing character of trade provisions within an IEA between the countries. *Complexity* is the standardized number of words contained therein. Robust standard errors clustered at the exporter-importer level are reported in parentheses. \* p<0.10, \*\* p<0.05, \*\*\* p<0.01