Title: Trade in Environmental Services and Environmental Performance
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Abstract: In recent years, international trade treaties have emerged as a catalyst of commitments in environmental protection. International trade thrives as a bargaining chip, being the EU one of the main promoters of using trade as a method for monitoring climate policies beyond its borders. At the same time, the region is the world's largest trader of services. Whereas most of the research focuses on the role of the EU as a pioneer in comprehensive trade agreements —thus on the effects of environmental provisions in its PTAs —this paper seeks to analyze the effects of trade in environmental services between the EU and other countries. The focus lies on the linkages between trade barriers in environmental services and countries' Environmental Performance Index (EPI). For this purpose, we created an index to measure the degree of liberalization of EU's partners in FTAs commitments for the environmental services sectors and subsectors. We use this index to identify whether a better access for EU's environmental services providers has an impact on its partners' EPI, and thus its environmental sustainability.

1. Background.

In recent years, the connection between international trade and environmental protection has seen an unprecedented expansion. Not only can international trade function as a bargaining chip when it comes to achieving improvements in environmental preservation, but the international community is realizing its role as a catalyst for sustainability through the transfer of knowledge and technology that comes with environmental goods and services.

In 2001, the WTO members agreed at the Doha Development Agenda on *"the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services"* to enhance the mutual supportiveness of trade and environment (WTO, 2001). Since then, there have been several efforts at the WTO level to promote and facilitate trade in environmental goods and services. At a multilateral level, the Committee on Trade and Environment continues the previous mandate established at the Doha Ministerial Declaration. At a plurilateral level, and perhaps with more substantial results, several WTO Members launched in 2014 the Environmental Goods Agreement. Nowadays,18 Members (counting the European Union as one member) continue with the rounds of negotiations. Focusing on trade in services, the GATS established in 1995 another mandate in its Article XIX to promote successive rounds of negotiations. Thus, starting in 2000, Members engaged in the negotiation of commitments in environmental and other services sectors in the Special Session of the Council for Trade in Services (WTO, 2022).

Outside the WTO, regional trade agreements' initiatives have reached higher levels of compromise regarding trade in environmental goods and services. For example, the Asian-Pacific Economic Cooperation (APEC) started in early 2000s to lead the trade facilitation in environmental goods and services impulse. In 2012, APEC created a list of 54 environmental goods where parties committed to reduce their tariff rates to 5 percent or less by the end of 2020. Even if not conclusive, APEC economies also work on the liberalization and facilitation of environmental services under their recent "Environmental Services Action Plan" (ESAP). Regional Trade Agreements have focused either on goods or on generally endorsing positive environmental investment, cooperation and facilitation, but the efforts in services are still not tangible. However, there are some exemptions. Apart from an ambitious list of 132 tariff-free environmental goods, the Agreement between New Zealand and the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu on Economic Cooperation (ANZTEC) recognized the importance of facilitating the movement of businesspersons for the sale, delivery and installation of environmental goods or supply of environmental services, thus searching to liberalize environmental services under Mode 4 (WTO, 2022). New Zealand has also promoted; together with Fiji, Iceland, Norway, Costa Rica and later Switzerland, the Agreement on Climate Change, Trade and Sustainability. Announced in 2019, this agreement will be the first of its kind, channeling the role of trade and its potential to foster sustainable development and environment protection. The negotiations will focus on market access for environmental goods and services, reducing fossil fuel subsidies and developing guidelines for voluntary eco-

labeling schemes (Foster, 2021). Even if rounds of negotiations are still taking place, the Agreement has an explicit goal of establish new commitments for environmental services.

As we can see, the majority of these initiatives focused on trade in goods and references on cooperation and promotion of trade in environmental services. The diffusion of environmental technologies can be transferred to countries in different manners, and trade in services not only is essential per definition (especially after the servicification of the majority of developed economies) but is often complementary to environmental goods trade.

This paper aims to analyze the effects that signing trade in services agreements with the EU might have on its partners' environmental performance. Concretely, we focus on the liberalization commitments that the parties granted to the EU in these treaties for subsectors in environmental services.

2. The role of trade in services in the diffusion of environmental technology

That international trade and foreign direct investment work as a channel for the transfer of technology is not a new idea. Environmental regulations can push firms to develop more environmental-friendly technologies, thereby enhancing innovation and productivity rather than undermining international competitive industries (Porter & van der Linde, 1995). International trade and foreign direct investment can introduce goods and services which are energy-efficient compared to those available in the domestic market. FDI can generate knowledge and environmental spillovers thanks to which developing-country firms can leapfrog to higher productivity and reduce the environmental costs of industrialization (Gallagher and Zarsky 2007).

The WTO's approach in the area of environmental services is to advocate enhanced developing countries' access to private capital, technology and management expertise, and improved market access for exports of environmental services (Hoekman, Mattoo and English (eds), 2002). Trade barriers do not necessarily play a role to reach environmental objectives (Jha, 2002). Similarly, the OECD has always maintained the importance of keeping the costs of environmental good and services low, not only to preserve efficiency and competitiveness, but also to make cleaner practices more accessible and widespread. Services are considered as essential to the uptake and diffusion of cleaner technologies, and complementary to trade in environmental goods due to the costs for customizing, installing and keeping the equipment functioning in an optimal manner (OECD, 2017).

In the new generation of deep PTAs, it is usual to explicitly mention environmental targets via the inclusion of environmental provisions. However, this trade-environment linkage sometimes is not prone to liberalization and might just aim for domestic regulatory autonomy. Monteiro (2016), for example, classified PTA's environmental provisions as exceptions to trade commitments, environmental cooperation activities, references to different multilateral

environmental agreements, and obligations regarding domestic environmental law or environmental governance between the parties. Blümer et al. (2020) distinguish between policies that aim at protecting the domestic status quo (defensive) and those that seek to promote policy reforms abroad (offensive). Several studies have analysed the role of these environmental provisions in FTAs, but they tend to ignore services trade. According to Brandi et al (2020), in 2018, each PTA had approximately 73 different environmental provisions. Several of these provisions are relevant for the trade flows between partners and aim at reducing trade barriers for environmental goods. It does not seem that there should be a trade-off between the environmental and the economic repercussions of these PTAs' provisions. On the contrary, Brandi et al. (2020) shown that the inclusion of these provision has been correlated with increased trade flows, increasing green goods exports from already green developing countries. It seems that environmental provisions in PTAs can complement the environmental reforms and policies of a country, but not substitute them (Brandi et al. 2020). Even in cases where developing countries sign agreements with developed countries, the former's exporters have been shown to benefit from the inclusion of environmental provisions (Berger et al. 2018).

There is also a line of previous research which has highlighted the fact that trade liberalization in environmental services might lead to win-win outcomes. This will occur when changes in trade in services rules have a positive economic, environmental and social impacts (Kirkpatrick, 2017). The different modes of trade in services have been categorized as a transmission channel of technology (Pigato et al., 2020). For example, movement of capital and knowledge through inward and outward foreign direct investment (Mode 3), movement of people through, for example, business (Mode 4), or diffusion of knowledge through the internet and other media (Mode 1). Pigato et al. (2020) point out that FDI is a critical channel for low carbon technology transfer to developing countries. In fact, there is a line of research that focuses on the relationship between FDI and the environmental performance index (EPI) of countries. Li et al. (2019) found that the impact of FDI on EPI is not significant for their full sample of countries, however it exists heterogeneity between developed and developing countries. In their results, FDI only had a positive and significant impact on EPI for developed countries that are in the EPI's high quantile. Ong et al (2021) investigated the linkages between the EPI and economic growth for the case of Malaysia. They concluded that exports of goods and services were positively related to the EPI. They also found a positive association between FDI growth and EPI, since the foreign investment seems to be cleaner that the domestic investment in Malaysia, bringing new greener technologies to the local sphere. However, the services analysis was not done in a granular manner and the variable of interest included services exports together with goods as an annual growth for Malaysia. At the end, mode 3 or commercial presence is strongly linked to FDI, but the latter does not include sales of operations of foreign affiliates in its statistics and goes beyond the tertiary sector (WTO, 2010).

To our knowledge, there is not extensive investigation of the impact of trade in services on the environmental performance index. Even though, research has demonstrated the important role of environmental services in providing access to environmental technology at the industry level. Focusing on green and sustainable global chains, a study regarding globally integrated solar energy supply chains, concluded that open and transparent trade regimes led to a decline in the cost of solar electricity by 77% between 2010 and 2018; but for the development of these solar

photovoltaic plants, 56% of the person-day needed are associated with services related to energy installations, while only 22% are associated to manufacturing (IRENA, 2021). For wind turbine manufacturing, Garsous and Worack (2021) found that international trade in capital goods, intermediate inputs and services are key to provide access to environmental technology. In wind farm projects, according to IRENA (2019), only 17% of the jobs are associated with manufacturing, while the rest is services such as operation and maintenance, installation and grid connection. Even if domestic employment policies are relevant to foster environmental specialization, opening mode 4 (movement of workers, services traded by individuals through their presence in the foreign territory) could have an impact in the training and job creation at the sustainable industries of host countries.

In general, we did not find extensive research on trade in environmental services and its linkage to environmental performance. Previous research has dealt with foreign direct investment and its repercussions to countries' environmental performance. As we saw, trade in environmental services liberalization has been subject of studies but at the industry level; or in a more general framework linked with overall goods trade and FTAs green provisions. To our knowledge, research on the effects of trade in environmental services liberalization on countries' environmental performance index is inexistent or very limited.

3. Why the European Union?

For several years, the European Union has been the world's largest exporter of services and is itself the biggest export market for around 80 countries (European Commission, 2020)

At the same time, Europe as a continent constantly leads the annual environmental protection index (EPI) ranking. In 2020, the EPI ranked 180 countries and used 32 performance indicators across 11 issue categories. Countries belonging to the European Union are usually among the EPI list of top performers, with 13 member states occupying the top 20 (Wendling et al., 2020). It is no secret that the EU has strong green ambitions, particularly with the new European Green Deal recently approved as a plan to decarbonize the EU economy by 2050. The EU's environmental worries and how it tries to implement it through trade has been a constant in the past years. The EU Sustainable Development Strategy from 2001 requires the EU to promote sustainable development worldwide (Monteiro, 2016). The trading bloc has also been involved in most of the innovative proposals for environmental services under the WTO. Together with the United States, the EU argued in a joint proposal tabled under the Doha Declaration that services that enabled to fulfil climate-change related objectives should not only be framed under the current environmental services classification, but also related technical and analysis services, energy-related and construction services (WTO, 2022).

These environmental concerns and active promotion of environmental protection has also been a constant in the EU's FTAs. According to Monterio (2016), in 2016, the majority of RTAs incorporating environmental-related provision were agreements between developed and developing countries, with 93 North-South RTAs (Monteiro, 2016). Previous research has

highlighted that power asymmetry is a decisive factor in explaining why countries with stronger environmental regulations impose provision on parties with weaker environmental provisions (Blümer et al. 2020). The EU uses trade as a bargaining chip, and benefits from its trade power to achieve non-trade objectives (Meunier and Nicolaïdis, 2006). The EU environmental provisions strategy is at the same time different than the US's approach. While the US PTAs are enforced through sanctions, the EU choses to rely on soft mechanisms of enforcement (Bastiaens and Postnikov, 2017). The US uses penalties to comply with the agreement; while the EU, even if the standards are legally binding, utilizes a Civil Society Dialogue instrument, where governments and society actors from the EU and the other party meet on a regular basis to work on implementation. Bastiaens and Postnikov (2017) found that fear of sanctions actually improves environmental protection, while the EU approach is only effective when linked with stronger civil society in partner states.

In these provisions, the EU has also made explicit moves to expand environmental goods and services trade, even if this type of provisions referring to the facilitation, promotion, development and trade of environmental goods, services and technologies where only found in 26 RTAs in 2016 (Monteiro, 2016). For example, in the 2008 Stabilisation and Association Agreement with Bosnia, the EU had provisions at aiming the pollution caused by heavy good vehicles and its intention to apply a similar regime to these vehicles registered in Bosnia and Herzegovina that wish to circulate through the European Community (Protocol 3 on Land Transport, article 11). The 2014 agreement with between the EU and Moldova, includes a total of 120 provisions on environment (Brandi et al., 2020). This agreement explicitly instructs the exchange of information and expertise on environmental matters and to implement joint research activities and exchange of information on cleaner technologies (article 88 in chapter 16 on Environment). In this association agreement, together with the ones with Ukraine and Georgia, the EU includes provisions to approximate the legislation on environment and climate change. With Georgia, the agreement demands the parties ''to facilitate the removal of obstacles to trade or investment concerning goods and services of particular relevance to climate change mitigation, such as sustainable renewable energy and energy efficient products and services." (Leal-Arcas et al., 2015). In the CARIFORUM-EU Economic Partnership Agreement, there is a section dedicated to tourism services where both parties encourage compliance with environmental standards applicable in this sector (Monteiro, 2016). In this same treaty, several CARIFORUM parties established in their environmental services schedules for mode 3 a requirement of transfer of knowledge and technology. At the EU - Colombia and Peru trade agreement, parties aim *"to facilitate the removal of trade and investment barriers to access to, innovation, development, and deployment of goods, services and technologies that can contribute to climate change mitigation or adaptation, taking into account developing countries' circumstances"* (Monteiro, 2016).

These provisions are in any case a general mandate, and they subsume services with goods trade. At the end, this paper aims to see if access granted to the European Union by the other parties in their PTAs to their environmental services markets — at the trade in environmental services scheduling level — will significantly impact the environmental performance of that same party.

4. Data and Methods.

The hypothesis is to know if liberalizing a country's services market to European environmental services providers will channel the diffusion of environmental technology and know-how and, thus, improve the country's environmental performance index.

Our dataset is a panel covering trade in services agreements between EU and countries outside the EU over the period 2005-2019. Our main variable of interest is the liberalization of the environmental services sector. We formulate an index that specifics a treaty's openness in 4 subsectors (Table 1) and across the 4 modes of trade in services. Thus, our main explanatory variable is the liberalization index. Similarly to the OECD's STRI, it ranges between 0 and 1, where 0 refers to full liberalization of countries' commitments in the environmental services and sectors and 1 refers to full closure of services and sectors or unbound.[1] The index coding is based on the treaties' services schedules, whereas it is an average of the content at the market access and national treatment provisions.

For our main dependent variable, we use data from the Environmental Performance Index (EPI) dataset covering 32 indicators over 180 countries (Wendling et al., 2020). For our analysis, we use the EPI indicator that corresponds to the environmental subsector mentioned in the agreement (Table 1). We find corresponding indicators for 4 subsectors of the 5 subsectors (Noise abatement was not covered in the EPI dataset). For some subsectors, several indicators are used to reflect the environmental performance accurately. We then compute the country's overall performance by averaging their performance across all relevant indicators. Thus, our dependent variable is the mean EPI per country at a specific year.

Environmental clause	**Name of indicator in EPI**	**CPC**	**Explanation of indicator**
6A. Sewage services	UWD, WWT	9401	Unsafe drinking water, waste water treatment
6B. Refuse disposal services	MSW	9402	Controlled solid waste
6C. Sanitation and similar services	USD, UWD	9403	Unsafe Sanitation, Unsafe drinking water,
6D. Other: Protection of ambient air and climate services to reduce exhaust gas and other emissions and improve air quality	APE: SDA, NXA, PMD, HAD, OZD CCH: CDA, CHA, FGA,NDA,BCA, LCB, GIB, GHP	9404	Air quality Climate change

[1] In cases, where it is liberalized but there are some restrictions, we code it as 0.25. In case it is closed but with some exceptions, it is coded as 0.75. We do so for both market access and national treatment and then take the average of both.

6D. Other: Remediation and clean up of soil water	WWT	9406	Waste water treatment
6D. Other: Noise and vibration abatement	-	9405	-

Table 1: Environmental clause/ subsectors in trade in services agreements and the corresponding name of indicator in the EPI dataset.

In addition to our main explanatory variable, we use the Trade and Environment Database (TREND) by Morin et al. (2018) to include information on the number of environmental provisions per country. The TREND covers environmental provisions of more than 690 PTAs from the period 1947 to 2016. We compute the total number of provisions a country has per PTA and then aggregate the data on a country level such that we end up with the total number of provisions per country. We, thus, control for the total number of environmental provisions on a country level over the period 2005-2016. Given that the main dependent variable is a country´s EPI indicator, we want to account for the number of environmental provisions a country has across all its PTAs as we expect that the number of provisions may be positively correlated with environmental performance. Moreover, to ensure that the results are not driven by other trade agreements, we include GATS index variable that considers the degree of liberalization of a country's GATS commitments for the environmental subsectors included in Table 1.[2] In essence, this variable is important to separate the effect of the EU treaty from the general country-level liberalization level. For the same purpose, we control for the share for merchandise trade in green goods. We use the classification of goods by the Asia Pacific Economic Cooperation (APEC) lists for green goods and use data on bilateral merchandise exports covering our panel data from the EUROSTAT. We use the share of green goods exports (% from total imports from the EU, measured in 100 kg) as proxy for the size of environmentally friendly trade flows.[3] We also control for macroeconomic variables that may be associated with environmental performance. We include real GDP at constant 2017 national price from Penn World Table 9.0, provided by the University of Groningen. We also include exports between the EU and each of the partner countries (measured in euros) to reflect the general size of trade flows between countries. Unfortunately, the Services Trade Restrictiveness Index (STRI) is not available for the environmental services sector, which would have helped us to control for the liberalization tendencies of the country at the national level.

We also control for the FDI inflows, the industry value added as a share of GDP, and the share of renewable energy form total energy consumption from the World Bank's World Development Indicators (WDI). The association between FDI and EPI is controversial and is led by two opposing hypothesis. On the one hand, according to the pollution haven hypothesis, we can expect a negative correlation between FDI and environmental performance as FDI may lead to a rise in pollution in a country due to the potential transfer of some industries, especially in countries with lax environmental regulations (Wei et al, 2022). On the other hand, FDI inflows may be associated with better environmental performance as it can motivate the use of cleaner energy, technology development and innovation, which are all useful in pollution

[2] This variable is coded following the same criteria as the liberalization index. It ranges from 0 to 1, with 0 reflecting full liberalization and 1 complete closure.

[3] Given the lack of sufficient data on services trade, we follow the standard of major studies and include merchandise trade data

reduction (Li et al, 2019; Wei et al, 2022). The share of industry value added is used to control for a country's industry structure, a larger share of industry value added is expected to be associate with worse environmental performance, given that that the industry sector tends to be one of the more polluting sectors. We account for the share of renewable energy consumption (of total energy consumption) for the relevant subsectors that are associated with air pollution and climate change.

We also control for the number of patents applications to reflect the innovation capacity of a country. We use the sum of patent applications by residents from the WIPO Patent Report by the World Intellectual Property Organization (WIPO). An increase in innovation capacity is expected to promote technological development and thus lead to more efficient energy use, waste management and recycling (Li et al 2019). We use the rule of law variable for the Varieties of democracy (V-dem) database to reflect the overall institutional environment.

We use country effects to control for time-invariant country characteristics, such as size and the distance to the EU. We also use year fixed effects to control for any year-specific developments that may affect the results. In some of our models, we do include mode fixed effects as well.

$$EPI_{its} = \beta_1 * Index_{ism} + \beta_2 * ENVPROV_{it} + \beta_3 * SHARE_{it} + \beta_4 * GATS_{its} + \beta_5 * Trade_{it} + \beta_6 * RGDP_{it} + \beta_7 * Ind + \beta_8 * PAT_{it} + \beta_9 * FDI_{it} + \beta_{10} * RE_{it} + \beta_{11} * RUL_{it} + \epsilon_{it}$$

EPI_{it} is the EPI indicator for country i at time t for subsector s , $Index_{is}$ is the index value ranging from 0 to 1 for country i and subsector s and mode m , $ENVPROV_i$ is the total number of environmental provision for country i. $SHARE_{it}$ is the share of imported green goods from total imports of country i at time t. $GATS_{ism}$ is a dummy variable reflecting whether country i has commitments for the same subsector and mode. Trade is the amount of exports from the EU to partner country i at time t.

We provide summary statistics for our main variables of interest in Table 2 and a correlation matrix in Table 3.

Variable	Obs	Mean	Std. Dev.	Min	Max
EPI	5544	47.922	25.762	0	100
RGDP	5544	441247.45	1032057.7	641.763	5099254
Index	5544	.572	.435	0	1
GATS dum	5544	.265	.441	0	1
Share green goods(%)	5544	.006	.008	0	.236
Trade (Euros)	5544	6.537e+09	1.353e+10	15555156	7.002e+10
Env. Provisions	2964	38.671	38.942	0	219
FDI	8723	7.118	42.112	-1275.19	1709.766
Industry (%GDP)	8421	26.469	9.976	3.15	87.797
RE (% Energy consumption)	8278	25.755	23.335	0	97.422
Rule of law	4530	.621	.287	.048	.985

Table 2: Summary statistics on the variables included in the analysis.

Variables	EPI	RGDP	Index	GATS dum	Share %	Trade	Env. Prov.	FDI	Indus. % GDP	RE (% Energy cons.)	Rule of law
EPI	1.000										
RGDP	0.196	1.000									
Index	0.062	0.239	1.000								
GATS	0.021	0.482	0.197	1.000							
Share green goods(%)	-0.044	-0.041	-0.099	-0.258	1.000						
Trade (Euros)	0.166	0.961	0.204	0.562	-0.043	1.000					
Env. Provisions	0.110	0.110	-0.011	0.003	-0.079	0.164	1.000				
FDI	-0.133	-0.485	-0.119	0.019	0.004	-0.453	-0.209	1.000			
Industry (%GDP)	0.101	0.183	-0.057	-0.267	0.284	0.154	0.073	-0.235	1.000		
RE (% Energy consumption)	-0.204	-0.656	-0.035	-0.466	0.124	-0.666	-0.189	0.141	-0.181	1.000	
Rule of law	0.123	0.460	-0.059	0.469	-0.068	0.521	0.120	-0.033	0.174	-0.683	1.000

Table 3: Correlation matrix for the variables included in the analysis.

5. Results

Results from our first model specification is presented in Table 3. The base model includes all subsectors and modes. The results from the base model (Table 3) show that the liberalization of the environmental sector is not significantly associated with a better EPI, an interesting finding is that the GATS dummy is positive and significant, showing that the general liberalization of these sectors, even if not fully, is positively correlated with a better EPI.

Given that the nature of the environmental services differs across subsectors, we expect that results would differ accordingly. To see whether the different CPC exhibit different results, we split the data based on the CPC. Results show that for subsector CPC 9401 and CPC 9404 (Waste water management and ambient air and climate services, respectively), we find a positive and highly significant correlation between trade in environmental services liberalization and the EPI.[4] On the other hand, CPC 9403 (Sanitation and similar services) exhibit a significant yet negative correlation between liberalization and environmental performance.

In line with these results, we find that for CPC 9401 addressing waste water management an increase in GDP and FDI may lead to better environmental performance, however, for CPC9403 addressing sanitation and similar services, an increase in GDP and FDI is associated with worse environmental performance.

For the variable reflecting technological innovation and industry share of GDP, we observe negative association with EPI for the CPC 9403 and 9404. In table 3 we observe a positive and significant coefficient for CPC 9401 but negative and significant coefficients for CPC 9403 and 9404. We also observe a similar case for the rule of law variable.

[4] The positive correlation is represented by the negative coefficient as the scale of the variable is reversed; complete liberalization is 0 and no liberalization is 1.

	Base	CPC9401	CPC9403	CPC9404
Index	2.544	-0.154**	0.469***	-2.336**
	-2.377	-0.0613	-0.148	-1.06
RGDP	-4.59E-06	1.46e-06***	-4.55e-06***	1.99E-06
	-1.83E-05	-5.01E-07	-1.11E-06	-4.91E-06
GATS	-0.395	0.00785	-0.0155	0.12
	-2.998	-0.0987	-0.224	-0.925
Share green goods(%)	-9.918	-3.249	-9.84	80.63*
	-151	-4.276	-9.684	-44.94
Trade flows	0	-0***	1.99e-10***	-3.66e-10***
	-3.91E-10	0	0	-1.23E-10
Env. Prov.	0.00205	0.000316	0.000298	0.00544
	-0.0177	-0.000495	-0.00112	-0.00496
FDI	0.121	0.0263***	-0.0378*	0.365***
	-0.312	-0.00892	-0.0203	-0.0981
Industry	-0.0602	0.0127	-0.0498***	-0.163*
	-0.301	-0.00823	-0.0186	-0.0904
Rule of law	-0.519	4.682***	-6.262***	-5.986
	-27.04	-0.751	-1.707	-7.181
Patents	8.93E-06	1.82e-05***	-3.90e-05***	-6.82e-05***
	-6.00E-05	-1.68E-06	-3.80E-06	-1.95E-05
RE (% Energy cons.)	0.197			0.961***
	-0.26			-0.072
Constant	42.22*	38.14***	71.11***	39.89***
	-23.74	-0.643	-1.475	-6.229
Year FE	yes	yes	yes	yes
mode FE	yes	yes	yes	yes
CPC FE	yes	-	-	-
Country FE	yes	yes	yes	yes
Observations	2,080	556	556	416
R-squared	0.274	0.903	0.915	0.668
Number of cntry	12	12	12	10

Table 3: Panel Regression with year and mode fixed effects. Base model includes all subsectors as well as CPC FE and mode FE. CPC9401 includes output for CPC 9401 only. CPC9403 includes output for CPC 9403 only. CPC9404 includes output for CPC 9404 only.

*** p<0.01, ** p<0.05, * p<0.1

The share of renewable energy consumption also shows, a positive and highly significant correlation with environmental performance. Trade value in euros shows a positive and significant sign for CPC 9403 and negative and significant for CPC 9404.

Given that the most common mode of supply of environmental services sector is mode 3 (commercial presence), we check whether the liberalization of this mode in specific is correlated with better EPI. Results for mode 3 (Table 4) are in line with to those presented in the general model in (Table 3). Higher liberalization is significantly associated with better EPI only for CPC 9401 and 9404 and worse EPI – but not significant- for CPC 9403.

The variables FDI, GDP and industry share of GDP, show similar direction of correlation but are not statistically significant from zero. The variables capturing innovation capacity, rule of law and renewable energy consumption, show results similar to the general model in terms of direction and in some cases also in the significance of the correlation.

	Base	CPC9401	CPC9403	CPC9404
Index	1.582	-0.507***	0.421	-6.732**
	-4.473	-0.148	-0.343	-2.726
RGDP	2.47E-07	2.23e-06**	-4.38e-06*	1.94E-06
	-3.46E-05	-1.08E-06	-2.48E-06	-1.08E-05
GATS	0.0483			
	-10.68			
Share green goods(%)	-23.64	-3.989	-8.569	84.15
	-301.5	-9.086	-21.74	-100.3
Trade flows	0	-5.84e-11**	1.97e-10***	-2.75E-10
	-7.42E-10	0	-5.32E-11	-2.76E-10
Env. Prov.	0.000959	0.000384	0.00042	0.0064
	-0.0349	-0.00105	-0.00251	-0.011
FDI	0.101	0.017	-0.0416	0.346
	-0.627	-0.0191	-0.045	-0.217
Industry	-0.059	0.00456	-0.0554	-0.121
	-0.575	-0.0176	-0.0411	-0.202
Rule of Law	2.228	3.478**	-6.18	-5.815
	-53.39	-1.634	-3.856	-16.02
Patents	-6.71E-06	1.61e-05***	-3.96e-05***	-9.32e-05**
	-0.000118	-3.60E-06	-8.46E-06	-4.39E-05
RE (% Energy cons.)				0.971***
				-0.161
Constant	45.19	39.21***	71.18***	43.27***
	-46.09	-1.395	-3.317	-13.91
Country FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
CPC FE	yes	-	-	-
Observations	556	139	139	104
R-squared	0.271	0.912	0.914	0.69
Number of cntry	12	12	12	10

Table 4: Panel Regression with fixed effects for mode 3. Base model includes all subsectors as well as subsector FE. CPC9401 includes output for CPC 9401 only. CPC9403 includes output for CPC 9403 only. CPC9404 includes output for CPC 9404 only.
*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

In our preliminary results, we have found that granting access to the EU's environmental services providers is correlated with a better environmental performance for that country under subsectors "6.A Sewage (or wastewater management) services/ CPC 9401" and "6.D other

/CPC 9404". For the other sector: sector 6. C "Sanitation and similar services", we find that liberalization is associated with worse environmental performance. For the overall environmental services sector and for mode 3 in specific, our results were non-significant.

These are just preliminary results, and we are planning to expand the model to further modes and perhaps countries (US, EFTA treaties). An explanation for our results might come from the fact that subsector 6.C is usually a public service and, close to the public procurement sphere, several countries do not want to make commitments to it. For example, in our sample, for the EU treaties with Korea and CARIFORUM, parties did not grant access to European services providers for this subsector. Even in the GATS, these countries have this subsector completely unbound. We should also not forget that if production in a country increases, even if it is for environmental products and services, there is a chance that this brings higher levels of pollution and stress on the ecosystem (Grossmman & Kruger, 1991).

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