

Environmental Goods and Services Series



Market Access Opportunities for ACP Countries in Environmental Goods

By David Laborde
Csilla Lakatos



International Centre for Trade
and Sustainable Development

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Csilla Lakatos



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International Centre for Trade and Sustainable Development (ICTSD)

International Environment House 2

7 Chemin de Balexert, 1219 Geneva, Switzerland

Tel: +41 22 917 8492

Fax: +41 22 917 8093

E-mail: ictsd@ictsd.org

Internet: www.ictsd.org

Chief Executive: Ricardo Meléndez-Ortiz

Programmes Director: Christophe Bellmann

Programme Manager: Ingrid Jegou

Programme Officer: Joachim Monkelbaan

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LIST OF ABBREVIATIONS AND ACRONYMS

ACP	African, Caribbean and Pacific Countries
AMA	Agricultural Market Access
AVE	Ad-Valorem Equivalent
BIC	Brazil, India and China
CARICOM	Caribbean Community
CEMAC	Economic Community of Central African States
COMESA	Common Market for Eastern and Southern Africa
DDA	Doha Development Agenda
ECOWAS	Economic Community of Western African States
EG	Environmental Goods
EGS	Environmental Goods and Services
EU	European Union
HHI	Herfindahl-Hirschman Index
HS	Harmonized System Product Classification
LDCs	Least Developed Countries
NAMA	Non-Agricultural Market Access
MFN	Most Favored Nation
NAMA	Non-Agricultural Market Access
NTB	Non-Tariff Barrier
OECD	Organization for Economic Co-operation and Development
SADC	Southern African Development Community
SDT	Special and Differential Treatment
WTO	World Trade Organization

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FOREWORD

Significant attention was brought to environmental goods and services (EGS) as a subset of goods and services in the WTO Doha Declaration. The purpose was to create a “win-win-win” situation for trade, the environment and development. Increasing access to and use of EGS can in fact yield a number of benefits, including reducing air and water pollution, improving energy and resource efficiency, and facilitating solid waste disposal. Gradual trade liberalisation and carefully managed market opening in these sectors can also be a powerful tool for economic development by generating economic growth and employment and enabling the transfer of valuable skills, technology, and know-how embedded in such goods and services. In short, well-managed trade liberalisation in EGS can facilitate the achievement of sustainable development goals laid out in global mandates such as the Johannesburg Plan of Implementation, the ‘Green Economy’, the UN Millennium Development Goals, and various multilateral environmental agreements (MEAs).

A major fault lines in the negotiations on environmental goods (EGs) are disagreement over which goods to include. What to do about goods which developing countries perceive as only vaguely linked to environmental protection and poverty reduction? Another source of tension relates to the import- and export impacts of including a broad range of environmental goods on the domestic industries, employment and tariff revenues of developing countries. Developing countries currently have no clear overview of such prospects for their exports of EGs.

Therefore, this paper by David Laborde and Csilla Lakatos analyses market access opportunities for environmental goods (EGs) from developing countries in the African, Caribbean and Pacific (ACP) regions and focuses on a few issues particularly relevant to these countries: preference erosion expected to arise from multilateral liberalization of environmental goods and the degree of utilization of preferences by ACP countries. The paper uses a partial equilibrium model to estimate the possible trade effects of different tariff liberalisation scenarios for ACP countries. The paper attempts to offer a greatly detailed quantification of these theoretical effects.

The authors find that ACP countries, as a block, have a trade deficit in EGs as well as relatively high tariffs. Therefore, any tariff elimination by ACP countries will result in an increased level of imports and a deepening of the trade imbalance in this sector. Nevertheless, it will also reduce the costs of these products for producers and consumers in ACP countries and will favor climate change mitigation strategies. To maximize the interests of ACP countries and to develop the supply of EGs in these countries, eliminating tariffs among WTO members, with consideration of special and differentiated treatment to protect ACP regional markets, appears to be a worthy outcome.

David Laborde is currently Senior Research Fellow and the leader of the “Globalization and Markets” research project inside the Markets, Trade and Institutions Division at the International Food Policy Research Institute (IFPRI) in Washington, DC. He is an expert in the field of applied international economics and computable general equilibrium modelling.

Csilla Lakatos is currently the Visiting Research Fellow at the United States International Trade Commission (USITC) in Washington, DC and the Post-Doctoral Research Associate at the Center for Global Trade Analysis (GTAP) at Purdue University. She has extensive experience with topics such as trade policy analysis, foreign direct investment, WTO dispute settlement, and computable general equilibrium modelling.

The paper is part of a series of issue papers commissioned in the context of ICTSD's Environmental Goods and Services Project, which address a range of cross-cutting, country-specific, and regional issues of relevance to the current EGS negotiations. The project aims to enhance developing countries' capacity to understand trade and sustainable development issue linkages with respect to EGS and reflect regional perspectives and priorities in regional and multilateral trade negotiations. We hope you will find this paper to be stimulating, informative reading and useful for your work.



Ricardo Meléndez-Ortiz

EXECUTIVE SUMMARY

The ultimate objective of paragraph 31(iii) of the WTO Doha Declaration that urged “the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services” was to create a “win-win-win” situation for trade, the environment and development. The mandate, however, defines neither what environmental goods are nor the speed/depth of liberalization to be achieved. This vaguely defined playing field of paragraph 31(iii) associated with increasing concerns about climate change leaves space for uncertainties regarding whether such a “triple win” scenario is attainable in general and for developing countries in particular.

The focus of this study is ACP countries and the analysis of their market access opportunities for environmental goods in the context of the Doha Development Agenda. Although ACP countries’ participation in the debate about EG liberalization has been limited so far and their share in total world EG trade is relatively small, there are specific areas of interest that we can identify. Most importantly, due to large initial preferential market access mainly to the EU and US markets, ACP countries face the risk of preference erosion arising from the multilateral liberalization of environmental goods. In addition, less than full utilization of preferences by ACP countries could worsen the losses incurred due to preference erosion. The modeling framework developed here accounts for both preference erosion and less than full utilization of preferences by ACP countries in EG - features that allow us to better assess the impact of multilateral liberalization of EG trade under different DDA tariff liberalization scenarios.

For the purposes of this paper we use a list of 63 HS6 products categorized as primary environmental goods. Further, we provide analysis of existing trade patterns and barriers to environmental goods for ACP countries. Overall, ACP countries are net importers for such goods (import to export ratio close to 10) and have higher tariffs on these products than most of their trade partners. Finally, we consider various trade liberalization scenarios and highlight the issue of potential preference erosion impact in the context of less than full utilization of preferences for different ACP countries, showing that a well-designed market access initiative aimed to promote ACP exports of environmental goods should include a mix of multilateral and regional liberalization, while still maintaining some protections versus third parties exports. Nevertheless, if the goal of such initiative is to promote the use of environmental goods in the ACP countries, a strong opening of ACP markets may be a better alternative, even it can threaten seriously regional trade pattern.

1. INTRODUCTION

Although the WTO Committee on Trade and Environment in a special session during the Fourth Ministerial Conference in Doha, Qatar, urged for “the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services”, the mandate defines neither what environmental goods are nor the speed/depth of liberalization. The objective of the mandate was aimed at creating a “win-win-win” situation for trade, the environment and development. More specifically, trade liberalization can benefit the domestic economy through access to green goods and technologies at a lower cost and increased efficiency. In turn, access to cheaper and better quality environmental goods can help countries pursue their environmental policy objectives and help in their fight against climate change. Finally, the reduction of barriers to environmental goods is aimed to help developing countries in addressing a broader set of domestic and development objectives. Nonetheless, the vaguely defined playing field of paragraph 31 leaves space for uncertainties regarding whether such a “triple win” scenario is attainable in general and for developing countries in particular.

Developing countries’ participation in the negotiations about the liberalization of

trade in environmental goods has been limited. While the reductions of barriers to trade to environmental goods have been promoted by developed countries such as the members of the European Union, Japan, Norway and Switzerland, the majority of developing countries expressed concerns that environmental negotiations might distract attention from development priorities and subsequent environmental measures might restrict access for their goods (ICTSD and IISD, 2005).

In this study, we focus on analyzing market access opportunities and the impact of liberalization of environmental goods for ACP countries in the context of the Doha Development Agenda (DDA). As a first step, we define a list of 63 products categorized as primary environmental goods. Further, we provide an extensive analysis of existing barriers to trade, taking into consideration (incomplete) utilization of preferences. Finally, we consider various trade liberalization scenarios under the DDA that highlight the contrasted interests of the ACP regarding additional trade liberalization on a multilateral basis compared to a potential trade liberalization of this sector among ACPs.

2. BACKGROUND: EGS NEGOTIATIONS

Since their inception in 2001, much of the debate about in the EGS negotiations concerned the identification of environmental goods and services. Two broad definitions can be used considering that goods can be environmentally friendly either by nature or by use. So far, discrimination among goods in the EGs trade negotiations has been closer from the former (nature of the good) and based on the classification of the goods in the HS nomenclature (e.g. some HS6 products are agricultural products and will follow AMA negotiations, when others are non-agricultural and comply with NAMA rules). In addition, the environmental impact of some goods is tied to their use and not to their nature leading to conflictual definitions and points of view among negotiators. Currently, we identify the following four approaches:

- the “list approach” (adopted here), supported by key exporters and consistent with traditional trade negotiations where WTO members agree on a list of products;
- the “project approach”, proposed by India, where an eligible environmental project will benefit from the reduction of tariff barriers on all imported inputs (goods, services);
- the “integrated approach”, introduced by Argentina, that combines the two previous solutions and where the project approach is complemented with an ex-ante agreement on which goods/services can benefit from the preferred treatment;
- the “request and offer approach”, proposed by Brazil, is aimed to avoid the definition of a common EG list for all WTO members but will rely on bilateral talks to get concessions on some goods/services in each market that will be extended to all WTO members afterwards.

The starting points in the discussion about the definition of EGs were two lists initially compiled by OECD and APEC.¹ The original OECD list

was compiled as part of OECD’s work on the role of environmental policy and industrial competitiveness from 1992 (Khatun, 2010). This list covered 123 HS6 products classified in three broader categories under environmental and developing goals such as pollution management, cleaner technologies and products and resource management. The APEC list has been defined in the context of the Early Voluntary Sectoral Liberalization (EVSL) program and the covered 109 HS6 products. On these original two lists, there are 55 EGs that overlap.

Later, there were different countries/country groupings that compiled and submitted EG lists to the Committee on Trade and Environment Special Session (CTESS) at the WTO among which the most important are the submission by a group of “9 Members“ including Canada, the European Union, Japan, Korea, New Zealand, Norway, Switzerland, Chinese Taipei and the United States (164 products)², by Saudi Arabia (262 products)³, Japan (51 products)⁴, the Philippines (17 products)⁵, by Qatar (20 products)⁶ and a submission by Singapore (91 products).⁷

Comparing the different lists, we discover that although there is some overlapping (102 products that are duplicates, 37 triplicates and 7 quadruplicates), while currently the cumulative list compiled by CTESS⁸ includes 514 different EGs - a number overwhelming to many WTO members, in particular for developing countries in the light of their effort to assess their priorities.

For the purposes of this study, we use a list of 63 EGs covering 8 HS2 and 36 HS4 sections used as reference in the negotiations by ACP countries with the WTO (see Table A- 1 in the Appendix A). The list is divided into three major categories of EGs as follows:

- a) **Renewable Products and Energy Sources** include 38 HS6 products, among which we find primary cell and batteries used for electricity generation through an

electromechanical process rather than combustion, AC generators used for generating electricity in renewable energy plants, hydraulic, steam and gas turbines used for generating hydroelectric power with no gas emissions, solar cooking stoves and water heaters, air conditioners with heat pumps, wind powered generators, electricity meters etc.

b) Environmental Monitoring, Analysis and Assessment Equipment covers 7 HS6

products including thermostats used for controlling the efficiency of the heating system, manostats with applications in waste water management and different control instruments used in producing electricity from renewable energy.

c) The Waste Management, Recycling and Remediation category covers 18 HS6 products among which tubes, pipes and reservoirs used in delivering safe drinking water and sanitation, vapor and steam boilers.

3. TRADE AND TRADE BARRIERS ON ENVIRONMENTAL GOODS

The ACP group comprises 79 very heterogeneous countries in Africa, the Caribbean and Pacific that cover a wide range of developing country classifications: more than 50% of its membership represents Least Developed Countries (LDCs), in addition to landlocked developing countries, small island developing states or highly indebted poor countries.

Even though the 57 WTO member ACP countries⁹ (note that South Africa has been excluded from the ACP aggregate) represent 37% of the membership of the WTO, these countries only account for 2.12% of world merchandise exports and 1.46% of total merchandise imports (see Table 2). Despite these countries' small share in total world trade, it is important to point out their increasing reliance on international trade. While the ratio of trade to GDP varies significantly across ACP members, most regions have a openness index above the world average with Lesotho (162%), Swaziland (136%), Barbados (125%) and Congo (124%) on the one extreme and Congo DPR (31%), Central African Republic (36%), Rwanda (40%) and Benin (42%) on the other (World Bank, 2011). As a result, ACP countries are particularly vulnerable to external economic shocks. Apart from the heavy reliance on international trade, ACP countries

are characterized by a dependence on a small number of commodities and a low level of export diversification. Exports of African ACP countries rely largely on primary commodities such as minerals and raw agricultural commodities, Caribbean countries exports are dominated by fuels and food and finally, Pacific countries' exports consist primarily of ores and metals (Fontagné et al., 2009).

3.1 A Global Picture of EG Trade Flows

As shown in Table 1, total ACP exports of EGs reached \$166.9 billion (average for 2005-2007¹⁰) contributing to a trade surplus of \$51.4 billion. Further, as a result of significant preferential access to major export markets, duties¹¹ collected on imported goods exceed by far those faced by ACP exports with \$11 billion and \$3.5 billion. When considering environmental goods only, ACP countries are shown to be net importers as imports exceed exports by about ten times, with 2.2 billion and 270 million, respectively. We can thus infer that EGs represent only a small share of total trade of the ACP group adding up to 0.16% of total merchandise exports and 1.91% of imports.

Table 1 The role of EG in ACP countries' trade (\$ million, average 2005-2007)

	Goods	EG
Exports	166,989.10	270.58
Imports	115,511.27	2,204.43
Collected duties	11,281.48	188.17
Faced duties	3,501.84	6.14

Source: Authors' calculations based on BACI(CEPII)

Note: ACP covers the 58 WTO members excluding South Africa. Duties = trade x tariffs

The global EG market, for our restricted list, is valued at around \$166.3 billion and OECD countries account for the most significant share of both EG exports and imports, 54% and 55%, respectively. The participation of ACP countries in world EG trade is relatively smaller than that in total merchandise trade: exports of environmental goods of ACP countries add up to 0.16% of total environmental

goods exports, while imports to 1.33%. This asymmetry could be partially explained by the nature of the products included in the EG list considered here (machinery and capital goods) and potentially by missing data on exports. The main destination of EG exports and the source of their imports are OECD countries accounting for 65% of total EG exports and 46% of imports.

Table 2 Merchandise and environmental goods trade (% of global trade average 2005-2007)

		Importer				
		ACP	BIC	Devping	OECD	WTO
		Merchandise trade				
Exporter	ACP	0.18	0.33	0.22	1.39	2.12
	BIC	0.22	0.60	5.58	11.08	17.48
	Devping	0.39	5.00	9.49	21.34	36.23
	OECD	0.67	5.25	13.55	24.70	44.17
	WTO	1.46	11.17	28.84	58.52	100.00
		Environmental goods trade				
	ACP	0.04	0.01	0.03	0.09	0.16
	BIC	0.29	0.56	6.88	14.56	22.28
	Devping	0.32	3.32	6.14	13.74	23.51
	OECD	0.68	9.06	17.05	27.25	54.04
	WTO	1.33	12.94	30.09	55.64	100.00

Source: Authors' calculations based on BACI(CEPII)

Although intra-regional ACP trade only accounts for 0.04% of world trade of environmental goods, there are interesting regional patterns that can be identified. As identified in Table 3, major intra-regional traders of environmental goods are CARCOM countries (27.9% of total exports and 27.8% of imports), COMESA (25.2%

of total exports and 17.2% of imports) and ECOWAS countries (24.8% of total ACP exports of EGs and 29.1% of imports). Further, note that intra-regional CARICOM trade accounts for 27.8% of total ACP environmental goods trade, while intra-regional ECOWAS for 22.1% and COMESA for 14%.

Table 3 Intra-regional trade of EG in main ACP regions

		Importer						
		CARICOM	CEMAC	COMESA	ECOWAS	OCEANIA	SADC	ACP
		ACP trade of EG (\$ mil)						
Exporter	CARICOM	17859.13	6.36	3.91	14.87	0.09	27.99	17912.35
	CEMAC	1.54	1367.23	17.33	191.61		393.38	1971.07
	COMESA	1.74	2531.97	9001.21	81.87	0.01	4587.08	16203.88
	ECOWAS	25.20	1525.55	40.89	14181.63		198.30	15971.58
	OCEANIA	0.04				68.57		68.61
	SADC	0.59	623.96	2024.30	4254.26	0.53	5159.61	12063.24
	ACP	17888.24	6055.06	11087.64	18724.24	69.20	10366.36	64190.74
		ACP trade of EG (% of total ACP trade)						
	CARICOM	27.82%	0.01%	0.01%	0.02%	0.00%	0.04%	27.90%
	CEMAC	0.00%	2.13%	0.03%	0.30%	0.00%	0.61%	3.07%
	COMESA	0.00%	3.94%	14.02%	0.13%	0.00%	7.15%	25.24%
	ECOWAS	0.04%	2.38%	0.06%	22.09%	0.00%	0.31%	24.88%
	OCEANIA	0.00%	0.00%	0.00%	0.00%	0.11%	0.00%	0.11%
	SADC	0.00%	0.97%	3.15%	6.63%	0.00%	8.04%	18.79%
ACP	27.87%	9.43%	17.27%	29.17%	0.11%	16.15%	100.00%	

Source: authors' calculations based on BACI (CEPII)

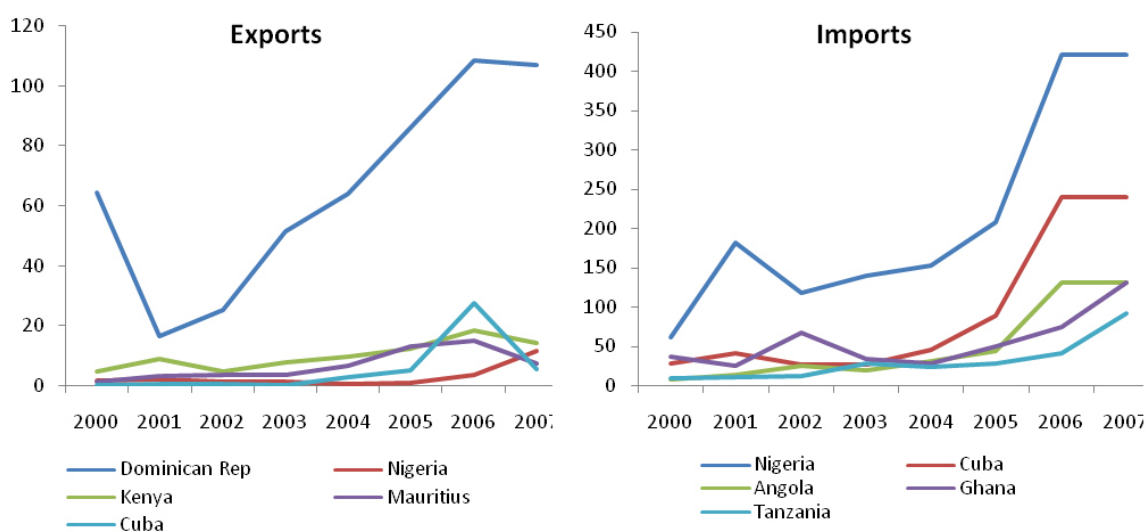
Note: In this table, COMESA countries includes only ACP members (e.g. Egypt is excluded) that are not included in the SADC group.

Although ACP countries are not major players in the world EG markets, there are specific interests that we can identify when looking at a more disaggregated level.

As shown in Figure 1, the ACP countries that have known the highest growth rate in terms of value of exports of EGs for the period 2000-2007 are the Dominican Republic (exports of EGs that have increased from \$64.6 million in 2000 to \$106.9 million in 2007), Nigeria, Kenya, Mauritius and Cuba. On the other hand,

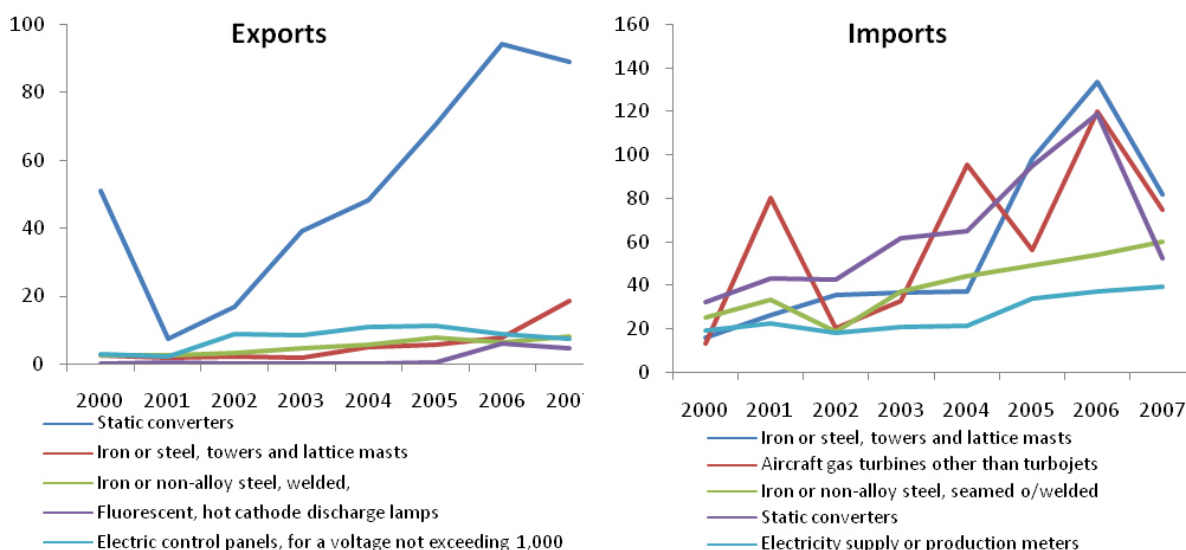
the top 5 ACP countries with the highest EG import value growth for the same period are Nigeria (imports of EGs of Nigeria increased from \$61.2 million in 2000 to \$421.5 million in 2007), Cuba, Angola, Ghana and Tanzania. As highlighted in Figure 2, Static converters (850440) are present in both the top 5 environmental goods with highest ACP exports and import growth as exports increased from \$51.1 million in 2000 to 88.8 million in 2007, while imports rose from \$32.3 million in 2000 to \$52.7 million in 2007.

Figure 1 Top 5 ACP countries with highest EG export/import growth (USD millions)



Source: Authors' calculations based on COMTRADE data

Figure 2 Top 5 EGs with highest ACP export/import growth (USD millions)



Source: Authors' calculations based on COMTRADE data

Figure 3 and Figure 4 depict two different aspects of different ACP countries participation in environmental goods trade: the importance of EG exports/imports relative to total goods trade of that country and the importance EG exports/imports in total EG trade of the ACP group, respectively.

As displayed in Figure 3, there are a few ACP countries that appear as both significant exporters and importers of EG relative to their total merchandise exports and imports. More specifically, St Kitts and Nevis is well above the ACP average (not shown in the graph) with exports of EG accounting for 19% of exports of merchandise and 3% of imports. Barbados and the Dominican Republic are other important exporters of EG relative to total goods exports, while Chad, Cuba, Zambia and Nigeria are important importers relative to total goods imports.

While Figure 3 examines the importance of EG trade relative to total goods trade of a particular country, Figure 4 further decomposes this picture by examining the relative importance of different ACP countries in total EG trade of the ACP group. Among the 57 ACP countries considered here it is the Dominican Republic that is shown to be a major exporter (40% of total ACP exports) while Nigeria is a major importer accounting for 18% of total EG imports of the ACP group. Other relatively important exporters are Mauritius, Kenya, Cuba and Nigeria, while importers are Cuba, Angola, Ghana and Tanzania.

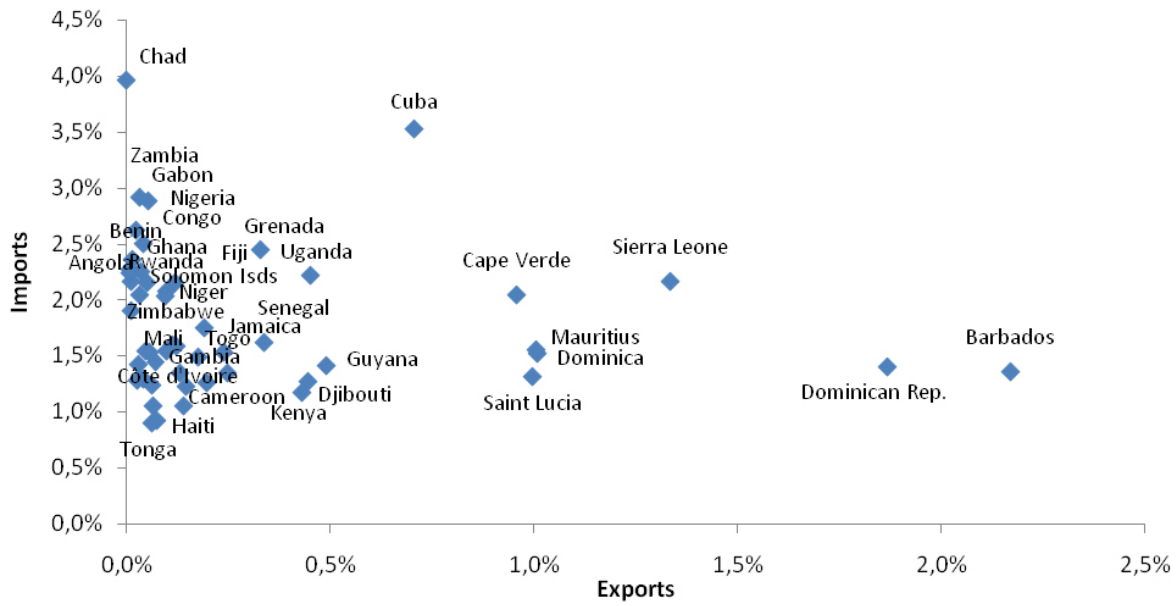
As a next step, we examine the importance of different EGs relative to total EG trade of the ACP group. Among the 63 EGs defined in Table A- 1, Static converters (850440) - used for converting DC (direct current) into AC (alternating current) electricity from solar energy - are the most important export and import EG accounting for 36% of total exports and 7% of total imports of EGs of ACP countries.

Apart from Static converters (exported mainly by the Dominican Republic), the following 9 environmental goods appear both in the top 15 exports and imports (see Figure 6): 392010-Plaits and similar products, 730690-Other tubes, pipes and hollow profiles, 730820-Towers and lattice masts, 730900-Reservoirs, 732690-Other articles of iron or steel, 841182-Gas turbines, of a power > 5,000 kW, 850300-Parts of motors, generators, 853710-Control boards, panels consoles, 853931-Fluorescent, hot cathode lamps.

One step further, in order to analyze the pattern of specialization of ACP countries in environmental goods, we use the so-called Revealed Comparative Advantage (RCA)¹² as an indicator. A positive and high value of RCA indicates a high degree of competitiveness of the country in the production of a certain commodity, while a negative RCA indicates the lack thereof. As shown in Table A- 4, there are no systematic patterns of specialization of different ACP countries in environmental goods but ACP countries have positive RCA in only a few products, leading to strong specialization. Similarly, the lack of similarities among ACP RCA is a strong argument in favor of regional integration due to potential complementarities. We find stronger positive RCA for instance St Kitts and Nevis 850300 Commutators and 853710 Electric control panels, for a voltage not exceeding 1,000, 859440 Static converters for the Dominican Republic and 731029 Iron/ steel, cans for any material for Barbados.

We also consider the geographical concentration of ACP countries' trade using the Herfindahl-Hirschman index of concentration.¹³ As shown in Table A- 3, the country with the highest index of concentration of exports of EGs is by far the Dominican Republic (one of the main exporter of EG goods but ultra specialized), followed by Mauritius, Nigeria and Cuba. On the other hand, imports of EGs of Nigeria, Cuba and Angola show the highest degree of regional concentration.

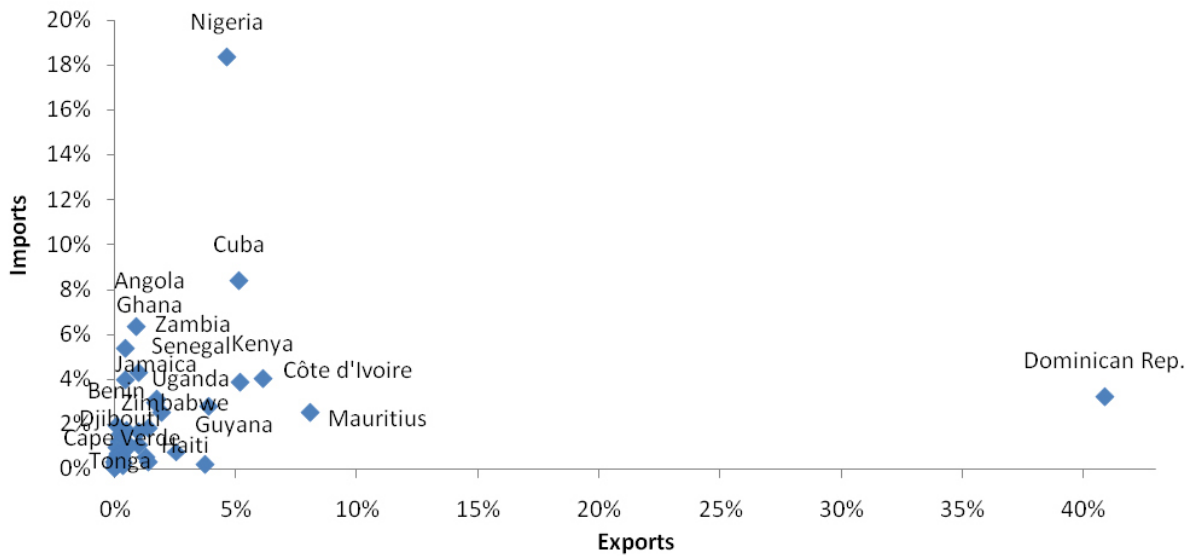
Figure 3 Share of EG exports/imports in total merchandise exports/imports by country



Source: Authors' calculations based on BACI (CEPII)

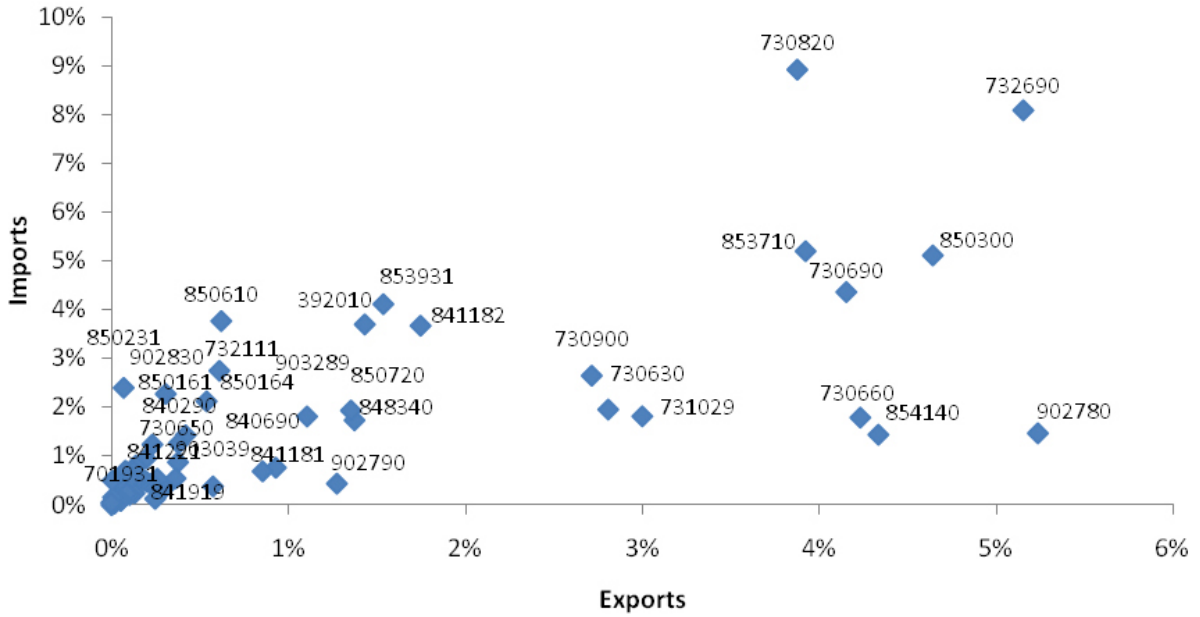
Note: St Kitts&Nevis is an outliers and not shown accounting for 19% of exports and 3% of imports.

Figure 4 Share of EG exports/imports in total EG exports/imports of ACP by country



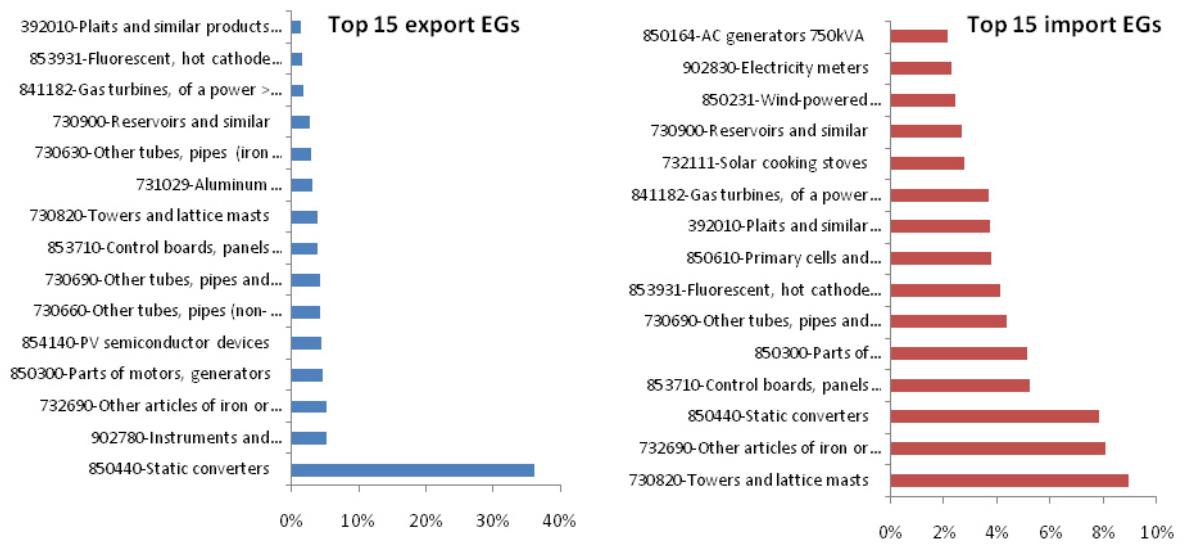
Source: Authors' calculations based on BACI(CEPII)

Figure 5 Share of EG exports/imports in total EG exports/imports by product

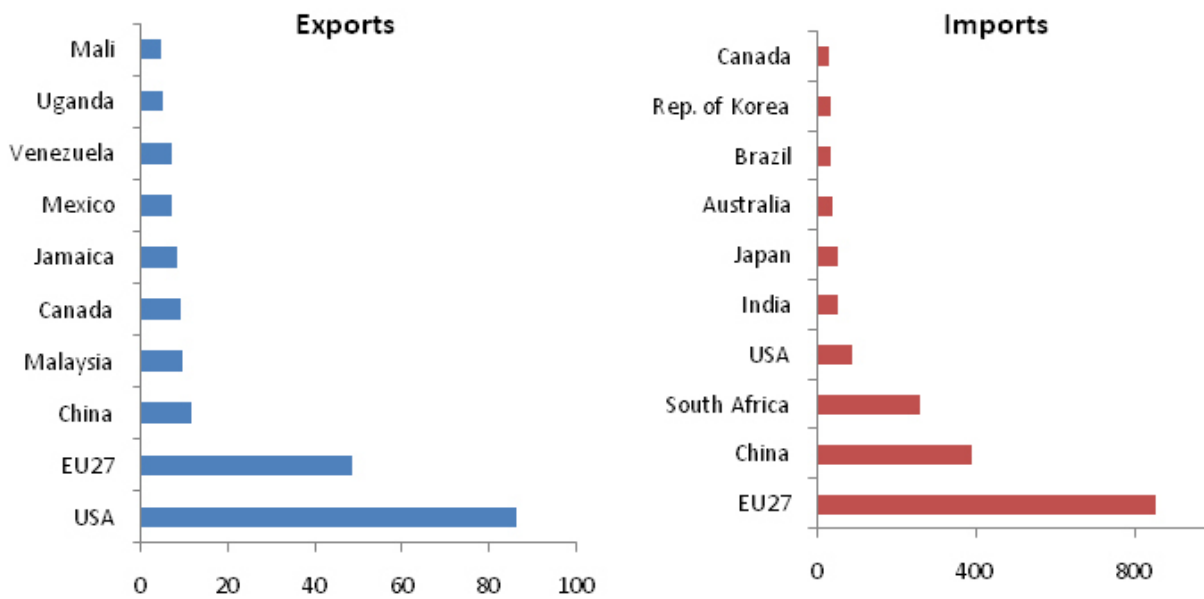


Source: Authors' calculations based on BACI(CEPII).
 Note: 850440 (Static converters) is an outlier and not shown accounting for 36% of exports and 7% of imports.

Figure 6 Top 15 traded EGs (% in total EG trade of the ACP group)



Source: Authors' calculations based on BACI(CEPII)

Figure 7 Destination and source of ACP countries' exports and imports of EGs (USD millions)

Source: Authors' calculations based on BACI (CEPII)

To conclude, in Figure 7 we consider the major trading partners of APC countries in environmental goods. With respect to the destination of ACP's exports of EGs we find that the US (31% of total exports) and EU 27 (18% of total exports) account for about half of the ACP group's exports. Other important destinations are China, Malaysia and Canada. On the other hand, ACP countries import mainly from EU 27 (38% of total imports), China (17%) and South Africa (11%).

3.2 Tariff Barriers

Although the aforementioned Paragraph 31(iii) of WTO Doha Declaration urged for "the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services" more than ten years ago, there are still significant, both tariff and non-tariff, barriers to trade in environmental goods that remain.

Overall, average world tariffs on EGs were bound at a level of 8.7%, almost three times higher than the average applied rate¹⁴ - considering

full use of preferences - at 3% (Table 4). While global average barriers are relatively low, a cross-country analysis shows very different protection profiles. ACP countries have bound average EG tariffs at 40%, significantly higher than the bound rate of OECD countries (2.7%). Further, we find that the highest bound tariffs on EGs are those between ACP countries (44.9%) compared to the 3% bound among OECD countries.

An examination of applied tariffs shows a similar pattern. On the one hand, ACP countries apply 9.6% tariffs on imports of EGs with slightly higher protection on imports from other developing countries and BIC. On the other hand, exports of EGs of ACP countries to OECD face very low tariffs (0.4%) but significantly higher on exports to other ACP and other developing countries. This finding can be explained by the fact that ACP country exports to OECD countries are eligible for the Generalized System of Preferences (GSP) scheme that grants duty free access to a wide range of products to these markets.

Table 4 Bound and applied tariffs on environmental goods (% AVE)

		Importer				
		ACP	BIC	Devping	OECD	WTO
		Bound Tariffs				
Exporter	ACP	44.9	27.6	25.7	2.5	15.5
	BIC	41.8	31.7	24.1	2.4	7.0
	Devping	41.3	16.3	24.1	2.3	7.8
	OECD	38.7	12.2	23.5	3.0	9.5
	WTO	40.0	13.7	23.7	2.7	8.7
		Applied Tariffs*				
	ACP	10.7	12.1	7.9	0.4	4.8
	BIC	11.7	14.1	5.5	1.7	2.7
	Devping	11.4	8.5	5.8	0.6	2.2
	OECD	8.1	8.5	4.0	1.9	3.3
WTO	9.6	8.8	4.5	1.6	3.0	

Source: Authors' calculations based on the TRAD Database (IFPRI) using the reference group weighting scheme

Note: *Assuming full utilization of preferences

A closer look at intra-regional tariffs (see Table 5) reveals interesting patterns of preferences. Applied intra-regional tariff rates range from 0.2% between CEMAC countries to 20% on exports of EGs from Oceania to CARICOM. Importantly, however we find that a significant share of intra-regional trade is subject to low tariffs. For instance, we find that trade between CARICOM countries that accounts for

27.8% of the ACP group's total trade is subject to a lower 3.6% tariff rate and a preferential margin of 8.8%. Further, applied tariffs on trade between ECOWAS countries accounting for 22.1% of total trade are slightly higher 5.6% and preferential margin of 7.7%. Finally, intra-COMESA trade (14.1% of total trade) is subject to 1.5% applied tariff rates and 13.8% preferential margin.

Table 5 ACP intra-regional preferences: applied tariffs and preferential margins

		Importer					
		CARICOM	CEMAC	COMESA	ECOWAS	OCEANIA	SADC
		Applied tariffs					
Exporter	CARICOM	3.6%	9.5%	16.6%	17.1%	5.2%	4.8%
	CEMAC	6.9%	0.2%	10.2%	6.2%		14.4%
	COMESA	20.2%	10.1%	1.5%	12.3%	3.0%	5.0%
	ECOWAS	1.7%	14.7%	11.6%	5.6%		13.5%
	OCEANIA	20.0%				10.3%	
	SADC	19.5%	11.9%	7.9%	11.3%	11.0%	2.4%
		Preferential margin					
	CARICOM	8.8%					
	CEMAC		15.6%				0.2%
	COMESA			13.8%			11.2%
	ECOWAS				7.7%		
	OCEANIA						
SADC			11.6%			11.3%	

Source: Authors' calculations based on the TRAD Database (IFPRI)

Table A- 2 is aimed to provide a summary of the GSP and other preferences granted to the ACP countries considered in this study. Thus, we find that on the one hand the European Union grants GSP status for all 57 ACPs, but GSP+ to none of them. Canada, Russia and Turkey grant duty free access to all 57 ACP under GSP, Japan grants GSP status to all 57 except Djibouti and Switzerland to all except Trinidad and Tobago. Finally, apart from GSP, the US has other non-reciprocal preference schemes that concern some ACP groups. AGOA (African Growth Opportunity Act) allows duty free treatment for a wide range of products imported from 40 Sub-Saharan African countries while CBI (Caribbean Basin Initiative) provides duty free access to 18 beneficiary countries. For instance, we find that while Antigua and Barbuda and Barbados exports to the US are not covered by GSP preferences¹⁵, they are granted preferential access by CBI.

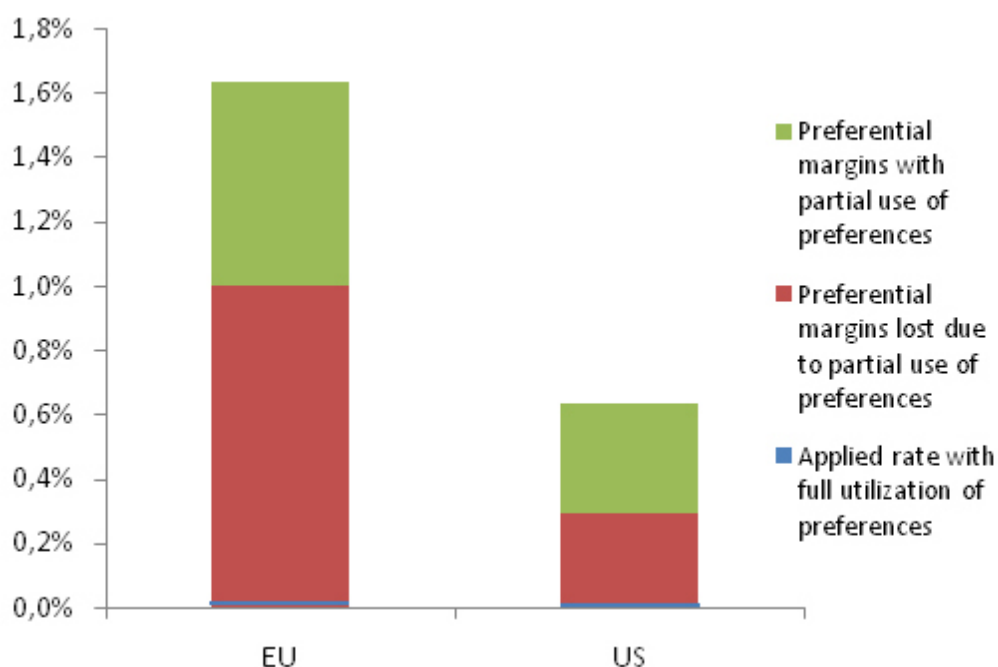
It is important to keep in mind that in order to receive preferential treatment, a product must meet rules of origin requirements or otherwise face MFN tariffs. While these requirements are in place for preventing non-GSP countries from transshipping their products through beneficiary countries, they can impose serious

costs that potentially outweigh the benefits of preferential access. In other words, when the option of preferential access is available, beneficiary country exporters might still chose not to claim preferential access leading to underutilization of preferences.

Note the underlying assumption in calculating the average applied tariffs presented in Table 4 is full utilization of preferences. Nevertheless, given a less than perfect utilization rate, ACP countries will face higher applied tariffs on their exports to OECD countries.

Indeed, as shown in Figure 8, there are significant differences between average tariffs faced by ACP country exporters of EG assuming full and partial utilization of preferences. Applied rates assuming a full utilization rate are close to zero in the EU and US markets¹⁶, while average tariffs calculated assuming the actual, less than perfect utilization rate of preference is about 1% in the EU and 0.29% in the US. Finally, we find that while the preferential margin on imports of EGs from ACP countries with full utilization of preferences is 1.63% in the EU and 0.63% in the US, preferential margins lost due to partial use of preferences add up to 1% in the EU and 0.29% in the US.

Figure 8 Full and partial utilization of preferences: tariffs faced by ACP countries in EU and US



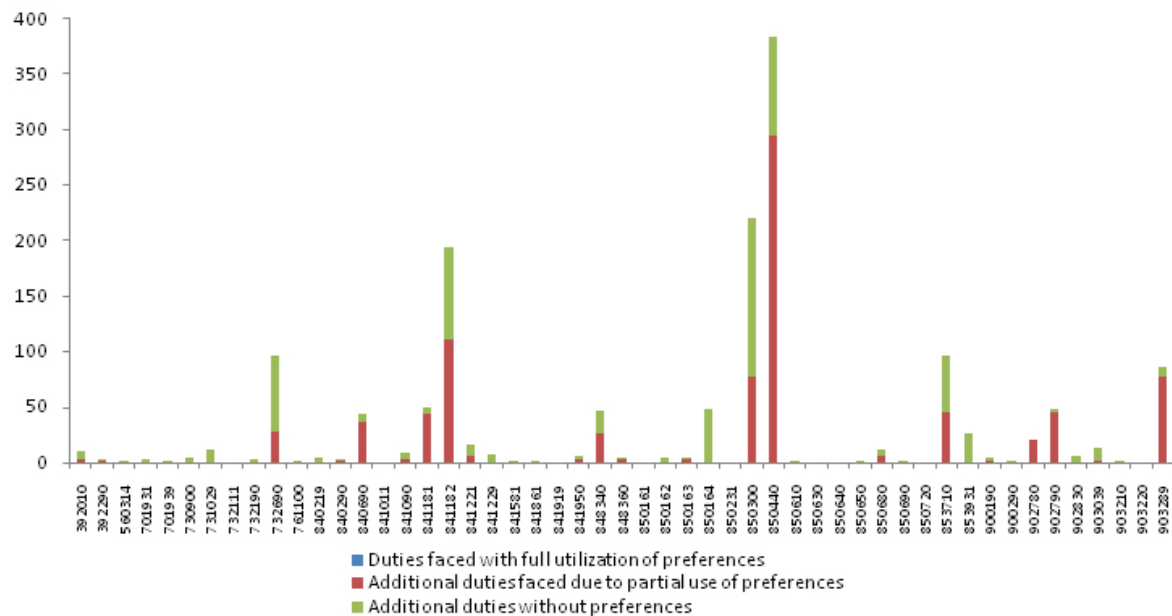
Source: Authors' calculations based on TRAD(IFPRI) using the reference group weighting scheme

Note: RED + GREEN = potential preferential margin, RED = lost preferential margin, GREEN = effectively used margin. BLUE=applied rate of duties assuming full utilization of preference, here they are close to 0.

We are able to further decompose these aggregates and look at duties paid by ACP countries on exports of AGs by products and by countries. The picture painted in Figure 9 and Figure 10 reinforces our previous conclusions that it is not only preferences that matter but also the utilization rate of these preferences. For instance, we find that significant peaks of duties paid by ACP exporters for certain environmental goods due to underutilization of preferences: as applied tariffs assuming full utilization rate are zero (except for 732690 *Other articles of iron or steel not eligible for GSP in the US* and 392010 *Plaits and similar products of plaiting materials, whether or not*

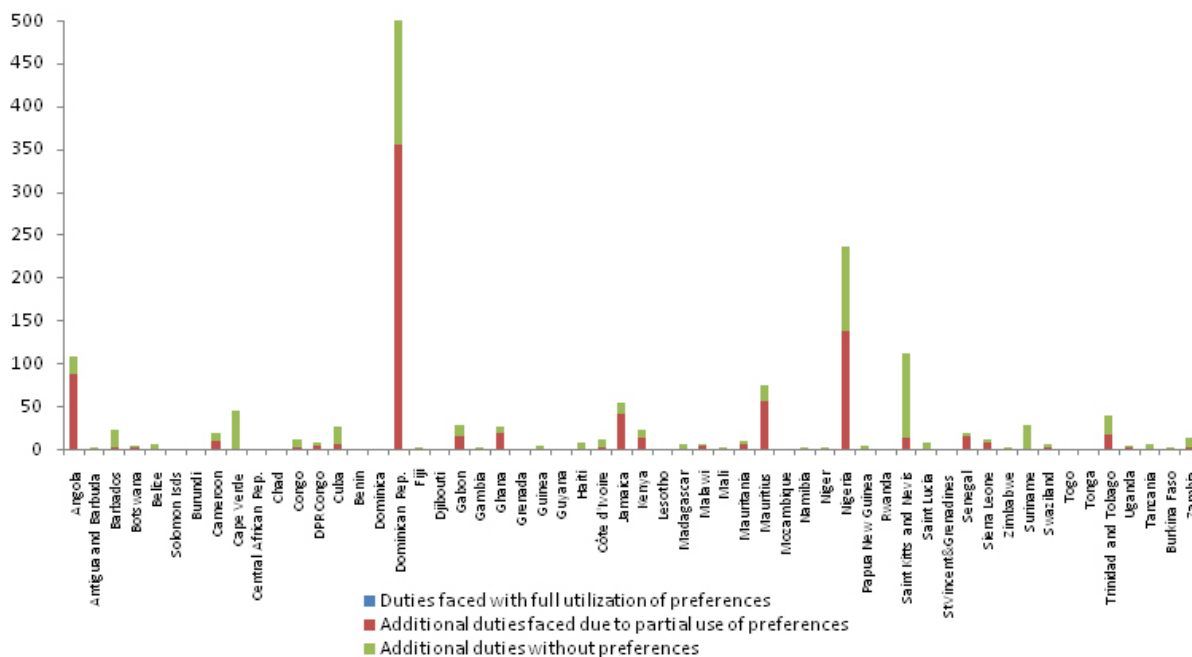
assembled into strips classified as a sensitive product according to EU GSP). Additional duties faced by ACP exporters, due to underutilization of preferences, add up to \$0.3 million for product 850440 *Static converters* and 0.1 million for 841182 *Gas turbines, of a power > 5,000 kW*. For most products, additional tariffs faced due to underutilization of preferences are higher than the additional tariffs faced when assuming away preferential treatment. Among the ACP countries considered here, it is the Dominican Republic, Nigeria and Angola that are most impacted by higher duties paid to the EU and US due to underutilization of preferences.

Figure 9 Duties paid and face value of preferences to EU and US by EG (\$ thousands)



Source: Authors' calculations based on TRAD (IFPRI)

Figure 10 Duties paid to EU and US by ACP exporter (\$ thousands)

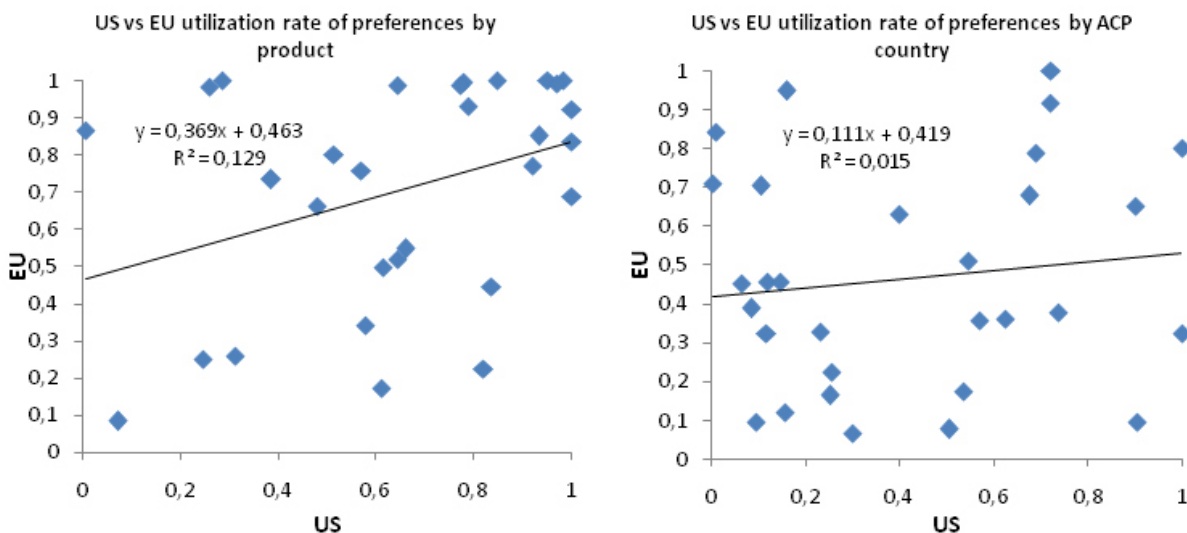


Source: Authors' calculations based on TRAD (IFPRI)

As depicted in Figure 11, we find a positive and significant relationship between the utilization rate of preferences of ACP countries in the US and EU markets that is more pronounced if disaggregated by product (left side) than by country (right

side), a relationship that can be explained by the nature of products and their degree of processing. In other terms, it appears that it is more difficult to respect rules of origin for some products, wherever the producers are located among ACP countries.

Figure 11 Utilization rate of preferences by ACP countries in the EU and US markets



Source: Authors' calculations based on TRAD (IFPRI)

3.3 Non Tariff Barriers

Although not as easily quantifiable as tariffs, non-tariff barriers (NTB) have been demonstrated to have potentially significant impacts on trade flows. They can take various forms ranging from price, finance, licensing and quantity controls to monopolistic or technical regulations.

Table B- 1 provides an overview of the number of NTBs in the category of quantity controls and technical regulations faced by ACP country exports. We find that there are a total of 531 NTBs in place, i.e. cases where NTBs are imposed on imports from ACP or other countries, out of which the most important category (382 NTBs) represents technical regulations such as product characteristics requirements (253 NTBs) or testing, inspection and quarantine requirements (69 NTBs). In addition, Table B- 2 further explores the composition of the number of NTBs by importer. Most notably, we find that it is Jordan (186 NTBs) and Brazil (51 NTBs) that impose the majority of NTBs on the exports of environmental goods of ACP countries.

Figure B- 1 presents the top 10 EGs and reporter ranked by the number of NTBs. Among EGs, it is Fluorescent, hot cathode discharge lamps

(19), Static converters (16) and Air conditioning machines (16) that are the most impacted by non-tariff barriers that are in place. A cross-country analysis further reveals that countries with the most NTBs are Jordan (186), Brazil (51) and Senegal (46).

A simple comparison between the ratios representing of number of NTBs relative to the number of environmental products ($745/63=11.8$) and the number of NTBs relative to the number of HS6 products that belong to HS2 chapters that include EGs ($14266/1357=10.5$) reveals a slight bias toward environmental goods in the number of NTBs.

Finally, Figure B- 2 explores whether there is any relationship between the MFN rate and the number of NTBs faced by EG exports of ACP countries demonstrating that there is no apparent relation with an R2 close to zero. As shown here, for most EGs, low average tariff barriers are associated with a high number of NTBs, with the exception of some primary cells (HS6 products 850640 and 840660) for which high average MFN rates are linked with high number of NTBs. Further, as shown in Figure B- 3, we do not find a systematic statistical relationship between the average MFN rate and the average NTB AVE faced by EG exports of ACP countries either.

4. ASSESSING THE IMPACT OF TRADE LIBERALIZATION

In this section, we analyze the impacts of different trade liberalization scenarios using a partial equilibrium model (see Box 1 below). Before discussing the scenarios and the results, a few caveats should be made to avoid the misinterpretation of our results:

1. Although most environmental goods are multiple use items, we cannot differentiate between different uses of the EGs and thus the trade data used in calibrating the model implicitly accounts for all trade flows independently from whether these are used for environmental purposes or not. Nevertheless, any liberalization based on the “list-based” approach (advocated by developed countries) would mimic the mechanisms of our model and have an impact on all trade flows;
2. One could point out the fact that prices might not be the main driver of demand for environmental goods. Nonetheless, we find that the simple average of import demand elasticities estimated in the literature (Kee et al., 2008) and used in our modeling framework are -1.18 for EGs (versus -1.67 for all goods). Other factors that could have a more significant impact on the demand for environmental goods are: new regulations, public investments, price incentives (subsidies) to adopt greener technologies etc. These factors will “shift” the demand, e.g. for a given price of imports domestic demand will be larger in the new policy context. Here, we study the effects of the trade policy changes under the assumption of “ceteris paribus” meaning that trade liberalization will not affect other domestic policies or regulations linked to the EGs. This assumption may be strong since some countries will try to package their policies in a way that additional environmental requirements applied on their domestic industries/consumers may be met at a lower price thanks to reduced tariffs. Nevertheless, it is difficult to define such policy packages ex-ante for all countries and we prefer to adopt the more neutral assumption, even if it also implies that we can underestimate the total market for EGs in our simulations.
3. The model assumes no constraints on ACP supply of EGs and therefore only captures the potential trade expansion driven by additional market access and may overestimate this effect if the specific industries face constraints in some countries;
4. The current version of the model addresses trade expansion and trade diversion but not that of trade creation in the sense of exports of new products by one country or exports of an existing product to a new destination. This limitation is shared by many trade models and may lead to an underestimation of the trade creation effects. However, it also captures the fact that without access to some technologies and investments (not modeled in our framework) a country cannot start to develop a new value chain. Similarly, the lack of existing exports to one specific market can be explained by prohibitive NTBs that we do not reduce in our scenarios. Therefore, our results are still meaningful since they can represent low hanging fruit of trade reforms, still considering our previous remark (1);
5. Due to the lack of data, we consider full utilization of preferences on all markets except for the US and the EU. For these regions, we have shown in the previous section the importance of keeping partial utilization rate of preferences to not overestimate the existing preferences, and therefore the negative consequences of their erosion. However, for other markets, it implies that we have a much stronger assumption that will be particularly important for intra ACP block trade (within CARICOM, ECOWAS...) where we will find strong preference erosion in some scenarios;

6. A side consequence of assuming full utilization of preferences among ACP block in the context of regional custom unions is that we neglect the problem of double taxation. Indeed, even the trade information we use should exclude re-exports, it is common to find them included in trade data of developing countries. The difficulties of regional integration also lead many members of regional custom unions to not implement free circulation of goods in the sub-region and this leads to double taxation (import duties are applied each time the border is crossed, even within the custom unions) and increases drastically the cost of the EG for the final consumers. Therefore, removing tariffs at the regional level can be translated by a much larger price decrease for the consumers. These effects are not included in the analysis.

4.1 Description of Scenarios

Four scenarios of trade liberalization of environmental goods are considered¹⁷:

1. **Doha Modalities:** this scenario implements the Doha modalities in market access for NAMA products. Tariff cuts have been determined using the Swiss Formula with Special and Differential Treatment, including sensitive products for developing countries. For a detailed description of the Modalities see Laborde and Martin (2011), p61;
2. **Full liberalization within ACP countries:** this scenario entails the full removal of tariff barriers for EGs within ACP countries in addition to the tariff cuts of the Doha Modalities for the rest of the world;
3. **Full liberalization among WTO members:** here, we consider the complete elimination of tariff barriers to trade on environmental products among all WTO members;
4. **WTO liberalization with Special and Differential Treatment (SDT):** in this scenario we examine the full removal of tariff barriers on EGs for developed countries while developing

countries cut tariffs by 50% more than the tariff cut implied by the Swiss formula. Note, however, that ACP countries benefit from the same flexibilities as in the Doha Modalities scenario and therefore, are not required to cut applied tariffs.

It follows that from the point of view of ACP countries, it is the Doha Modalities scenario that implies the least extensive degree of liberalization, followed by the WTO liberalization with Special and Differential Treatment, while the remaining two scenarios (Full liberalization within ACP countries and Full liberalization among WTO members) entail the full removal of barriers to trade on EGs.

In the following subsection we examine the impact of these different trade liberalization scenarios on indicators such as aggregate exports, imports, collected and paid duties and further, at a more disaggregated country and product level.

4.2 Simulation Results

Table 6 and Figure 12 summarize the impacts of varying degrees of liberalization of barriers to environmental goods trade on ACP and non-ACP exports, imports and net trade balance.

As pointed out previously, the Doha Modalities and the WTO with SDT for developing countries require the least commitment from ACP countries in terms of tariff cuts among the four scenarios considered here. Interestingly, we note that imports of ACP countries do not change as a result of tariff cuts implied by these two scenarios since their own applied tariffs are not affected, i.e. the combination of high bound rates on imports of environmental goods in ACP countries and flexibilities for developing and SVE economies lead to no actual changes of applied rates for the ACP countries. On the other hand, exports of ACP countries in these two scenarios increase only modestly by \$0.79 million (0.29%) and \$2.81 million (1.01%), respectively. When considering the scenario with full liberalization of EG trade within ACP countries, the impact on ACP

countries' trade is more significant: exports increase by \$24 million while imports by \$6.9 million. The differences between these two figures represent the trade diversion driven by intra ACP new preferential treatment: \$17.1 million of ACP imports of products originated in non ACP countries are now supplied by ACP producers. Note that this significant increase in exports points towards the importance of

intra-regional trade in EGs. It also requires one to keep in mind that rules of origin among ACP countries should be defined in a way that the tariff reductions can provide real preferential access. The role of intra ACP trade, and existing preferential treatment within some ACP regions (e.g. CARICOM) is illustrated also by the full liberalization among WTO members but in a mirror way.

Box 1. A partial equilibrium model to assess the trade impacts of tariffs reduction on EG

Simulations have been carried out using a multi-region multi-product partial equilibrium model for trade policies at the HS6 level with full country detail, i.e. ACP countries are represented as both exporters and importers. Preferences are described by a nested structure combining a product specific iso-elastic demand function by importer, and a CES structure to allocate imports by country of origin. The latter feature is the so-called Armington assumption (Armington 1969); it captures imperfect substitution on the basis of product differentiated by their country of origin. More specifically, aggregate imports are specified as an iso-elastic demand function of the form:

$$M^{hs6,r} = M_0^{hs6,r} \left(\frac{P^{hs6,r}}{P_0^{hs6,r}} \right)^{\eta^{hs6,r}}$$

where $M_0^{hs6,r}$ and $M^{hs6,r}$ represent initial and post-simulation imports of environmental good HS6 by country r , $P_0^{hs6,r}$ and $P^{hs6,r}$ are the initial and post-simulation price indexes of imports of environmental good HS6 by country r and $\eta^{hs6,r}$ is the elasticity of import demand based on Kee, Nicita and Olareagga (2006) and expanded for missing values as in Fontagne and al. (2008). The demand for imports is not shifted by any factor and we do not assume dynamic market growth. Further, the allocation of total imports across countries of origin is determined by the above described Armington-type CES function:

$$Mb^{hs6,r,s} = \alpha^{hs6,r,s} M^{hs6,r,s} \left(\frac{Pb^{hs6,r,s}}{P^{hs6,r}} \right)^{-\sigma^{hs6,r}}$$

where $Mb^{hs6,r,s}$ represents imports of environmental good HS6 by country r from country s , $Pb^{hs6,r,s}$ is the price of imports of good HS6 by country r from country s , $\sigma^{hs6,r}$ is the Armington elasticity fixed to 8 to mimic the larger degree of homogeneity at the product level (see Fontagne and al. (2008) for a discussion) and $\alpha^{hs6,r,s}$ is the CES parameter calibrated from the initial database based on the formula:

$$\alpha^{hs6,r,s} = \left(\frac{Pb^{hs6,r,s}}{P^{hs6,r}} \right)^{-\sigma^{hs6,r}} \left(\frac{Mb^{hs6,r,s}}{M_0^{hs6,r}} \right)$$

Last, we assume a perfectly elastic export supply function. Therefore, domestic price changes are only driven by import duties reduction and exporters do not face supply constraints. This assumption may appear quite strong for ACP countries that are well known to face severe bottle necks on the production side but it is quite useful to assess the potential effects of trade expansion.

The scenario with full liberalization among WTO members implies the same commitment for ACP countries with other ACP but also more market access in third parties (other WTO members) and the opening of their own markets to global competition. We find significant differences due to the full elimination of barriers by the rest of the world. Most importantly, results show that, in this scenario, exports of ACP countries fall by -\$7.67 million (-2.8%) and draw attention to considerable erosion of preferences for ACP countries. Further, note that in the simulations described here we assume full utilization of preferences by ACP countries on other ACP export markets. However, as highlighted in Figure A- 1 in the Appendix A, results are sensitive to assumptions about the utilization rate: using the effective utilization rate of preferences¹⁸ may slightly dampen the losses in the WTO liberalization scenario. Indeed, for the two main OECD markets, the US and the EU, considering partial utilization rate of preferences, we find that we reduce the losses/increase the gains of ACP countries

in the Doha Modalities and WTO with SDT scenarios. In other words, by assuming full use of preferences we overestimate the role of initial preferences and the effects of preference erosion.

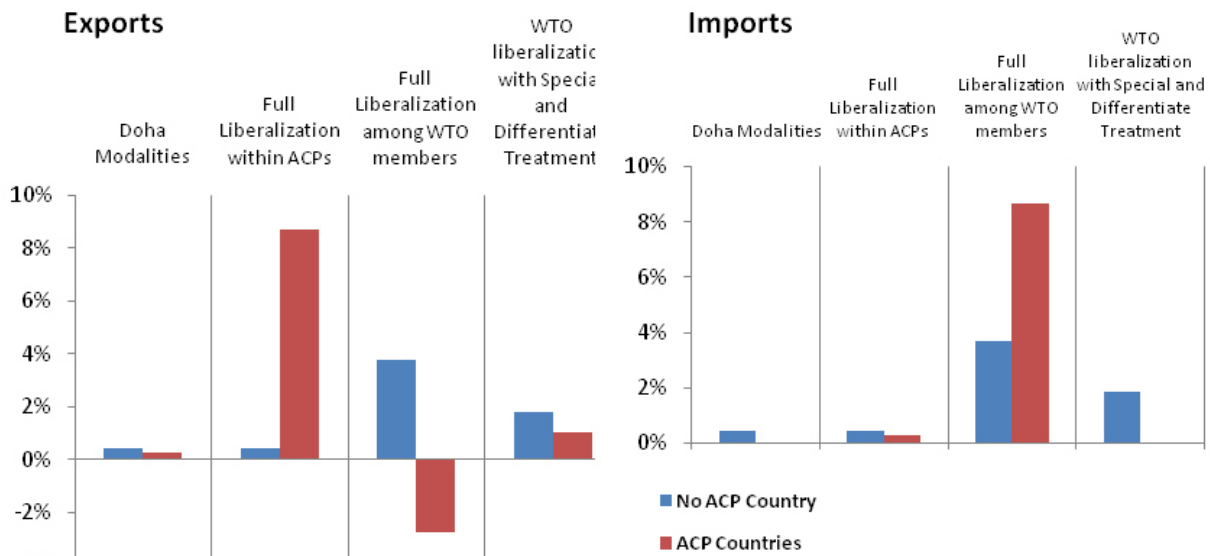
With respect to non-ACP countries' trade, we find that full liberalization of environmental goods' trade among all WTO members increases non-ACP countries' exports by \$3,824 million (3.8%) and imports by \$3,614 million (3.7%). A less extensive liberalization, due to the special and differential treatment provisions for developing countries, reduces the gains of non-ACP countries compared to full liberalization, i.e. exports increase by \$1,834 million (1.8%) while imports by \$1,832 million (1.9%). Finally, note that there are only small differences between the Doha Modalities and the Full Liberalization within ACPs scenarios explained by the fact that ACP countries are not major exporters for EGs to the rest of the world and thus full trade liberalization within the region does not impact imports/exports significantly.

Table 6 The impact of trade liberalization on trade (USD thousands)

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO Members	WTO Liberalization with Special and Differential Treatment
Exports				
non-ACP countries	447,752	434,459	3,824,183	1,834,859
ACP countries	796	24,136	-7,670	2,812
Imports				
non-ACP countries	447,259	447,259	3,614,005	1,832,614
ACP countries	0	6,925	190,859	0
Net Balance				
non-ACP countries	3,071,640	3,058,347	3,281,324	3,073,392
ACP countries	-1,925,386	-1,908,970	-2,124,711	-1,923,370

Source: authors' simulations

Figure 12 The impact of trade liberalization on trade (% change)



Source: Authors' simulations

Table 7 further decomposes aggregate trade results highlighting the evolution of imports of various countries from the ACP group. First, note that trade liberalization results in trade diversion effects for ACP countries in all scenarios, except in Full Liberalization within ACP where we find significant trade expansion effects. More specifically, full liberalization among WTO members leads to an improvement in the relative competitiveness of non-ACP countries and results in a decrease in intra-regional ACP imports by -17.1%. On the other

hand, the liberalization of the intra-regional ACP market creates trade and leads to an increase of intra-regional imports by 32.0%.

Concerning the impact of liberalization on other countries' imports from the ACP group, we find that it is mainly Korean and Chinese markets that expand relatively more. Most notably, as a result of the full liberalization among WTO members scenario, still considering partial tariff elimination for China, Korea and China import 28% and 9.8% more from ACP countries.

Table 7 The impact of trade liberalization on imports from ACP countries (% change)

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO Members	WTO liberalization with Special and Differential Treatment
non-ACP countries	0.41%	0.41%	2.34%	1.44%
EU25	0.28%	0.28%	0.99%	0.99%
Japan	-0.01%	-0.01%	-0.04%	-0.04%
Korea	9.72%	9.72%	27.87%	27.87%
USA	0.02%	0.02%	0.42%	0.42%
China	2.27%	2.27%	9.83%	3.44%
India	1.61%	1.61%	14.41%	11.94%
ACP countries	-0.06%	32.03%	-17.14%	-0.21%

Source: Authors' simulations

Given the significant changes in intra-ACP trade as a result of certain trade liberalization scenarios, we are interested in decomposing these changes by major ACP regional groupings. As shown in Table 7, full liberalization within ACP countries leads to an increase in intra-ACP imports by 32% that is further decomposed in Table 8: most significantly, exports of EGs from COMESA and Oceania to CARICOM countries increase by 268% and 223%, respectively. Exports from CARICOM and COMESA to ECOWAS countries increase by 254% and 105%, respectively. Finally, we also find that exports of CEMAC and ECOWAS

countries to COMESA increase significantly by 107% and 192%, respectively.

On the other hand, we find that full liberalization among WTO members has a significant negative impact (-17.1%) on intra-ACP trade of environmental goods. While we find that there are ACP regions among which trade expands as a result of liberalization (between COMESA-CARICOM and CEMAC-COMESA), the regions that account for the majority of the intra-ACP trade experience trade diversion impacts. More specifically we find that intra-CARICOM trade decreases by -21.8%, intra-COMESA trade by -31.7% while intra-ECOWAS trade by -13.6%.

Table 8 Impact of trade liberalization on intra-ACP trade (% change)

		Importer							
		CARICOM	CEMAC	COMESA	ECOWAS	OCEANIA	SADC	OTHER	
		Full Liberalization within ACPs							
Exporter	CARICOM	12.8%	100.6%	75.4%	254.3%	0.0%	16.1%	0.0%	
	CEMAC	42.9%	-0.6%	107.3%	83.9%		162.0%	0.0%	
	COMESA	268.0%	42.5%	5.9%	105.7%	0.0%	38.0%	0.0%	
	ECOWAS	17.1%	99.0%	192.7%	38.2%	0.0%	101.0%	0.0%	
	OCEANIA	223.0%	-28.2%	0.0%	-2.5%	9.2%	0.0%	0.0%	
	SADC	-0.3%	1.1%	5.5%	5.6%	0.0%	0.2%	0.0%	
	OTHER	0.0%		0.0%	0.0%		0.0%		
			Full Liberalization among WTO members						
	CARICOM	-21.8%	9.6%	5.5%	16.7%	0.0%	11.1%	0.0%	
	CEMAC	6.5%	-37.4%	23.2%	5.8%		15.2%	0.0%	
	COMESA	30.0%	12.8%	-31.7%	10.7%	0.0%	-34.1%	0.0%	
	ECOWAS	8.2%	15.7%	13.0%	-13.6%	0.0%	13.1%	0.0%	
	OCEANIA	13.1%	14.9%	0.3%	16.4%	0.9%	11.9%	0.0%	
	SADC	8.4%	11.3%	7.9%	9.5%	0.0%	3.3%	0.0%	
OTHER	23.1%		0.0%	4.9%		21.1%			

Source: Authors' simulations

Further, as shown in Table A- 5, the impact of trade liberalization decomposed by individual ACP countries is diverse. While trade liberalization under the Doha Modalities scenario leads to an increase of exports of Niger (6%), Kiribati (2.7%), Nigeria (2.3%) and Jamaica (2.0%), it negatively impacts exports of Vanuatu (-2.7%), Mozambique (-1.8%).

Adding the liberalization of the intra-ACP market for environmental goods has more significant impacts on ACP countries trade.

While aggregate ACP exports increase by 8.7%, we find above average positive changes in the exports of environmental goods of Tanzania (55.1%), Togo (39.8%), Cote d'Ivoire (39.3%) and Benin (39.1%). On the other hand, Burundi appears to be slightly negatively affected (-1.7% as a combination of the DDA and the intra ACP liberalization).

In spite of the fact that full liberalization among WTO members negatively impacts the ACP-group as a whole in terms of exports

(-2.7%), there are certain ACP countries that reap the benefit of liberalization: for instance we find that exports of EGs of Niger (13.9%), Kiribati (10.7%) and Nigeria (6.9%) increase while countries such as Zimbabwe (-35.0%), Trinidad and Tobago (-33.7%), Burundi (-32.2%) and Kenya (-21.5%) are negatively impacted.

WTO liberalization with SDT for developing countries would have a more moderate impact on different ACP countries trade (1.0%) with above average increase in exports of Niger (10.9%) and Kiribati (10.67%) while exports of Vanuatu, Lesotho and Mali decrease significantly.

Finally, we find the largest variations in exports across scenarios for countries such as Tanzania, Niger, Cote d'Ivoire, Togo and Benin.

Given the specification of our partial equilibrium model, we are also able to decompose

the impact of trade liberalization by HS6 EGs (see Table A- 6 for the complete list of EGs). For instance, we find that exports of Static converters (850440), accounting for 36% of total exports and 8% of total imports of the ACP group, increase only modestly by 1.83% as a result of the full WTO liberalization scenario and by 1.07% under the WTO liberalization with SDT.

Table 9 reports the exports of the top 10 most (positively and negatively) impacted EGs. We find the largest variation in exports across scenarios for products such as 850630 Mercuric oxide primary cells and primary batteries, 730690 Iron or non-alloy steel, seamed o/ welded, 850610 Manganese dioxide primary cells and primary batteries, 732111 Iron or steel, portable non-electric domestic cooking appliances and plate warmers and 902830 Electricity supply or production meters.

Table 9 ACP exports of EGs - top 10 most impacted products

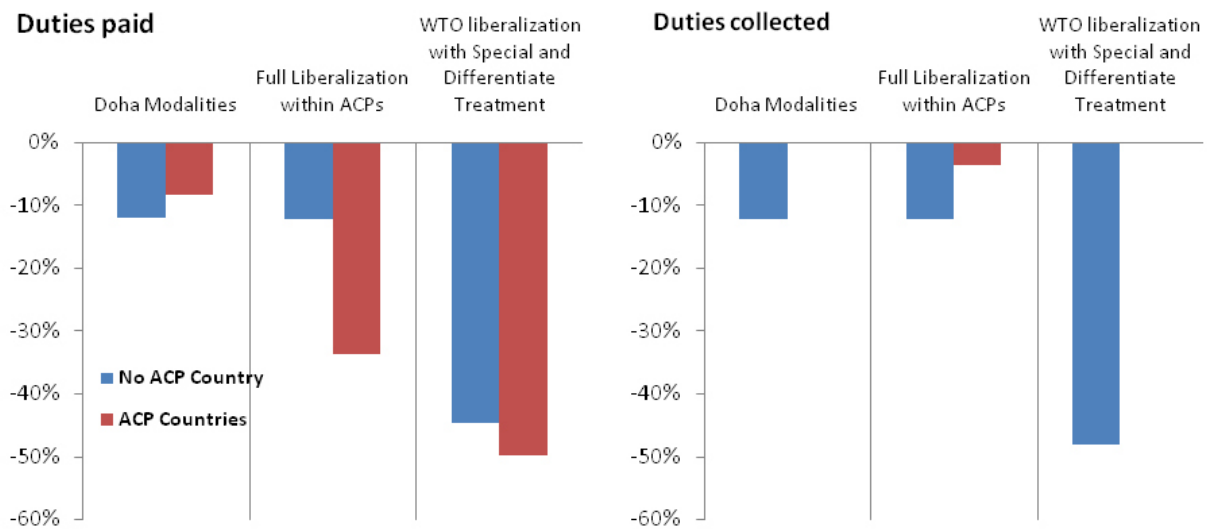
Full Liberalization among WTO members				WTO liberalization with Special and Differentiate Treatment			
EGs	\$ mil	EGs	%	EGs	\$ mil	EGs	%
850440	1,800	853931	12.40%	730820	1,080	560314	15.90%
853931	601	850630	8.68%	850440	1,059	730820	10.28%
730820	233	560314	7.73%	732690	514	903210	4.89%
732690	169	900190	7.63%	850300	173	732690	3.77%
850300	147	902830	7.01%	853710	128	848360	3.36%
902780	102	903210	5.70%	841181	96	841181	3.13%
903289	97	841181	3.13%	903289	84	850610	3.10%
841181	96	730820	2.22%	902790	56	850680	2.56%
902790	69	850300	2.14%	850610	53	850300	2.52%
900190	62	850440	1.83%	850680	27	903289	1.54%
850610	-401	761100	-16.73%	730630	-19	841940	-0.88%
731029	-583	392010	-18.97%	841861	-20	854140	-1.02%
730630	-636	730900	-19.80%	850161	-31	840410	-1.16%
853710	-647	850610	-23.71%	730900	-31	841182	-1.20%
392010	-717	850231	-23.88%	730690	-35	900290	-1.54%
730900	-771	730650	-25.50%	848340	-35	850161	-1.56%
732111	-923	841919	-25.51%	730650	-49	392010	-1.56%
730660	-950	392290	-26.19%	392010	-59	732190	-2.27%
730690	-1,453	732111	-55.25%	854140	-124	841861	-3.02%
850720	-2,180	850720	-58.28%	841182	-126	730650	-4.97%

Source: Authors' simulations

Finally, we also consider the impact of trade liberalization on collected tariff revenue and paid duties as depicted in Figure 13. As pointed out previously, the Doha Modalities and the WTO liberalization with SDT does not translate in effective cuts of applied tariffs and consequently these scenarios do not lead to a loss of tariff revenue for ACP countries. Further, intra-regional liberalization of environmental goods trade within the ACP group leads to a moderate loss of tariff revenue of -3.62%. A detailed decomposition of the changes in tariff revenues by individual ACP countries is shown in Table A- 7 in the Appendix A.

On the other hand, liberalization has a more pronounced impact on duties paid on ACP countries' exports of EGs. For instance, we find that WTO liberalization with SDT results in a -48.27% decrease in duties paid while full liberalization within the ACP group would decrease paid duties by -33.82%. Of course, the full duty elimination within WTO members leads to the nearly complete elimination of duties paid by ACP members on these products due to the nearly complete monopoly of WTO members on the EG trade.

Figure 13 Impact of trade liberalization on paid and collected duties (% change)



Source: Authors' simulations

CONCLUDING REMARKS

This paper provides an overview of existing trade pattern and potential trade opportunities in a selection of environmental goods by ACP countries. We find that ACP countries, as a block, have a large trade deficit in EGs as well as relatively high tariffs. Therefore, any tariff elimination by ACP countries will translate to an increased level of imports and a deepening of the trade imbalance in this sector. Nevertheless, it will also reduce the costs of these products for producers and consumers in ACP countries and will favor mitigation strategies. Given the nature of environmental goods, there is an additional gain we need to consider, i.e. the positive externality (reduced emissions or pollution) associated with the consumption/use of the EGs. The key question in terms of welfare analysis (not done in this paper) is to know who benefits from the positive externalities: domestic agents (and therefore, domestic welfare increase) or the world. In terms of export opportunities, a much richer picture appears. First, a few ACP appears to have a strong specialization in exporting a few EGs, in particular on existing regional markets. Indeed, for ACP exporters, the ACP markets represent half of the OECD markets, a very noticeable situation since for the ratio is nearly 1 for 10 for all goods instead

of 1 for 2 in the case of the EG. On OECD markets, ACP faces nearly no tariffs if we consider full utilization rate of preferences. However, for several important products, the utilization rate is low and on average half of the preferences are not used. This implies that the preference erosion mechanism will be lower on these markets (preference erosion is in any case limited in average due to the low level of protection on these products in OECD markets). Emerging countries apply higher tariffs and may be attractive markets for ACP exports if they open up. In this context, to maximize the offensive interests of ACP countries and to develop the supply of EG goods in these countries, the elimination of tariffs among the WTO members, but considering adequate special and differentiated treatment to protect ACP regional markets, appears to be the perfect compromise. If at the same time, intra ACP trade of EGs can be liberalized, it will reinforce the development of this sector, unlocking economies of scale needed to attract key investments. A critical issue for the regional integration path is the definition of adequate rules of origin that appear to be an important challenge for using preferential scheme in these sectors as illustrated by the EU and the US cases.

ENDNOTES

- 1 For the EG list proposed by OECD and APEC see WTO document TN/TE/W/18 22 November 2002 of the Committee on Trade and Environment
- 2 JOB(09)/132 circulated 9 October 2009
- 3 JOB(09)/169 circulated 6 November 2009
- 4 TN/TE/W/75/Add.1 circulated 16 February 2010
- 5 JOB/TE/2 circulated 16 February 2010
- 6 JOB/TE/4 circulated 14 June 2010
- 7 JOB/TE/5 circulated 23 June 2010
- 8 TN/TE/20 circulated 21 April 2011
- 9 For the purposes of this study we limit our analysis to ACP countries that are *WTO members (58) excluding South Africa*: Angola Antigua & Barbuda, Barbados, Belize, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Côte d'Ivoire, Cuba, Congo (Democratic Republic), Djibouti, Dominica, Dominican Rep., Fiji, Gabon, Gambia, Ghana, Grenada, Guinea, Guinea Bissau, Guyana, Haiti, Jamaica, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Papua New Guinea, Rwanda, St Kitts & Nevis, St Lucia, St Vincent & the Grenadines, Senegal, Sierra Leone, Solomon Islands, Suriname, Swaziland, Tanzania, Togo, Tonga, Trinidad & Tobago, Uganda, Zambia and Zimbabwe.

Bahamas, Comoros, Equatorial Guinea, Ethiopia, Liberia, Samoa, São Tomé & Príncipe, Seychelles, Sudan and Vanuatu (WTO observers) and Cook Islands, Eritrea, Kiribati, Marshall Islands, Micronesia, Nauru, Niue, Palau, Somalia, Timor-Lesté and Tuvalu (neither WTO members nor observers) are not considered in this study.
- 10 We use the 2005-2007 period to focus on recent data but avoiding the noise generated by the economic and financial crisis of 2008-2009 and their consequences on trade flows.
- 11 Duties, here, refer to theoretical duties, i.e. trade x applied tariffs assuming full utilization of preferences.
- 12
$$RCA_{EG,ACP} = \frac{1000}{X_{ACP} + M_{ACP}} \left[(X_{EG,ACP} - M_{EG,ACP}) - (X_{ACP} - M_{ACP}) \frac{(X_{EG,ACP} + M_{EG,ACP})}{(X_{ACP} + M_{ACP})} \right]$$

For a detailed review see Freudenberg and Lemoine (1999).
- 13 The Herfindahl-Hirschman index of geographical concentration of a country's exports/ imports is measured as the sum of the squares of the export/import shares of each country of destination/origin in the total world exports/imports of environmental goods:
$$HHI_EXPORTS_{ACP} = \sum_{REG} \left(\frac{EXPORTS_{ACP,REG}}{\sum_{REG} EXPORTS_{ACP,REG}} \right)^2, HHI_IMPORTS_{ACP} = \sum_{REG} \left(\frac{IMPORTS_{REG,ACP}}{\sum_{REG} IMPORTS_{REG,ACP}} \right)^2$$
- 14 Applied tariffs as used in this paper refers to both applied tariffs on an MFN basis and applied preferential tariffs depending on whether the trading partner is awarded preferences or not.
- 15 The United States GSP expired on December 31, 2010. Importers can still use GSP import documents in case the program is reinstated retroactively.

- 16 Average applied tariffs facing ACP EG exports in the US are not zero as the US does not grant preferential status to Cuba and in addition product 732690 Other articles of iron or steel is not eligible under the GSP scheme.
- 17 Our modeling framework considers only applied tariffs and tariff cuts that impact applied tariffs. Note however that trade liberalization scenarios have been designed “outside” our modeling framework and consider both bound and applied rates ((see Laborde and Martin, 2011 for further details on the design of tariff scenarios).
- 18 Data about the effective utilization rate of preferences by country and product was only available for the United States and EU27 countries.

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APPENDIX A

Table A- 1 List of environmental goods and their associated potential environmental benefits

HS 2002	HS 6-digit Description	Additional Product Specification & Environmental Benefit
Renewable Products and Energy Sources		
730820	Towers and lattice masts	Used together with a wind turbine to generate electricity from wind as a source of renewable energy
732111	Solar cooking stoves	Used solar thermal energy for domestic use and cooking. Suitable for off grid usage
732190	Stoves, parts	Parts are used in the maintenance and repair of solar stoves
840682	Steam turbines < 40 MW	Steam turbines are used as part of a system to derive electricity from environmental recovery operations
840690	Parts of steam turbines	Parts used to repair and maintenance of energy recovery turbines
841011	Hydraulic turbines, micro (<1 MW)	Used in producing hydroelectric power with no gas emissions
841012	Hydraulic turbines, small (1-10 MW)	Used in producing hydroelectric power with no gas emissions
841090	Parts for hydraulic turbines	Parts used to repair and maintenance of hydraulic turbines
841181	Gas turbines, of a power < 5,000 kW	To generate electricity from biogas as a form of renewable energy
841182	Gas turbines, of a power > 5,000 kW	To generate electricity from biogas as form of renewable energy
841221	Hydraulic power engines and motors, cylinders	Used in producing hydroelectric power with no gas emissions
841229	Hydraulic power engines and motors, other	Used in producing hydroelectric power with no gas emissions
841581	Air conditioner with heat pump	Used in geothermal heat pump system to transfer heat available in water masses to either heat or cool building
841861	Heat pumps	To transfer heat available in water masses to either heat or cool buildings
841919	Solar water heater	Uses solar energy to heat water
841950	Heat exchange units	Use in relation with renewable energy such as geothermal energy
848340	Gears	Gearboxes for wind turbine to transform rotation of blades of wind turbines into speed required to produce electricity
848360	Clutches	Used for initial assembly, repair and maintenance of wind energy systems
850161	AC generators <75kVA	Used in conjunction with boiler and turbines to generate electricity in renewable energy plant
850162	AC generators 75 - 375kVA	Used in conjunction with boiler and turbines to generate electricity in renewable energy plant
850163	AC generators 375 - 750 kVA	Used in conjunction with boiler and turbines to generate electricity in renewable energy plant

Table A- 1 *Continued*

HS 2002	HS 6-digit Description	Additional Product Specification & Environmental Benefit
850164	AC generators 750kVA	Used in conjunction with boiler and turbines to generate electricity in renewable energy plant
850231	Wind-powered generation sets	Used in relation to generate electricity from renewable energy source
850300	Parts of motors, generators	For repair for wind powered generators
850440	Static converters	Can be used to convert DC into AC electricity from solar energy
850610	Primary cells and batteries (manganese dioxide)	Cells used hydrogen to produce electricity through an electrochemical process rather than combustion.
850630	Primary cells and batteries (mercuric oxide)	Cells used hydrogen to produce electricity through an electrochemical process rather than combustion.
850640	Primary cells and batteries (silver dioxide)	Cells used hydrogen to produce electricity through an electrochemical process rather than combustion.
850650	Primary cells and batteries (lithium)	Cells used hydrogen to produce electricity through an electrochemical process rather than combustion.
850660	Primary cells and batteries (air zinc)	Cells used hydrogen to produce electricity through an electrochemical process rather than combustion.
850680	Primary cells and batteries, other	Cells used hydrogen to produce electricity through an electrochemical process rather than combustion.
850690	Primary cells and batteries, parts	Cells used hydrogen to produce electricity through an electrochemical process rather than combustion.
850720	Lead acid accumulators	Used in controlling the function of a photovoltaic system
853931	Fluorescent, hot cathode lamps	Helps reduce carbon footprint
854140	PV semiconductor devices	Solar photovoltaic cells generate electricity with no carbon emissions
900190	Mirrors (for solar energy)	Used in solar panel to heat water from solar energy
900290	Glass mirrors (for solar energy)	Used in solar panel to heat water from solar energy
902830	Electricity meters	Used to measure electricity flow
Environmental Monitoring, Analysis and Assessment Equipment		
853710	Control boards, panels consoles, desks cabinets and other bases, equipped with 2 or more app, for a voltage not exceeding 10Q0V	Used in system producing electricity from renewable energy

Table A- 1 *Continued*

HS 2002	HS 6-digit Description	Additional Product Specification & Environmental Benefit
902780	Instruments and apparatus for physical or chemical analysis not elsewhere specified	These instruments include magnetic resonance instruments which are used in mass spectrometers to identify elements and compounds
902790	Microtomes; parts and accessories of instruments and appliances.	These instruments include microtomes which are devices that prepare slices of samples for analysis
903039	Other instruments and apparatus, for measuring or checking voltage, current, resistance or power, without a recording device.	These include single functions meters such as ammeter, voltmeter, ohmmeter which are also used to repair and maintenance of other equipments
903210	Thermostats	Controls efficiency of heating system
903220	Manostats	used to control pumps in applications such as waste water treatment
903289	Other control instruments	Parts used in repair
Waste Management, Recycling and Remediation		
392010	Plaits and similar products of plaiting materials, whether or not assembled into strips	Used in landfills to protection of soil and prevent methane from escaping
392290	Bath shower bath, sinks, water basins for waterless urinals, composting toilets, bidets, lavatory pans seats.	Waterless urinals and composting toilets minimize water use. Composting toilet also provide self contained sewage treatment on site with no need for sewer and treatment plants
560314	Nonwovens, weighing >150 g/m ²	Used in landfill draining mat t ensure efficient gas landfill drainage
701931	Mats	Used a soil cover to prevent soil erosion
701939	Other glass-fiber insulation products	Used to prevent heat loss as a means of efficient use of energy as well as reduce noise levels in buildings
730630	Other tubes, pipes and hollow profiles of iron or non-alloy steel	For delivery of safe drinking water and sanitation
730640	Other tubes, pipes and hollow profiles of stainless steel	For delivery of safe drinking water and sanitation
730650	Other tubes, pipes and hollow profiles of other alloy steel	For delivery of safe drinking water and sanitation

Table A- 1 *Continued*

HS 2002	HS 6-digit Description	Additional Product Specification & Environmental Benefit
730660	Other tubes, pipes and hollow profiles, non-circular cross-section	For delivery of safe drinking water and sanitation
730690	Other tubes, pipes and hollow profiles, other	For delivery of safe drinking water and sanitation
730900	Reservoirs and similar	
731029	Aluminum casks, drums, cans boxes and similar containers	Containers of any form for liquid or solid waste including municipal or dangerous waste
732690	Other articles of iron or steel: Other.	Used to filter water at the entrance to drains thereby facilitating the delivery of safe drinking water and sanitation
761100	Aluminum reservoirs, tanks	Containers for any material to be recycled for the production of biogas, waste water management, drinking water production and solar thermal energy
840219	Vapor generating boilers, other	Boilers for the production of heat and power when using biomass fuels
840290	Steam or other boilers, parts	Parts of biomass boilers
840410	Auxiliary plant for use with boiler	Components of industrial pollution control plant to reduce pollutants emissions in atmosphere
841940	Distilling or rectifying plant	Used in treating used water to recuperate and reuse of solvents such as used in printing and painting

Table A- 2 Generalized System of Preferences: Beneficiary ACPs

Beneficiary ACP countries	Preference giving countries															
	LDC status	Australia	Belarus	Canada	EU			Japan	New Zealand	Norway	Russia	Switzerland	Turkey	US		
					GSP	EBA	GSP+							GSP	AGOA	CBI
Angola	LDC		X	X	X	X		X	X	X	X	X	X	X	X	
Antigua and Barbuda				X	X			X	X		X	X	X			X
Barbados			X	X	X			X	X	X	X	X	X			X
Belize			X	X	X			X	X		X	X	X	X		X
Benin	LDC	X	X	X	X	X		X	X	X	X	X	X	X	X	
Botswana		X	X	X	X			X		X	X	X	X	X	X	
Burkina Faso	LDC	X	X	X	X	X		X	X		X	X	X	X	X	
Burundi	LDC	X	X	X	X	X		X	X		X	X	X	X	X	
Cameroon			X	X	X			X	X	X	X	X	X	X	X	
Cape Verde	LDC	X	X	X	X	X		X	X	X	X	X	X	X	X	
Central African Rep.	LDC	X	X	X	X	X		X	X		X	X	X	X	X	
Chad	LDC	X	X	X	X	X		X	X		X	X	X	X	X	

Table A- 2 Continued

Beneficiary ACP countries	Preference giving countries															
	LDC status	Australia	Belarus	Canada	EU			Japan	New Zealand	Norway	Russia	Switzerland	Turkey	US		
					GSP	EBA	GSP+							GSP	AGOA	CBI
Togo	LDC	X	X	X	X	X		X	X	X	X	X	X			
Tonga		X	X	X	X			X	X	X	X	X	X			
Trinidad&Tobago			X	X	X			X	X	X	X		X	X		X
Uganda	LDC	X	X	X	X	X		X	X	X	X	X	X	X	X	
Zambia	LDC	X	X	X	X	X		X	X	X	X	X	X	X	X	
Zimbabwe			X	X	X			X	X	X	X	X	X			

Source: UNCTAD, 2009

Table A- 3 Herfindahl-Hirschman Index of Concentration

	Exports	Imports		Exports	Imports
Angola	0.527	9.879	Jamaica	0.881	1.362
Antigua Barbuda	0.007	0.047	Kenya	5.005	3.247
Barbados	1.620	0.140	Madagascar	0.022	0.468
Belize	0.005	0.021	Malawi	0.005	0.149
Solomon Is	0.001	0.001	Mali	0.047	0.396
Burundi	0.000	0.026	Mauritania	0.005	0.107
Cameroon	0.147	0.454	Mauritius	14.899	1.497
Cape Verde	0.058	0.293	Mozambique	0.085	1.018
Central African Rep	0.000	0.006	Niger	0.034	0.121
Chad	0.000	0.137	Nigeria	9.214	89.265
Congo (ROC)	0.010	0.493	Papua New Guinea	0.011	0.525
Congo (DROC)	0.013	0.395	Rwanda	0.001	0.054
Cuba	6.565	20.310	St Kitts-Nevis	6.238	0.024
Benin	0.002	2.471	St Lucia Is	0.016	0.035
Dominica Is	0.016	0.003	St Vincent & Grenada	0.000	0.007
Dominican Rep	616.233	2.147	Senegal	0.790	4.319
Fiji	0.010	0.618	Sierra Leone	1.576	0.028
Djibouti	0.049	0.108	Zimbabwe	0.510	2.005
Gabon	0.266	1.597	Suriname	0.040	0.062
Gambia	0.000	0.023	Togo	0.089	0.581
Ghana	0.098	4.782	Tonga	0.000	0.001
Grenada Is	0.001	0.010	Trinidad & Tobago	3.558	2.903
Guinea	0.003	0.278	Uganda	0.812	1.084
Guyana	1.060	0.050	Tanzania	0.138	3.587
Haiti	0.008	0.030	Burkina Faso	0.014	0.169
Cote d`Ivoire	1.864	3.211	Zambia	0.032	6.507

Source: Authors' calculations based on BACII (CEPII)

Table A- 4 Revealed Comparative Advantage/Disadvantage for major EG exporters

	Barbados	Cuba	Dominican Republic	Cote d`Ivoire	Kenya
392010	-0.124	-0.552	-1.627	-0.298	0.026
392290	-0.053	-0.031	-0.014	-0.030	-0.008
560314	-0.008	-0.002	-0.152	-0.009	-0.015
701931	-0.006	-0.024	-0.009	-0.013	-0.012
701939	-0.004	-0.015	-0.011	-0.003	-0.006
730630	-0.056	-0.332	0.089	0.019	0.122
730640	-0.021	-0.049	-0.008	-0.031	-0.034
730650	-0.018	-0.027	-0.038	-0.010	-0.003
730660	-0.058	-0.082	0.069	0.164	0.147
730690	-0.451	-0.088	-0.013	-0.103	0.110
730820	-0.049	-0.085	-0.271	-0.077	-0.253
730900	0.044	-0.133	-0.096	-0.153	0.052
731029	4.233	-0.045	-0.036	-0.101	-0.122
732111	-0.355	-0.032	-0.914	-0.174	-0.127
732190	-0.012	-0.013	-0.036	-0.008	-0.002
732690	-0.127	-0.499	-0.411	-0.561	-0.267
761100	-0.004	-0.003	0.000	-0.008	0.003
840219	-0.005	-0.057	-0.046	-0.043	-0.038
840290	0.004	-0.388	-0.113	-0.044	-0.066
840410	-0.001	-0.368	-0.006	-0.002	-0.014
840682	0.000	0.001	-0.001	-0.005	0.000
840690	-0.024	0.072	-0.036	-0.051	-0.039
841011	-0.001	-0.003		0.000	-0.165
841012		0.000			-0.009
841090	0.000	-0.027	-0.038	-0.031	-0.027
841181	-0.010	-0.011	-0.001	-0.006	-0.092
841182	-0.509	-0.373		-0.005	-0.001
841221	-0.011	-0.012	-0.005	-0.004	-0.006
841229	0.005	0.030	-0.001	-0.015	-0.022
841581	-0.067	-0.138	-0.014	-0.005	-0.031
841861	-0.076	-0.109	-0.096	-0.106	-0.076
841919	0.114	-0.054	-0.010	-0.010	-0.053
841940	-0.011	-0.160	-0.006	-0.007	-0.100
841950	-0.005	-0.156	-0.056	-0.059	-0.017
848340	-0.041	-0.045	-0.049	-0.102	-0.123
848360	-0.021	-0.039	-0.019	-0.047	-0.051
850161	-0.002	0.107	-0.014	-0.010	-0.032
850162	-0.029	0.002	-0.001	-0.007	-0.029
850163	-0.013	-0.018	-0.006	-0.022	0.027
850164	-0.015	-0.207	-0.041	-0.004	-0.044
850231	-0.013	-0.073	-0.082	-0.105	-0.072
850300	0.021	-1.317	-0.249	-0.070	-0.259
850440	-0.047	-0.416	7.222	-0.623	-0.789

Table A- 4 *Continued*

	Mauritius	Nigeria	St Kitts & Nevis	Trinidad & Tobago	Uganda
392010	-0.288	-0.389	-0.048	-0.173	-0.225
392290	-0.087	-0.016	-0.029	-0.023	-0.098
560314	-0.019	-0.005	-0.003	-0.023	-0.005
701931	-0.018	-0.004	-0.013	-0.008	-0.009
701939	-0.011	-0.008	-0.017	-0.006	-0.005
730630	-0.127	-0.093	-0.023	-0.265	-0.046
730640	-0.072	-0.028	-0.001	-0.036	-0.019
730650	0.003	-0.008		-0.124	-0.010
730660	-0.022	-0.020	-0.015	-0.051	0.914
730690	0.525	-0.056	-0.210	-1.454	0.103
730820	-0.163	-1.318	-0.311	-0.318	-0.966
730900	-0.079	-0.295	-0.065	-0.088	-0.136
731029	-0.074	-0.029	-0.015	-0.190	-0.078
732111	-0.231	-0.113	-0.435	-0.199	-0.061
732190	-0.011	-0.016	-0.002	-0.094	-0.003
732690	-0.798	-0.409	-6.618	-1.107	-0.126
761100	-0.007	-0.002	-0.002	-0.002	-0.004
840219	-0.017	-0.055	-0.001	-0.018	-0.517
840290	-0.208	-0.113	-0.014	-0.046	-0.068
840410	-0.057	-0.004	-0.002	-0.003	-0.523
840682	-0.269	-0.024		0.003	-0.064
840690	-0.029	-0.037		-0.062	-0.089
841011	-0.004	-0.007			-0.004
841012	-0.001	-0.001		0.000	
841090	-0.035	-0.009		-0.003	-0.050
841181	-0.081	-0.252	-0.034	-0.005	0.001
841182	-0.031	-1.431		-0.125	
841221	-0.019	-0.012	-0.043	-0.017	0.000
841229	-0.038	-0.034	-0.004	-0.012	-0.018
841581	-0.098	-0.110	-0.109	-0.006	-0.030
841861	-0.035	-0.045	-0.015	0.000	-0.177
841919	-0.045	-0.010	-0.109	0.002	-0.041
841940	-0.048	-0.102		-0.709	-0.009
841950	-0.096	-0.109		-0.211	-0.020
848340	0.023	-0.093	-0.018	-0.108	-0.015
848360	-0.029	-0.030	-0.012	-0.033	-0.019
850161	-0.006	-0.286	-0.005	-0.011	-0.238
850162	-0.016	-0.063	-0.008	-0.010	-0.076
850163	-0.077	-0.010	-0.042	-0.007	-0.132
850164	-0.236	-0.291	-0.015	-0.108	-0.229
850231	-0.036	-0.637	-0.032	-0.054	-0.214
850300	-0.296	-0.302	53.108	-0.018	-0.402
850440	-0.409	-0.940	0.256	-0.200	-0.873

Table A- 4 *Continued*

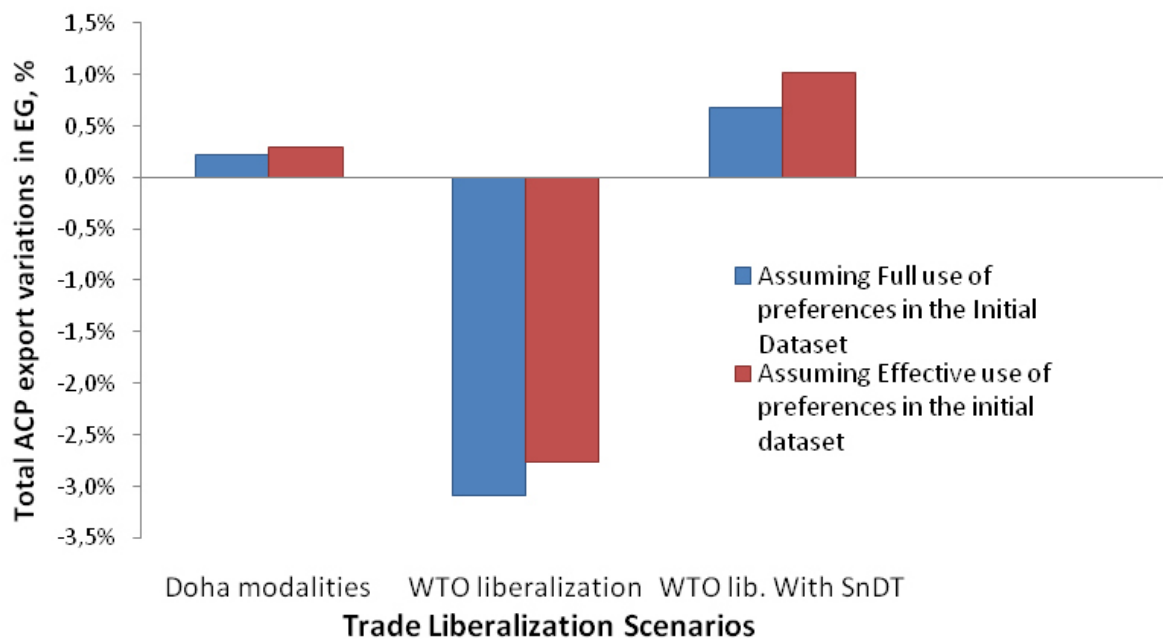
	Barbados	Cuba	Dominican Republic	Cote d`Ivoire	Kenya
850610	-0.008	-0.006	-0.091	-0.297	-0.010
850630	0.000	0.000		0.000	-0.001
850640	0.000	0.000	0.000	0.000	0.000
850650	-0.018	-0.067	0.000	-0.023	-0.040
850660	-0.017	-0.059	0.001	-0.027	-0.042
850680	-0.014	-0.062	0.001	-0.024	-0.023
850690	0.000	-0.004	0.000	-0.001	-0.255
850720	-0.142	-0.119	-0.707	-0.118	-0.018
853710	-0.076	-0.641	0.060	-0.367	-0.085
853931	-0.050	-4.269	-0.182	-0.076	-0.084
854140	-0.007	0.399	0.504	-0.030	-0.277
900190	0.197	-0.003	-0.003	-0.002	-0.001
900290	0.013	-0.007	-0.001	-0.002	-0.001
902780	0.110	-0.057	-0.015	-0.150	-0.064
902790	0.002	-0.053	-0.001	-0.037	-0.022
902830	0.209	-0.164	-0.130	-0.404	-0.143
903039	0.264	-0.077	0.028	-0.026	-0.032
903210	0.006	-0.092	-0.008	-0.015	-0.012
903220	-0.001	-0.010	-0.008	-0.008	-0.003
903289	-0.045	-0.097	-0.010	-0.139	-0.093

Table A- 4 Continued

	Mauritius	Nigeria	St Kitts & Nevis	Trinidad & Tobago	Uganda
850610	-0.087	-0.071	0.003	-0.008	-0.075
850630	-0.002	0.000	-0.001	0.000	-0.002
850640	0.000	-0.001		0.000	-0.005
850650	-0.064	-0.011	-0.006	-0.011	-0.402
850660	-0.076	-0.011	-0.005	-0.010	-0.431
850680	-0.054	-0.011	-0.006	-0.011	-0.403
850690	-0.005	-0.006	-0.001	-0.002	-0.010
850720	-0.039	-0.118	-0.037	0.056	-0.322
853710	-0.265	-0.558	13.627	-0.036	-0.355
853931	-0.082	-0.038	-0.228	-0.042	-0.051
854140	-0.005	-0.019	-0.003	-0.042	-0.420
900190	-0.161	-0.002		-0.009	-0.009
900290	-0.035	-0.001	0.000	-0.001	-0.001
902780	1.911	-0.064	-0.003	-0.096	-0.116
902790	0.482	-0.040		-0.024	-0.036
902830	-0.035	-0.124	-0.096	-0.001	-0.226
903039	-0.025	-0.014	1.293	-0.010	-0.033
903210	-0.026	-0.006	-0.006	-0.015	-0.008
903220	-0.005	-0.003	0.000	-0.001	-0.002
903289	-0.172	-0.218	0.100	-0.100	-0.159

Source: Authors' calculations based on BACII (CEPII)

Figure A- 1 The role of imperfect utilization rate of preferences in assessing trade liberalization



Source: Authors' simulations

Table A- 5 The impact of trade liberalization on ACP country exports

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO members	WTO liberalization with Special and Differential Treatment
	% change			
None ACP Countries	0.44%	0.43%	3.79%	1.82%
ACP Countries				
ACP (WTO member)	0.29%	8.67%	-2.76%	1.01%
Angola	0.36%	0.81%	2.96%	3.16%
Antigua & Barb.	-0.70%	-0.71%	-7.95%	-4.70%
Bahamas	-0.36%	-0.38%	-1.49%	-3.76%
Barbados	0.08%	0.07%	-5.58%	-0.50%
Belize	0.08%	0.08%	1.23%	0.62%
Benin	0.00%	39.17%	-6.31%	-0.07%
Botswana	0.17%	0.17%	-0.59%	-0.59%
Burkina Faso	0.14%	12.74%	-15.00%	0.25%
Burundi	0.00%	-1.27%	-32.15%	-4.57%
Cameroon	0.21%	-0.51%	-15.46%	1.37%
Cape Verde	0.01%	0.02%	0.20%	0.18%
Central Afr. Rep.	-0.62%	8.03%	2.08%	-0.04%
Chad	-0.38%	-0.38%	-2.54%	-2.68%
Comoros	0.01%	0.01%	-0.85%	-1.12%
Congo	0.02%	1.83%	-7.69%	-0.01%
Congo DPR	-0.09%	13.12%	0.21%	-1.16%
Cook islands	-0.02%	-0.02%	5.66%	5.42%
Côte D'Ivoire	0.92%	39.32%	-10.79%	1.12%
Cuba	-0.70%	11.25%	3.03%	-1.95%
Djibouti	0.00%	0.12%	-1.92%	-0.28%
Dominica	0.52%	1.82%	1.94%	2.12%
Dominican Rep.	0.14%	0.68%	1.71%	1.30%
East Timor	0.46%	0.34%	0.47%	-0.43%
Equatorial guinea	0.12%	0.02%	3.78%	4.63%
Eritrea	-0.38%	-0.38%	-2.92%	-3.24%
Ethiopia	-0.10%	-0.11%	0.22%	-0.61%
Fiji	0.07%	4.19%	-3.58%	-4.04%
Gabon	0.11%	22.35%	2.05%	0.84%
Gambia	1.44%	1.72%	0.64%	0.47%
Ghana	0.63%	20.83%	3.98%	1.42%
Grenada	0.05%	1.11%	-18.83%	0.10%
Guinea	0.73%	14.31%	6.70%	1.93%
Guyana	0.11%	0.05%	-3.07%	0.20%
Haiti	-0.08%	2.84%	-4.14%	-2.27%
Jamaica	2.03%	3.25%	5.92%	3.76%
Kenya	0.01%	16.18%	-21.53%	0.56%
Kiribati	2.72%	2.72%	10.67%	10.67%

Table A- 5 *Continued*

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO members	WTO liberalization with Special and Differential Treatment
	USD thousands			
None ACP Countries	447,752	434,459	3,824,183	1,834,859
ACP Countries				
ACP (WTO member)	796	24,136	-7,670	2,812
Angola	21	46	167	178
Antigua & Barb.	-4	-4	-49	-29
Bahamas	-5	-5	-19	-49
Barbados	6	5	-407	-36
Belize	1	1	8	4
Benin	0	76	-12	0
Botswana	1	1	-2	-2
Burkina Faso	1	99	-117	2
Burundi	0	0	-1	0
Cameroon	6	-14	-438	39
Cape Verde	0	0	4	3
Central Afr. Rep.	-1	11	3	0
Chad	0	0	-2	-2
Comoros	0	0	0	0
Congo	0	21	-87	0
Congo DPR	-1	91	1	-8
Cook islands	0	0	25	24
Côte D'Ivoire	96	4,113	-1,128	117
Cuba	-100	1,599	431	-278
Djibouti	0	1	-14	-2
Dominica	4	12	13	14
Dominican Rep.	167	782	1,983	1,508
East Timor	0	0	0	0
Equatorial guinea	2	0	68	83
Eritrea	0	0	-4	-4
Ethiopia	0	0	1	-3
Fiji	0	30	-26	-29
Gabon	3	724	66	27
Gambia	2	2	1	1
Ghana	11	351	67	24
Grenada	0	1	-13	0
Guinea	4	71	33	10
Guyana	1	0	-26	2
Haiti	0	16	-23	-12
Jamaica	122	195	356	226
Kenya	1	2,812	-3,743	97
Kiribati	5	5	20	20

Table A- 5 Continued

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO members	WTO liberalization with Special and Differential Treatment
	% change			
Lesotho	0.00%	0.00%	-8.16%	-8.16%
Liberia	0.01%	-0.06%	2.21%	1.30%
Madagascar	0.26%	2.57%	1.16%	0.99%
Malawi	1.26%	17.82%	-8.26%	3.53%
Mali	-0.91%	6.33%	-8.94%	-6.97%
Marshall Islands	-0.01%	-0.01%	6.18%	6.16%
Mauritania	0.57%	4.88%	4.68%	1.78%
Mauritius	0.08%	29.34%	0.94%	0.85%
Micronesia	-0.14%	-0.14%	5.55%	4.06%
Mozambique	-1.79%	18.70%	-8.10%	-5.60%
Namibia	-0.67%	-0.67%	-5.62%	-5.62%
Nauru	-0.01%	-0.01%	0.28%	0.16%
Niger	6.00%	25.92%	13.94%	10.94%
Nigeria	2.25%	5.71%	6.93%	6.28%
Niue	1.13%	1.13%	4.93%	4.86%
Palau	0.00%	0.00%	-0.05%	0.00%
Papua New Guin.	-0.21%	-0.21%	-3.66%	-3.68%
Rwanda	-0.07%	0.62%	-14.86%	0.36%
Saint Kitts & Nev.	0.09%	0.09%	-4.04%	-4.24%
Saint Lucia	0.43%	-0.08%	-7.07%	5.12%
Saint Vincent	1.31%	1.07%	-9.90%	3.53%
Samoa	-0.09%	-0.09%	4.35%	0.05%
Sao Tome & Princ	0.73%	0.73%	2.04%	1.72%
Senegal	0.28%	30.69%	-2.79%	1.19%
Seychelles	-0.60%	-0.60%	-5.42%	-5.48%
Sierra Leone	1.65%	2.39%	6.83%	6.12%
Solomon Islands	0.01%	0.01%	2.53%	0.33%
Somalia	0.00%	0.00%	3.94%	0.46%
South Africa	0.16%	-0.34%	4.90%	1.35%
Sudan	-0.05%	-0.05%	-0.83%	-1.05%
Suriname	0.11%	0.72%	0.62%	0.37%
Swaziland	0.01%	0.01%	-0.53%	-0.53%
Tanzania	-0.03%	55.12%	-6.21%	-0.82%
Togo	0.00%	39.89%	-8.82%	0.08%
Tonga	-0.40%	-0.40%	-3.41%	-4.25%
Trinidad & Tob.	-0.11%	0.11%	-33.73%	-1.32%
Tuvalu	0.00%	0.00%	-1.23%	-1.23%
Uganda	0.06%	14.37%	-4.43%	0.20%
Vanuatu	-2.66%	-2.66%	-8.91%	-8.91%
Zambia	-0.22%	18.48%	-9.41%	-5.32%
Zimbabwe	-0.47%	1.14%	-35.01%	-1.71%

Table A- 5 *Continued*

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO members	WTO liberalization with Special and Differential Treatment
	USD thousands			
Lesotho	0	0	0	0
Liberia	0	0	7	4
Madagascar	1	14	6	5
Malawi	6	90	-42	18
Mali	-11	78	-110	-86
Marshall Islands	0	0	185	184
Mauritania	4	33	32	12
Mauritius	18	6,196	199	180
Micronesia	0	0	2	2
Mozambique	-20	213	-92	-64
Namibia	-1	-1	-6	-6
Nauru	0	0	2	1
Niger	59	253	136	107
Nigeria	399	1,012	1,227	1,111
Niue	2	2	9	8
Palau	0	0	0	0
Papua New Guin.	-2	-2	-38	-38
Rwanda	0	1	-34	1
Saint Kitts & Nev.	2	2	-88	-93
Saint Lucia	4	-1	-67	49
Saint Vincent	2	1	-13	5
Samoa	0	0	4	0
Sao Tome & Princ	3	3	8	7
Senegal	15	1,605	-146	62
Seychelles	-6	-6	-53	-54
Sierra Leone	11	17	47	43
Solomon Islands	0	0	1	0
Somalia	0	0	4	0
South Africa	982	-2,138	30,762	8,463
Sudan	-1	-1	-11	-14
Suriname	2	10	8	5
Swaziland	0	0	-2	-2
Tanzania	-1	1,667	-188	-25
Togo	0	631	-140	1
Tonga	0	0	-1	-1
Trinidad & Tob.	-12	12	-3,690	-144
Tuvalu	0	0	0	0
Uganda	3	773	-238	11
Vanuatu	-1	-1	-3	-3
Zambia	-5	451	-230	-130
Zimbabwe	-17	41	-1,248	-61

Table A- 6 The impact of trade liberalization on ACP country exports by EGs

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO members	WTO liberalization with Special and Differential Treatment
	% change			
392010	0.04%	11.65%	-18.97%	-1.56%
392290	-0.23%	19.70%	-26.19%	-0.49%
560314	5.00%	11.36%	7.73%	15.90%
701931	0.00%	13.37%	-5.13%	0.15%
701939	0.24%	5.71%	-6.14%	-0.30%
730630	-0.01%	21.09%	-8.59%	-0.26%
730640	-0.06%	39.44%	-12.06%	-0.72%
730650	-1.77%	20.75%	-25.50%	-4.97%
730660	-0.03%	21.77%	-8.55%	-0.11%
730690	-0.16%	79.37%	-16.39%	-0.40%
730820	3.53%	18.49%	2.22%	10.28%
730900	-0.05%	12.42%	-19.80%	-0.81%
731029	-0.05%	6.10%	-6.66%	-0.16%
732111	0.00%	17.66%	-55.25%	-0.11%
732190	-0.63%	12.27%	-2.85%	-2.27%
732690	1.53%	23.00%	1.24%	3.77%
761100	0.14%	4.28%	-16.73%	-0.28%
840219	0.11%	0.42%	-5.94%	0.48%
840290	0.09%	0.14%	-2.92%	0.96%
840410	0.19%	0.27%	-1.27%	-1.16%
840682	-0.10%	0.00%	-0.38%	-0.39%
840690	1.06%	1.49%	1.36%	0.25%
841011	0.00%	0.81%	0.09%	0.00%
841012	0.08%	0.08%	0.85%	0.68%
841090	0.01%	1.99%	-0.19%	0.13%
841181	0.25%	0.25%	3.13%	3.13%
841182	0.00%	0.00%	-1.20%	-1.20%
841221	0.05%	1.53%	-0.18%	0.74%
841229	0.17%	4.22%	0.82%	0.29%
841581	0.02%	30.75%	-13.19%	-0.41%
841861	-1.03%	-0.57%	-12.18%	-3.02%
841919	0.03%	5.18%	-25.51%	0.09%
841940	0.00%	0.00%	-0.25%	-0.88%
841950	0.03%	0.27%	0.85%	0.20%
848340	0.12%	0.72%	-4.54%	-0.86%
848360	0.25%	12.31%	-3.27%	3.36%
850161	0.00%	3.75%	-0.83%	-1.56%
850162	0.04%	2.99%	-1.22%	0.37%
850163	0.13%	0.25%	-2.26%	0.26%
850164	0.01%	1.45%	-1.31%	0.06%

Table A- 6 *Continued*

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO members	WTO liberalization with Special and Differential Treatment
	USD thousands			
392010	1	440	-717	-59
392290	-2	160	-213	-4
560314	2	6	4	8
701931	0	24	-9	0
701939	0	6	-7	0
730630	-1	1,561	-636	-19
730640	0	160	-49	-3
730650	-17	204	-251	-49
730660	-3	2,419	-950	-12
730690	-14	7,038	-1,453	-35
730820	371	1,941	233	1,080
730900	-2	484	-771	-31
731029	-5	535	-583	-14
732111	0	295	-923	-2
732190	-3	52	-12	-10
732690	208	3,132	169	514
761100	0	7	-28	0
840219	1	2	-28	2
840290	1	2	-32	11
840410	0	0	-1	-1
840682	0	0	-2	-2
840690	35	49	44	8
841011	0	0	0	0
841012	0	0	0	0
841090	0	9	-1	1
841181	8	8	96	96
841182	0	0	-126	-126
841221	1	26	-3	13
841229	2	59	12	4
841581	0	106	-46	-1
841861	-7	-4	-81	-20
841919	0	38	-188	1
841940	0	0	-2	-8
841950	0	2	7	2
848340	5	30	-188	-35
848360	1	66	-18	18
850161	0	75	-16	-31
850162	0	21	-8	3
850163	1	2	-22	3
850164	0	32	-29	1

Table A- 6 *Continued*

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO members	WTO liberalization with Special and Differential Treatment
	% change			
850231	0.00%	26.41%	-23.88%	0.16%
850300	1.30%	2.85%	2.14%	2.52%
850440	0.11%	0.27%	1.83%	1.07%
850610	1.98%	45.47%	-23.71%	3.10%
850630	0.96%	103.19%	8.68%	1.49%
850640	0.00%	22.13%	1.75%	0.00%
850650	0.20%	14.51%	-2.07%	1.05%
850660	0.00%	45.09%	-7.66%	0.09%
850680	1.03%	31.04%	-12.09%	2.56%
850690	0.03%	30.52%	-7.14%	0.01%
850720	-0.12%	5.62%	-58.28%	-0.43%
853710	0.09%	1.31%	-5.49%	1.09%
853931	-1.38%	36.65%	12.40%	0.01%
854140	0.00%	1.44%	-2.82%	-1.02%
900190	0.03%	0.03%	7.63%	1.31%
900290	0.23%	3.43%	-0.79%	-1.54%
902780	0.00%	1.79%	0.81%	0.18%
902790	0.40%	0.59%	1.72%	1.39%
902830	0.00%	62.58%	7.01%	0.28%
903039	0.02%	2.88%	0.34%	0.67%
903210	0.66%	4.62%	5.70%	4.89%
903220	0.24%	0.24%	-0.01%	-0.14%
903289	0.20%	0.78%	1.79%	1.54%

Table A- 6 *Continued*

	Doha Modalities	Full Liberalization within ACPs	Full Liberalization among WTO members	WTO liberalization with Special and Differential Treatment
	USD thousands			
850231	0	56	-51	0
850300	89	195	147	173
850440	106	268	1,800	1,059
850610	34	769	-401	53
850630	0	6	0	0
850640	0	4	0	0
850650	1	66	-9	5
850660	0	12	-2	0
850680	11	327	-127	27
850690	0	208	-49	0
850720	-4	210	-2,180	-16
853710	10	154	-647	128
853931	-67	1,777	601	0
854140	0	176	-345	-124
900190	0	0	62	11
900290	0	7	-2	-3
902780	0	228	102	23
902790	16	24	69	56
902830	0	539	60	2
903039	1	63	7	15
903210	2	17	21	18
903220	0	0	0	0
903289	11	42	97	84

Source: simulation results

Table A- 7 The impact of trade liberalization on tariff revenue. Annual changes in thousands USD.

	Full Liberalization Among WTO members	Full Liberalization within ACPs
ACP Countries	-174,795.9	-6,329.7
Angola	-9,280.9	-278.3
Antigua and Barbuda	-901.9	-28.0
Barbados	-2,215.6	-0.5
Belize	-759.9	-17.0
Solomon islands	-204.2	-4.7
Burundi	-612.0	-45.7
Cameroon	-3,161.7	-93.4
Central Afr. Republic	-300.1	-25.4
Chad	-1,008.3	-43.3
Congo	-3,510.7	-138.8
Congo DPR	-2,173.8	-384.5
Cuba	-19,713.0	-87.3
Benin	-3,487.7	-158.9
Dominica	-307.4	-23.7
Dominican Republic	-7,471.2	-0.2
Djibouti	-4,155.5	0.0
Gabon	-4,355.9	-256.5
Ghana	-11,019.5	-440.5
Grenada	-470.1	-26.7
Guyana	-863.3	-76.8
Côte d'Ivoire	-6,521.6	-151.5
Jamaica	-5,461.7	-473.0

Table A- 7 *Continued*

	Full Liberalization Among WTO members	Full Liberalization within ACPs
Kenya	-5,299.3	-19.7
Madagascar	-2,457.7	-0.7
Malawi	-2,039.3	-98.6
Mali	-2,149.0	-611.2
Mauritania	-1,569.8	-111.4
Mauritius	-1,438.4	0.0
Mozambique	-2,977.9	-55.3
Niger	-1,192.6	-101.3
Nigeria	-25,824.7	-887.1
Papua New Guinea	-778.6	-0.6
Rwanda	-1,666.2	-349.5
Saint Kitts and Nevis	-949.7	-25.9
Saint Lucia	-628.8	-66.6
Saint Vincent	-463.8	-35.8
Senegal	-5,752.5	-251.7
Zimbabwe	-4,828.8	-25.3
Suriname	-1,051.5	-61.6
Togo	-3,596.7	-96.4
Trinidad and Tobago	-4,464.6	-0.3
Uganda	-4,832.2	-160.3
Tanzania	-4,315.8	-571.8
Burkina Faso	-1,020.7	-41.6
Zambia	-7,541.1	-2.1

Source: simulation results

Note: Other scenarios do not involve applied tariff reduction for ACP countries

APPENDIX B

Table B- 1 Number of non tariff barriers by product/type of NTB

Type of non-tariff barriers				Type of non-tariff barriers			
	Quantity	Technical	Total		Quantity	Technical	Total
392010	1	4	5	841940	3	7	10
392290	2	3	5	841950	4	8	12
560314	1		1	848340	3	3	6
701931		1	1	848360	3	2	5
701939		1	1	850161	3	12	15
730630		4	4	850162	3	12	15
730640		4	4	850163	3	12	15
730650		4	4	850164	3	12	15
730660		4	4	850231	3	8	11
730690		4	4	850300	3	7	10
730820		2	2	850440	3	13	16
730900	3	5	8	850610	4	10	14
731029	2	6	8	850630	4	10	14
732111	2	13	15	850640	4	10	14
732190		5	5	850650	4	10	14
732690	1	5	6	850660	4	9	13
761100	1	5	6	850680	4	9	13
840219	6	8	14	850690	3	11	14
840290	6	5	11	850720	3	10	13
840410	5	3	8	853710	3	10	13
840682	3	3	6	853931	4	15	19
840690	3	2	5	854140	3	9	12
841011	3	3	6	900190	1	2	3
841012	3	3	6	900290		2	2
841090	3	2	5	902780		6	6
841181	3	3	6	902790		4	4
841182	3	3	6	902830		5	5
841221	3	4	7	903039		4	4
841229	3	4	7	903210		3	3
841581	6	10	16	903220		4	4
841861	6	10	16	903289		2	2
841919	5	8	13	Total	149	382	531

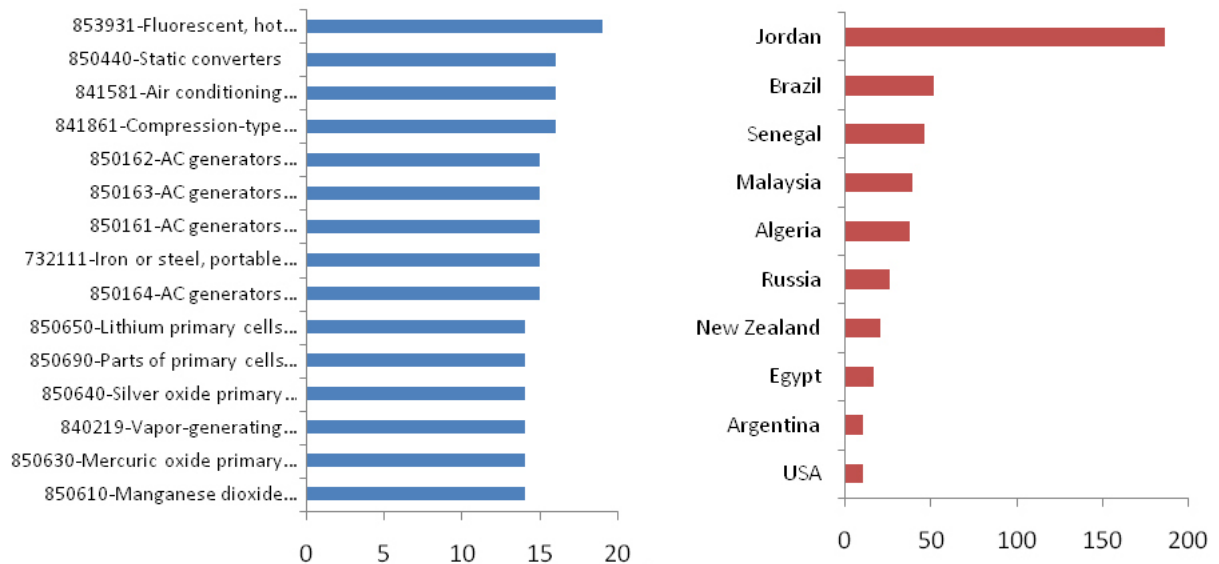
Source: TRAINS/WITS database

Table B- 2 Number of NTBs by importer/type of NTB

Type of non-tariff barriers				Type of non-tariff barriers			
	Quantity	Technical	Total		Quantity	Technical	Total
Algeria		37	37	Mexico	2	4	6
Argentina	3	7	10	New Zealand	4	16	20
Australia		7	7	Pakistan	2		2
Bahrain	2		2	Papua New Guinea	6		6
Bangladesh	3		3	Paraguay		2	2
Belarus		8	8	Peru		3	3
Brazil	5	46	51	Romania	5		5
Canada		3	3	Russia		26	26
Chile		1	1	Senegal		46	46
Colombia	1		1	Singapore		2	2
Cuba	2		2	Taiwan		4	4
Egypt		16	16	Tunisia		9	9
Guatemala	2		2	Ukraine		9	9
Jordan	111	75	186	USA		10	10
Latvia		7	7	Venezuela	1		1
Malaysia		39	39	Total	149	382	531
Mauritius		5	5				

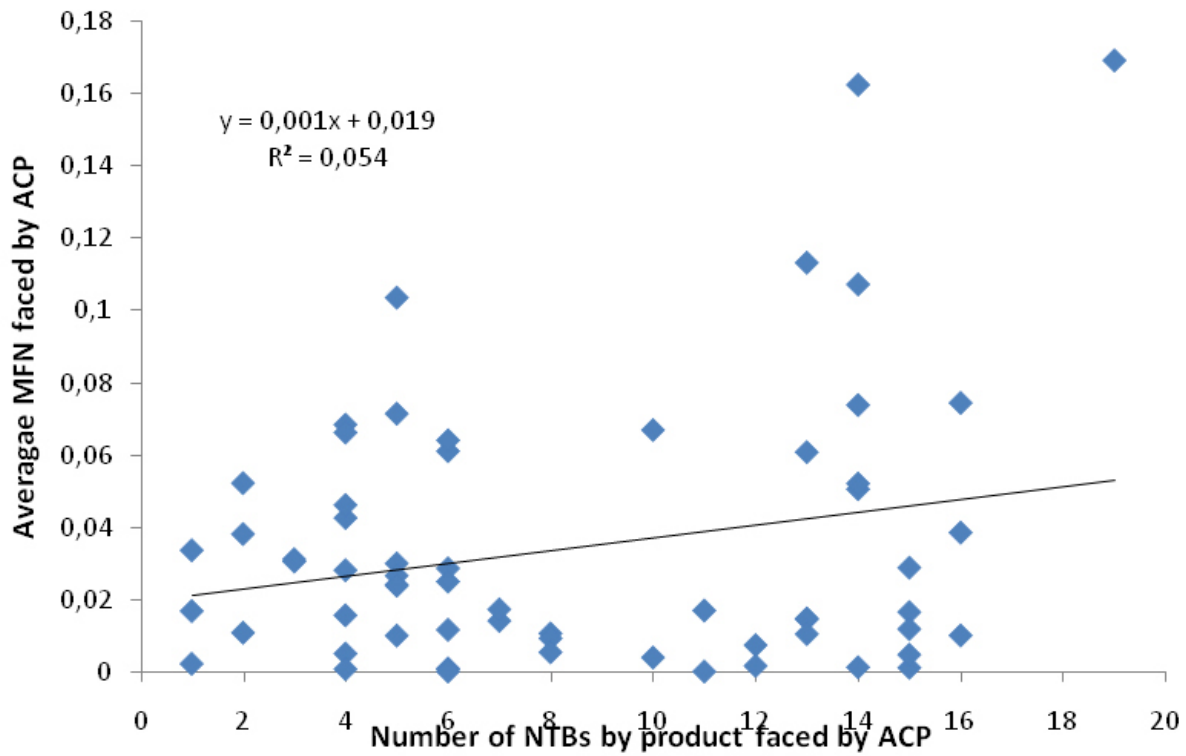
Source: TRAINS/WITS database

Figure B- 1 Number of NTBs: top 10 EGs and reporters



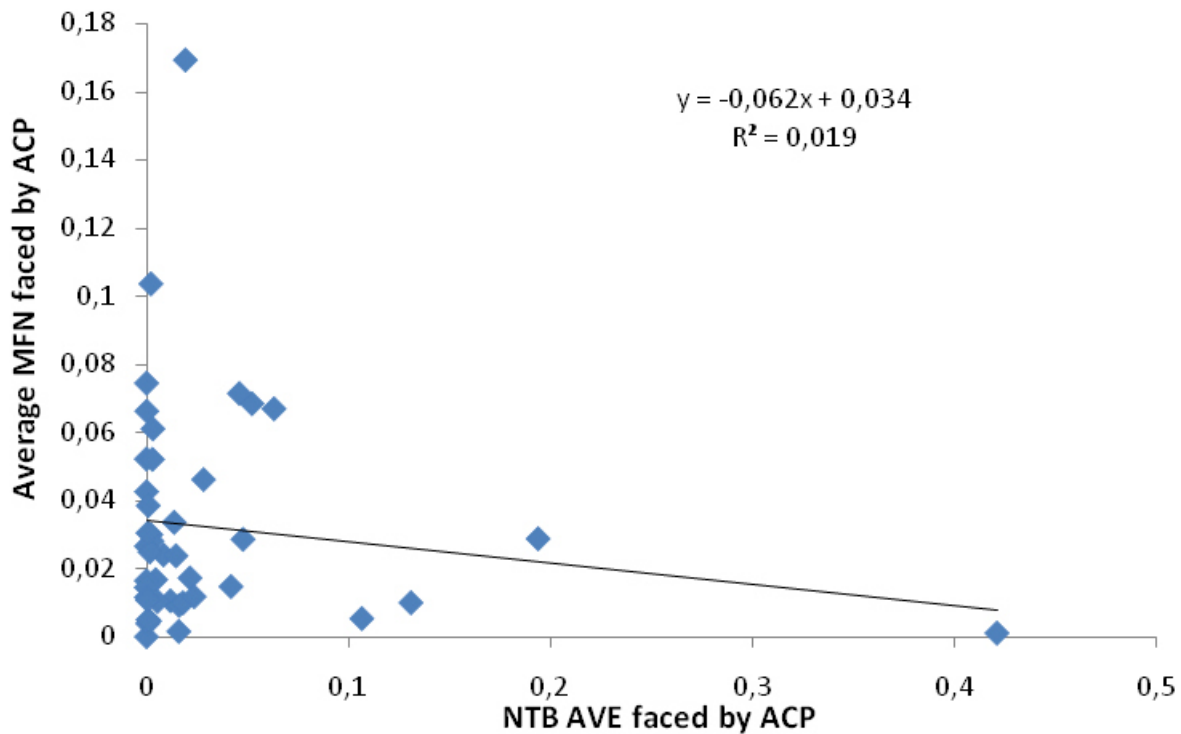
Source: Authors' calculations based on TRAD (IFPRI)

Figure B- 2 Correlation between MFN rate and number of NTBs by product



Source: Authors' calculations based on TRAD (IFPRI) and TRAINS/WITS database

Figure B- 3 Correlation between MFN rate and number of NTB AVEs by product



Source: Authors' calculations based on TRAD (IFPRI) and Kee, Nicita and Olarreaga (2005)

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