Environmental provisions in trade agreements and firms' performance: Evidence from Egyptian Firm-Level Data

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I. MOTIVATION

- The last two decades have witnessed a surge in both the number and depth of preferential trade agreements (PTAs), with a growing number of agreements incorporating a variety of environment-related provisions.

- The question of compatibility between trade liberalization and environmental protection has been at the center of a long debate in the literature, and is increasingly addressed during the formulation of public policies.

- The impact of environmental policies on trade becomes a more pronounced issue in the case of developing countries, which usually lack the required technology to comply with environmental rules and move towards a greener production process.

- Despite the increase in the number and scope of environmental provisions in PTAs, the economic effects of such provisions have been rarely tackled in the literature.

2. RESEARCH QUESTION

What is the impact of environmental provisions in preferential trade agreements (PTAs) on Egyptian firms' exports during the period 2005-2016?

3. LITERATURE REVIEW

- A first strand of literature focused on studying the effect of domestic environmental regulations on trade at the country and sectoral levels, using different proxies for regulation stringency such as pollution abatement costs, environmental expenditures and energy consumption.

- The literature on the environmental content of PTAs and its effect on international trade is scarce (Brandi et al., 2020 and Berger et al., 2020). The majority of the existing studies focuses on examining the design of PTAs and the factors explaining the inclusion of environmental provisions in bilateral and regional trade agreements.

- Finally, this study also builds on the literature of trade and firm heterogeneity that was first introduced by Melitz (2003). Firms have different levels of productivity and hence they are affected differently by the introduction of a new policy.

4. CONTRIBUTION

- First, unlike the majority of literature papers that examine the impact of environmental protection at the country and sectoral levels, this paper conducts the analysis at the firm level.

- Second, this is one of the first papers to tackle the issue of environmental provisions and trade flows in a MENA region country.

- Third, relying on a novel database on the content of PTAs, this paper doesn't only consider the presence of environmental provisions in PTAs but also examines the enforceability level of these provisions.
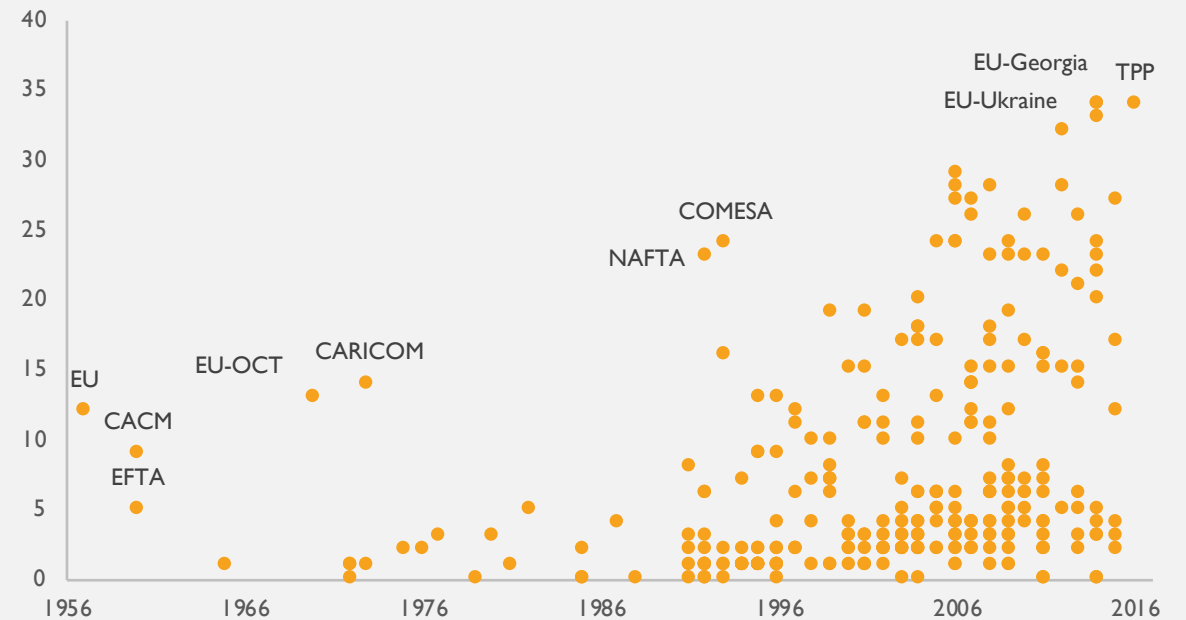
5. STYLIZED FACTS

Figure 1. Evolution of the number of PTAs with environmental provisions (1957-2016)
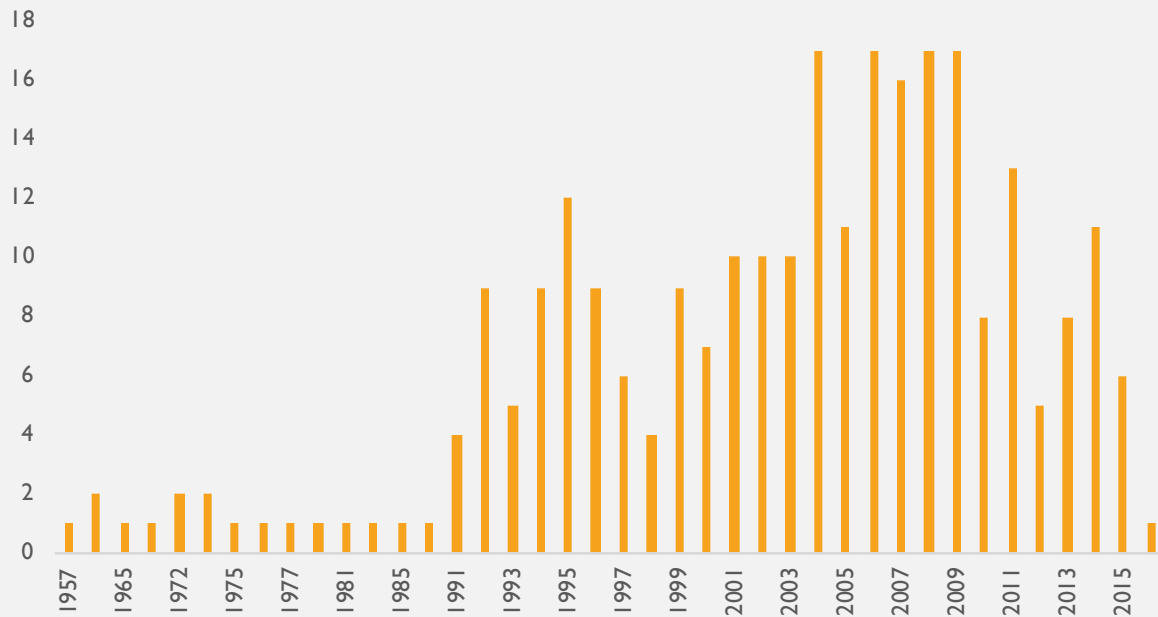
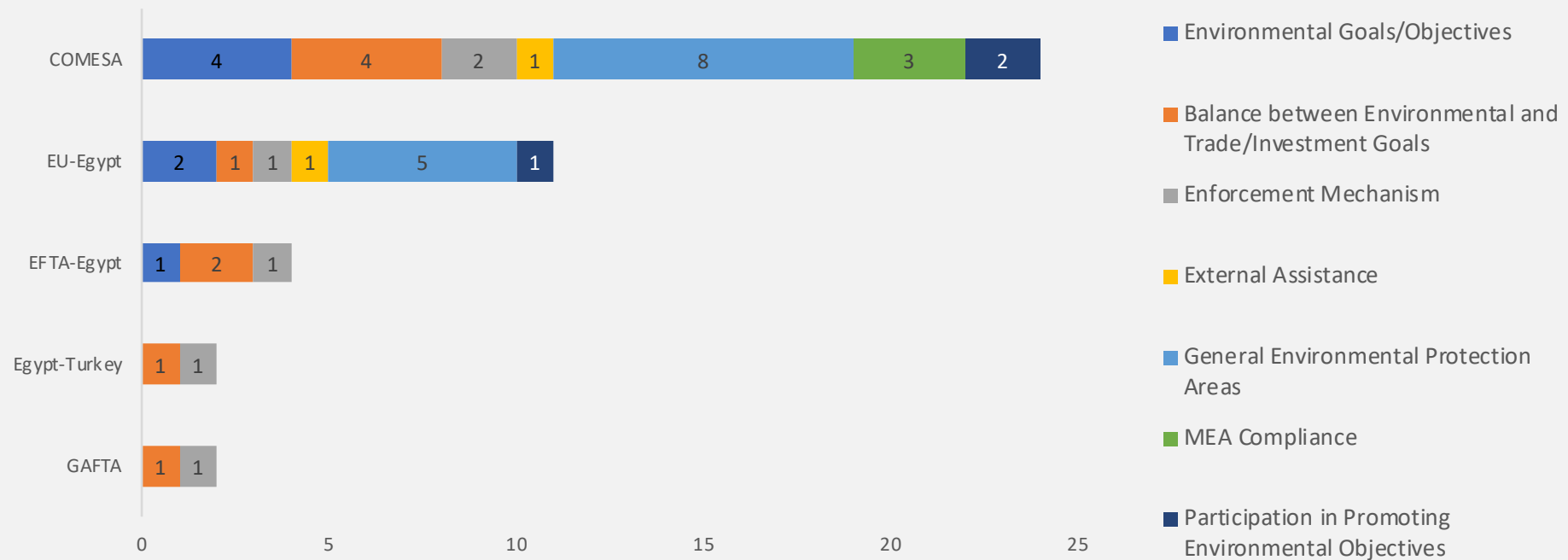Source: Constructed by the author using the World Bank's Deep Trade Agreements database, Chapter 18.

Figure 2. Evolution of the number of types of environmental provisions in PTAs (1957-2016)

Source: Constructed by the author using the World Bank's Deep Trade Agreements database, Chapter 18.
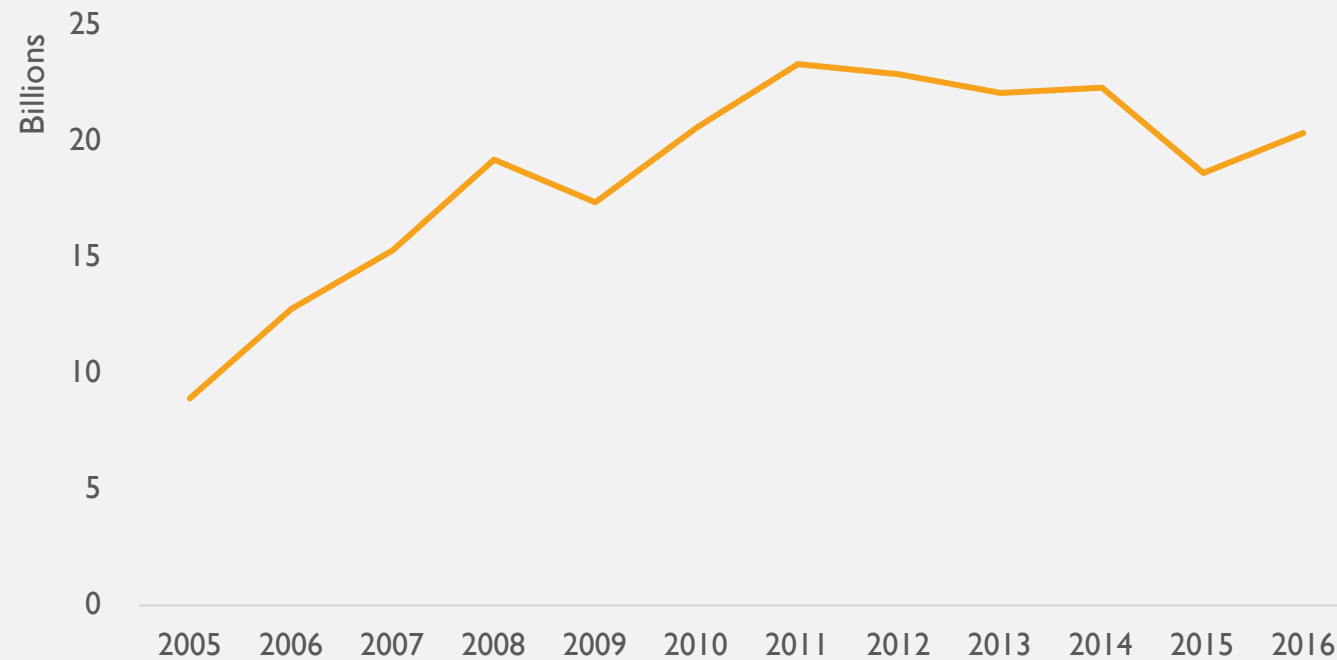
5. STYLIZED FACTS

Figure 3. Types of environmental provisions in PTAs signed by Egypt

Source: Constructed by the author using the World Bank's Deep Trade Agreements database, Chapter 18.

5. STYLIZED FACTS

Figure 4. Evolution of export value in billion US dollars (2005-2016)

Source: Constructed by the author using the GOEIC and the ERF's firm-level dataset.

6. DATA AND METHODOLOGY

- The study makes use of two main data sources:

1. Data on environmental provisions are obtained from the World Bank's Deep Trade Agreements database (Chapter 18 on environmental laws).

2. For exports data, the study utilizes the Egyptian firm-level customs data collected by the General Organization for Export and Import Control (GOEIC) and published by the Economic Research Forum (ERF).

6. DATA AND METHODOLOGY

The model has the following specification:

$$X_{i,s,j,t} = \beta_0 + \beta_1 \ln(GDP_{j,t}) + \beta_2 \ln(Dist_{i,j}) + \beta_3\, Contig_{i,j} + \beta_4\, Col_{i,j} + \beta_5\, ComLeg_{i,j}$$

$$+ \beta_6 \ln(Tar+1)_{i,s,j,t} + \beta_7\, PTA_{i,j,t} + \gamma_t + f_i + \vartheta_s + \varepsilon_{i,s,j,t} \tag{1}$$

Where $\varepsilon_{i,s,j,t}$ is the error term.

The regression is run with five different dependent variables $X_{i,s,j,t}$ to estimate the trade margins:

(1) Value of exports of product *s* from firm *i* to country *j* in year *t* → Intensive margin

(2) A dummy variable that takes 1 if firm *i* exports a positive value of product s to destination j → Export participation probability

(3) A dummy variable that takes 1 if firm *i* exports a positive value of product *s* to destination *j* in year *t* but didn't export it in year *t*-1 → Firm entry probability

(4) A dummy variable that takes 1 if firm *i* exports a positive value of product *s* to destination *j* in year *t*-1 but no longer exports it in year t → Firm exit probability

(5) Number of exported products (in logs) by firm *i* to destination *j* in year *t*.

6. DATA AND METHODOLOGY

The model has the following specification:

$$X_{i,s,j,t} = \beta_0 + \beta_1 \ln(GDP_{j,t}) + \beta_2 \ln(Dist_{i,j}) + \beta_3\, Contig_{i,j} + \beta_4\, Col_{i,j} + \beta_5\, ComLeg_{i,j}$$

$$+ \beta_6 \ln(Tar + 1)_{i,s,j,t} + \beta_7\, PTA_{i,j,t} + \gamma_t + f_i + \vartheta_s + \varepsilon_{i,s,j,t} \tag{1}$$

Where $\varepsilon_{i,s,j,t}$ is the error term.

$GDP_{j,t}$ GDP of importing country j in year t, in constant 2015 USD.

$Dist_{i,j}$ Geographical distance between Egypt and its partner j.

$Contig_{i,j}$ A dummy that equals 1 if the two countries share a common border.

$Col_{i,j}$ A dummy that equals 1 if the two countries have any colonial links

$ComLeg_{i,j}$ A dummy that equals 1 if the two countries have common legal origins.

$Tar_{i,s,j,t}$ Average applied tariffs the HS6-digit level.

Year γ_t, firm f_i and product ϑ_s fixed effects are included in the regression to control for any unobserved heterogeneities that may influence trade patterns.

6. DATA AND METHODOLOGY

The model has the following specification:

$$X_{i,s,j,t} = \beta_0 + \beta_1 \ln(GDP_{j,t}) + \beta_2 \ln(Dist_{i,j}) + \beta_3\, Contig_{i,j} + \beta_4\, Col_{i,j} + \beta_5\, ComLeg_{i,j}$$

$$+ \beta_6 \ln(Tar + 1)_{i,s,j,t} + \beta_7\, PTA_{i,j,t} + \gamma_t + f_i + \vartheta_s + \varepsilon_{i,s,j,t} \qquad (1)$$

Where $\varepsilon_{i,s,j,t}$ is the error term.

Our main independent variable $PTA_{i,j,t}$ is a categorical variable that is constructed with two methods.

In a first step, the PTA variable equals

- 0 if there is no PTA between the two countries
- 1 if there is a PTA without environmental provisions
- 2 if there is a PTA with environmental provisions

In a second step, the PTA variable equals

- 0 if there is no PTA between the two countries
- 1 if there is a PTA without environmental provisions
- 2 if there is a PTA with environmental provisions subject to an enforcement mechanism
- 3 if there is a PTA with environmental provisions subject to more than one enforcement mechanism

6. DATA AND METHODOLOGY

- Estimation Methods

1. **A Poisson-Pseudo Maximum Likelihood (PPML)** technique is used to estimate the effect on the intensive margin to account for the large share of zero trade flows. (bilateral zero trade flows represent 86% of our data)

2. **A linear probability model (LPM)** is used to estimate the effect on export participation, entry probability, and exit probability.

3. **Ordinary Least Squares (OLS)** is used to estimate the effect on the number of exported products per firm and destination.

7. EMPIRICAL FINDINGS

Table 1. Intensive margin results

	(1) Ln(Exports)	(2) Exports
PTA without env. provisions	-0.180***	-0.505***
	(0.0511)	(0.0987)
PTA with env. provisions	-0.00242	0.209***
	(0.0279)	(0.0595)
Constant	7.665***	5.886***
	(0.208)	(0.330)
Year FE	Yes	Yes
Firm FE	Yes	Yes
Product FE	Yes	Yes
Observations	820,792	5,518,583
R-squared	0.572	
Pseudo R-squared		0.495
Estimation Method	OLS	PPML

Robust standard errors clustered at the importer-year level in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2. Intensive margin results

	(1) Exports	(2) Exports
PTA without env. prov.	-0.511***	-0.617***
	(0.0999)	(0.114)
PTA with env. prov. s.t. 1 enforcement mechanism	0.199***	0.00255
	(0.0622)	(0.0696)
PTA with env. prov. s.t. >1 enforcement mechanism	0.304***	0.215**
	(0.0763)	(0.0860)
PTA without env. prov. x Dirty		0.410***
		(0.152)
PTA with env. prov. s.t. 1 enforcement mechanism x Dirty		0.686***
		(0.101)
PTA with env. prov. s.t. >1 enforcement mechanism x Dirty		0.378***
		(0.103)
PTA without env. prov. x Green		0.479**
		(0.236)
PTA with env. prov. s.t. 1 enforcement mechanism x Green		0.458***
		(0.136)
PTA with env. prov. s.t. >1 enforcement mechanism x Green		0.515***
		(0.171)
Year FE	Yes	Yes
Firm FE	Yes	Yes
Product FE	Yes	Yes
Observations	5,518,583	5,518,583
Pseudo R-squared	0.495	0.496

Robust standard errors clustered at the importer-year level in parentheses   *** p<0.01, ** p<0.05, * p<0.1

7. EMPIRICAL FINDINGS

- **List of dirty goods:**

➢ encompasses goods incurring the highest levels of pollution abatement costs, which were identified by Low (1992).

- **List of green goods:**

➢ encompasses goods used to "measure, prevent, limit, minimize or correct environmental damage"

➢ we rely on a combination of the two most commonly accepted lists of environmental goods.:

1. List of environmental goods of the Organization for Economic Cooperation and Development (OECD) in OECD and Eurostat (1999).

2. List of environmental goods elaborated by the Asia-Pacific Economic Cooperation (APEC) countries for the purpose of negotiations on tariff reductions on environmental goods (APEC, 2012).

Table 3. Extensive margin results

	(1) Exp. Prob.	(2) Entry	(3) Exit	(4) Ln(Nb. Products)
PTA without env. prov.	-0.0104**	-0.00368	-0.000159	-0.0384***
	(0.00492)	(0.00363)	(0.00255)	(0.0148)
PTA with env. prov. s.t. 1 enforcement mechanism	0.0149***	0.0102***	-0.00988***	0.141***
	(0.00306)	(0.00226)	(0.00168)	(0.0116)
PTA with env. prov. s.t. >1 enforcement mechanism	0.0172***	0.00988***	-0.0123***	0.0896***
	(0.00400)	(0.00291)	(0.00217)	(0.00995)
Constant	0.0310	-0.00640	0.208***	-0.333***
	(0.0203)	(0.0149)	(0.00919)	(0.0643)
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	No
Observations	5,519,531	5,054,590	5,054,590	201,141

Robust standard errors clustered at the importer-year level in parentheses   *** p<0.01, ** p<0.05, * p<0.1

8. ROBUSTNESS CHECKS

- First, we test the robustness of results to our use of fixed effects by running the regression with different combinations of fixed effects:
  - Firm-Year and Product fixed effects
  - Firm-Product and Year fixed effects

- Second, in order to ensure that the resulting coefficients are not mainly driven by large firms' exports. We examine the change in the effect of environmental provisions when large exporters are dropped from the analysis.

  - Also a way of addressing the potential endogeneity problem that may stem from a reverse causality between exports and environmental provisions in PTAs.
  - Since large firms are the ones that tend to have high lobbying power and can influence the decisions of policymakers, eliminating them from the regression could control for this potential source of endogeneity.

9. CONCLUSION

- Results indicate that including environmental provisions in PTAs has a positive and significant effect on both the intensive and extensive margins of trade.

  - They increase the value of exports, the firm export participation, the firm entry probability, and the number of exported products by firm.

  - At the same time, they reduce the firm exit probability.

- The effect of environmental provisions is more pronounced when they are supported by more than one enforcement mechanism.

- Environmental provisions can stimulate exports of green products by Egyptian firms. However, they are not effective in hindering exports of dirty products, as the effect on the value of dirty exports was found to be also positive.

10. POLICY RECOMMENDATIONS

- First, results are reassuring to policymakers in Egypt regarding the inclusion of environmental provisions in Egypt's PTAs. Trade and environment objectives are not contradictory and can be pursued together.

- Second, implementing measures that encourage producers to innovate and invest in green and more efficient technologies could strengthen the positive effect that environmental provisions have on exports of green products.

- Third, enhancing the quality of institutions is crucial to enforce environmental commitments in PTAs and reduce exports of dirty products.

11. LIMITATIONS AND FUTURE RESEARCH

- There is a lack of more recent data on Egyptian firms' exports.

- Results may still suffer from an endogeneity problem. Hence, it would be instructive for future research to control for the endogeneity problem with the right instruments.

- It would also be interesting to examine, using another dataset, how firms' characteristics (such as firm's productivity) may influence the effect of environmental provisions on export performance.

Thank you for your attention