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Which trade integration scheme can best help SSA develop and export more processed agricultural goods? [†, ‡, §]

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Abstract

Trade integration of Sub-Saharan African (SSA) countries agriculture is pointed out as a powerful driver of agricultural growth, especially if it increases processing of agricultural products. But there is no consensus on which negotiations for increased trade integration to put first. Static effects of regional and multilateral tariff reduction shocks are simulated with the MIRAGE CGE model in order to compare them and test their coherence with the objective of enhanced value-added in agriculture. A new method is tested to treat existing data issues in the GTAP7 database that usually lead to overestimations of gains from some trade integration. Those new results reveals that even if at the world level a combination of DFQF and DDA brings the highest GDP and real income growth, for SSA an ambitious regional integration delivers as much as multilateral integration. Multilateral and regional integration differ on the pattern of agricultural growth they bring: multilateral liberalization, especially DFQF, would drive SSA countries further away from agricultural led industrialization. The increased competition leads to a reorientation of the structure of production and exports of SSA towards raw agricultural products. On the contrary, regional integration fosters the production and trade of processed agricultural products, and thus might be more in line with the stakes of economic development. Nevertheless, from a political economy perspective, identity of the gainers and losers should be considered as regional integration leads to consequent tariff revenue losses for many SSA countries. Compensation of those revenue losses could help further negotiate regional integration.

Keywords: Trade policy, multilateral negotiations, competitiveness, agriculture, computable general equilibrium, trade preferences, sub-Saharan Africa

JEL codes: C68, O13, O24, O55, Q17

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. Introduction

Growth of the agricultural sector is an important issue for sub-Saharan African countries[5] (De Janvry and Sadoulet 2010) since it is still a major source of employment (FAO 2010), and an essential part of foreign exchange earnings for many governments (WDI and GDF 2010[6]). The fact that agricultural growth through its many linkages with the other sectors could be a stimulus to the overall growth of sub-Saharan African economies is now largely documented (Delgado et al. 1994, Cervantes-Godoy and Dewbre 2010). The need to capture those linkages when studying opportunities for increased economic growth in those countries justifies the use of computable general equilibrium models.

1.1. The research question

The research question of this paper stems from a recurrent political recommendation of previous research that increased market integration of smallholder farmers could be a potential powerful driver of economic growth (World Bank 2008). Looking at that issue from a country level perspective, we focus on the scope to decrease the barriers to market access of sub-Saharan African countries.

At the regional level, despite the existing economic integration processes there is a historically low level of regional trade and a high level of protection on regional trade among sub-Saharan African countries compared to other regions of the world (UNECA 2010).

[5] "Sub-Saharan Africa" refers here to all the countries in the African continent below the Sahara, as opposed to Northern Africa. SSA is composed of Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Saint Helena, Sierra Leone, Togo Nigeria, Senegal, Ethiopia, Madagascar, Malawi, Mauritius, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe, Botswana, South Africa, Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon, Sao Tome and Principe, Angola, Democratic Republic of Congo, Burundi, Comoros, Djibouti, Eritrea, Kenya, Rwanda, Seychelles, Somalia, Sudan, Lesotho, Namibia, Swaziland. Note that Reunion is not assumed to be part of SSA in this analysis but is included in some of the database used.

[6] Data from the World Bank's World Development Indicators and Global Development Finance databases.

Sub-Saharan African exports to the world are characterized by their concentration on primary or raw agricultural products (FAOstat). In terms of tariff, even though African countries' access to the EU market is fairly good (EU is the main trading partner), high tariff barriers still apply tariff escalation on processed goods on processed goods is recurrent to all other destinations (own calculation with MAcMapHS6-2.1). Sub-Saharan Africa has been increasingly marginalized in global trade (Bora et al. 2007) which is sometimes thought to be consistent with the poor economic performance of the region as a whole compared to other developing regions (Rodrik 1998, Bouët and Roy 2008) but also a consequence of the erosion of historical market share by the displacement by similar goods from competing countries (Ng and Yeats 2000) mostly because of lack of competitive gains in traditional exports (Ng and Yeats 2002).

The main assumption of this study is that the pattern of agricultural exports matters for development. Historically, researchers have looked at the composition of agricultural exports by distinguishing traditional agricultural export crops (generally coffee, cocoa, cotton, tea and tobacco) as opposed to non-traditional exports which are very diversely defined, and food stuff (composed of cereals and livestock) mainly for the domestic and regional markets. One of the main global general equilibrium studies focusing on the agricultural growth potential of sub-Saharan Africa is Diao et al. (2003). By looking at the impact of different productivity growth they suggest that demand need not constrain rapid agricultural growth, particularly for non-traditional exports but that simultaneous productivity growth in grains and livestock offer more potential for major impacts on poverty and food consumption. However this studies does not look at the impact of changes in tariff barriers.

The originality of our approach is that it distinguishes agricultural commodities according to whether they are sold raw or processed. Indeed further specialization in the production of raw agricultural products is often pointed out as a risk for sustainable development (IAASTD 2008) while it is rather recommended that sub-Saharan African countries strengthen the linkages between industry and agriculture through enhanced value-added in agriculture (Reardon and Timmer 2005). Sub-Saharan Africa is the region of the world which is processing the least part of its agriculture production with less than 50% in 2004, while more than 70% of its agriculture imports are processed (calculations from the GTAP7

database), as compared to 80% of developed countries agricultural imports that are processed. Thus, there is scope for sub-Saharan Africa to increase the processing of its agricultural production for exports both to the regional and international markets.

In the end, we will compare the economic impacts of different trade integration schemes and study to what extent they might lead to different level of processing of the agricultural goods.

1.2. Comparing different level of market integration

Beyond domestic market integration within each country which seems consensual, there is no consensus at the international level on whether market integration at the regional or multilateral level should be the priority for sub-Saharan African countries.

Indeed recent literature review (Harrison 2010) shows that theory alone cannot predict the detailed impacts of trade liberalization, and thus the answer to our research question is empirical. Since the overall outcome of a trade policy reform on a given country depends on the relative impacts on its competitors as was shown by Low (2005) and Carrere and De Melo (2010), empirical trade policy analysis at a global level is the only way to compare different trade integration level. Global general and partial equilibrium models are useful to study the long term perspectives of trade agreements and specifically identify and quantify the opportunities that might arise, and some of the difficulties that might be faced.

Numerous simulations of the impacts of agricultural trade liberalization on sub-Saharan African countries have been produced in the past, but Bouët (2008) has shown that the results of those studies are hardly comparable since simulations differ widely by the data, behavioral parameters, or theoretical features of the models they use. Furthermore most simulations focus on one precise trade agreement, assessing the impacts of slight variations of the terms of that agreement, neither comparing several agreements nor studying their interactions. Notable exceptions are Fontagné et al. (2008) who test the interaction effect of the Economic Partnership Agreement (EPA) with regional integration, Keck and Piermartini (2006) and Bouët et al. (2008) who compare EPA with multilateral liberalization, and Kowalski and Shepherd (2006) who compare North-South to South-South multilateral integration. Those studies highlight the fact that different level of trade integration have very

different impacts, and that interaction effects of simultaneous integration are important to take into account.

It is indeed by taking into account the impacts of preferential agreements, that several studies, such as Bouët et al. (2006) have highlighted the fact that some countries being currently granted high preferential margins, such as sub-Saharan African countries, might experience an erosion of those preferences and terms of trade loss with increased competition on their exports, especially with multilateral liberalization. The recognition that some least developed countries are likely to lose from multilateral liberalization and should be compensated with extra-market access led to the proposal of a Duty Free Quota Free (DFQF) provision that, to our knowledge, has not yet been simulated in interaction with multilateral liberalization. Considering the high political stakes behind this proposal, it seems essential to deliver quantitative results to fuel the debate.

Hence at the multilateral level reciprocal liberalization in the form of the Doha Development Agenda as negotiated at the WTO, a preferential DFQF are simulated and their interactions tested. The impacts of those different types of multilateral integration with those of different level of regional integration within sub-Saharan Africa are compared. Furthermore sensitivity of those results to two possible outcomes of the current EPA negotiations is tested: either that bilateral EPA between the EU and each ACP country is signed or, what is already underway, that each ACP country is transferred to the European preferential system corresponding to its level of development (Everything but arms –EBA- for least developed countries –LDC- and Generalized System of Preferences –GSP- for non LDC.)

1.3. Analyzing detailed regional and sectoral changes

The Sub-Saharan African region is very heterogeneous in terms of the stakes linked with agricultural trade (Ng and Aksoy 2008) which requires to study as much as possible the distributive impacts at the country level within sub-Saharan Africa. Indeed, some countries are major exporters of raw tropical products at the global level (Ivory Coast for cocoa, Madagascar for vanilla, Malawi for tobacco, etc.) while others, mostly natural resources rich countries, hardly export any agricultural goods (Angola, Congo, Equatorial Guinea, Gabon, Nigeria). As for imports, most low-income sub-Saharan African countries tend to be net food importers (even when agricultural exporter) sometimes also highly dependent on food

aid, but some are self sufficient or even net exporters of food commodities (WDI 2010). The sub-Saharan African region is also diverse in terms of level of development. As a consequence they are offered different possibilities and required different commitments in current trade negotiations. Indeed sub-Saharan Africa is mostly composed of LDCs which are exempted from commitments at the multilateral level. But the regional level includes both LDCs and non LDCs developing countries.

It is now widely acknowledged that trade liberalization invariably produces contrasted impacts across sectors and countries (Winters et al. 2004). Considering the fact that overall sub-Saharan Africa is experiencing an increasing food balance deficit and it is still the first region in the world affected by food insecurity and poverty (FAO, 2010), it seems crucial to assess those impacts. They can only be identified through a high degree of sectoral and regional disaggregation and a detailed analysis of the results.

Despite the many simulations of liberalization scenarios produced in the past, most global equilibrium studies fail to assess the impacts at the country level in sub-Saharan Africa because only 13 of the 52[7] countries of sub-Saharan Africa appear individually in the GTAP 7 database (Global Trade Analysis Project of the Purdue University, which is the most used database for trade policy analysis), and the rest are included in 5 regions grouping highly heterogeneous countries. The mapping of our study focusing on sub-Saharan Africa is described in Annex 2. Furthermore, as shown in Annex 3, the agricultural sectors of specific importance for sub-Saharan Africa, other than grains, are not detailed in the GTAP database : roots and tubers are not separated and traditional exports crops such as coffee, cocoa, cotton, tea and tobacco are aggregated into the "exportable other crops" sector. Moreover, most global CGE models have one representative agent and do not permit the analysis of distributional household impacts.

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[7] Individual countries are Nigeria, Senegal, Ethiopia, Madagascar, Malawi, Mauritius, Mozambique, Tanzania, Uganda, Zambia, Zimbabwe, Bostwana, South Africa

Regions are Rest of Western Africa (Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Saint Helena, Sierra Leone, Togo), Rest of Central Africa (Cameroon, Centrak African Republic, Chad, Congo, Equatorial Guinea, Gabon, Sao Tome and Principe), Rest of South Central Africa (Angola, Democratic Republic of Congo), Rest of Eastern Africa (Burundi, Comoros, Djibouti, Eritrea, Kenya, Mayotte, Reunion, Rwnada, Seychelles, Somalia, Sudan), and Rest of South African Customs Union (Lesotho, Namibia, Swaziland).

There are several ways that studies address these issues and bring further their analysis, either by using alternative databases (Nuetah et al. (2010) use the UNCTAD Agricultural Trade Policy Simulation Model, ATPSM[8], which is a partial equilibrium model, Fontagné et al. (2008) have built their own partial equilibrium models to maximize the available data) and many studies also rely on national or sub-national general equilibrium models. One way to address the household level issue is also to link the global model to the household level either through household level data as in Bourguignon et al.(2010) or a poverty elasticity as in Hertel et al. (2006), Chemingui and Bchir (2009) and Hertel (2009).

Considering the limitations of the poverty elasticity shown in Bouët (2007), this paper will not try to assess the impacts of trade integration on poverty. Direct interpretation of the output of the MIRAGE model such as in Bouët et al. (2005) will enable conclusion on potential impacts on the changes in GDP volume, Real Income and the structure of the agricultural production and trade structure.

1.4. The simulations with the MIRAGE model and GTAP7 database

The trade integration scenarios are implemented in the MIRAGE model initially developed by the CEPII, which proposes several innovations from other CGE models applied to trade policy analysis such as horizontal product differentiation linked to varieties, but also to geographical origin (nested Armington – Dixit-Stiglitz utility function) and distinction of product quality. MIRAGE can also describe imperfect competition, imperfect mobility of factors and several other specifications, including sequential dynamic. A more detailed description of the model is available in Annex 1.

However, following Davis and Mishra (2007)‘s advice, one should wonder what extent of complexity in the model is really needed to adequately answer one’s question. Thus, this simulation exercise does not take advantage of all the specifications MIRAGE has to offer. We consider perfect competition, since imperfect competition significantly impacts results (Karam 2009) and introduces a bias detrimental to countries specialization in agriculture

[8] http://r0.unctad.org/ditc/tab/atpsm.shtm

(Decreux and Valin 2007), and in a static mode since the focus is on the comparison of the long term effect of multiple scenarios.

The mapping of the study focusing on sub-Saharan Africa agricultural sectors is described in Annex 2 and 3: The 13 individualized sub-Saharan African countries, the 5 sub-Saharan African regions and the 18 agricultural sectors are kept.

Thanks to the detailed MAcMapHS6-2.1 database (Bouët et al. 2008), the changes in the tariff barriers for each scenario are first made at the HS6 level for the year 2004. Only then are these data aggregated in the model's nomenclature, according to a procedure designed to limit the extent of the endogeneity bias. As a result, MIRAGE is based on a more precise description of trade barriers at the bilateral level.

However, despite the detailed trade and tariff data from the MAcMapHS6-2.1 2004 database, the model is limited by the regional disaggregation of the GTAP 7 database. Fortunately for the regional scenarios chosen, the GTAP7 regional aggregation of sub-Saharan countries is mostly coherent with the regional groups chosen (Annex 4). The only exception is the "Rest of Central Africa" (XAC) GTAP 7 region which comprises the Democratic Republic of Congo that is part of the Central region and Angola that is part of the Southern region.

Thus, results for each scenario are available for the 29 regions of which 18 Sub-Saharan African and the 28 sectors of which 20 agricultural. For simplicity, the results are presented in this paper aggregated in 5 "zones of interest" (Sub-Saharan Africa –SSA-, North Africa -NA-, Developed Countries –DC-, Emerging Economies -EC- and Other developing countries -ODC-) as detailed in Annex 2 and "sectors of interest" (raw agricultural products –"Raw agricultural products"-, processed agricultural products industries –"Processed agricultural products"-, Fishing –"Fish"- and all the other sectors –"Other"-) in Annex 3, the analysis focusing on the changes in the structure of "Raw agricultural products" and production and exports of Sub-Saharan African countries.

In the end, this study goes further than previous studies on the effects of trade integration on sub-Saharan Africa for several reasons. First, it brings forward new comparable quantitative

assessments of the impacts of several multilateral and regional trade integration scenarios and their interactions with other bilateral negotiations for sub-Saharan African countries but also the rest of the world. Secondly, the results are analyzed taking into account the specific economic structure of sub-Saharan countries and the stake of structural transformation towards processing agricultural goods. Third, it takes into account some data issues of the GTAP7 database that contribute to significant "virtual trade flows" being created leading to bias in the results. The paper further documents them and proposes an easy way to treat them. Two important caveats of this study should be noted. The analysis of the simulation results explicitly focuses on demand issues and assumes that agricultural supply increases will be achieved if the opportunity arises. Second we do not consider the impacts of various alternative trade integration shocks on income distribution and poverty. But the changes in many agricultural sectors, grains and other major food staples, in particular, are likely to have larger effects on poverty and food consumption than on total GDP or real income. Given that reduction in poverty and hunger is a major development objective, the analysis should be extended beyond consideration of impacts on economic growth and aggregate consumption.

2. Implementation of the tariff shocks with the MIRAGE CGE model

Scenarios of tariff changes are constructed using the Changer pour MAcMAPs-HS6 database. They are presented for zones and sectors of interests in Annex 5. General equilibrium effects of those shocks are simulated thanks to the MIRAGE model.

2.1. Pre-experiment

The Market Access Maps database developed by the CEPII and ITC represents full structure of protection, bound, MFN applied, and preferential[9] applied duties, in 2004. It is thus necessary to update the database in a "pre-experiment" step to take into account major

9 It should be acknowledged that rules of origin are not taken into account and thus supposed to be fully used, even though there is some evidence that developing countries are not able to fully take advantage of those preferences.

changes in tariffs since 2004 that have affected sub-Saharan African countries and their main trade partners. Bouët (2008) shows that without this preliminary step, gains from increased liberalization can be substantially overestimated. Hence, the main trade agreements concerning sub-Saharan African countries and their main trade partners since 2004 are added to the database at the HS6 level, such as the end of the multi-fiber agreements in 2005, the enlargement of the EU to 25 and then 27, expanded DFQF by India, China, Turkey and Korea to some least developed countries, some new FTA or the phasing out of the EU protocols for sugar, rice and banana.

Table 1: Average applied tariffs by sector and region

		Exporter				
Importer	Sector	Dvd	EmgEco	Odvg	NoAf	SSA
Dvd	Raw ag	0.14	0.17	0.12	0.11	0.10
	Processed ag	0.18	0.17	0.16	0.11	0.14
	Fish	0.04	0.04	0.05	0.04	0.05
	Other	0.03	0.04	0.03	0.03	0.02
EmgEco	Raw ag	0.13	0.13	0.11	0.09	0.19
	Processed ag	0.24	0.21	0.25	0.18	0.32
	Fish	0.14	0.11	0.13	0.10	0.20
	Other	0.08	0.11	0.09	0.06	0.07
Odvg	Raw ag	0.12	0.20	0.17	0.20	0.15
	Processed ag	0.19	0.32	0.21	0.25	0.22
	Fish	0.22	0.21	0.21	0.14	0.21
	Other	0.07	0.11	0.08	0.07	0.09
NoAf	Raw ag	0.21	0.25	0.26	0.17	0.12
	Processed ag	0.40	0.26	0.37	0.18	0.82
	Fish	0.25	0.26	0.26	0.11	0.25
	Other	0.14	0.18	0.17	0.07	0.16
SSA	Raw ag	0.11	0.16	0.13	0.16	0.18
	Processed ag	0.26	0.24	0.23	0.34	0.28
	Fish	0.16	0.11	0.10	0.05	0.15
	Other	0.10	0.16	0.12	0.12	0.14

"Dvd" developped countries, "Emg Eco" emerging economies, "Odvg" other developing economies, "NoAF" northern Africa, "SSA" sub-saharan Africa

"Raw ag" raw agricultural products, "Processed ag" processed agriculture products, "Fish" fishing products, "Other" primary and manufactures products and services

Source : MAcMapHS6 2004 after pre-experiment, reference-weight group aggregating method

Looking at the tariffs in Table 1, initially every region still applies higher tariffs on agricultural imports than on manufactured (Other) imports, that tariff escalation (applying a higher protection on more processed goods) appears in agriculture, that "Raw agricultural

products" exports from sub-Saharan Africa do benefit from a preferential margin from Developed countries, which is somewhat reciprocal, since sub-Saharan Africa also applies a lower tariff on "Raw agricultural products" and "Other" exports from developed countries than from other countries, and that sub-Saharan African countries are poorly integrated at the regional level.

2.2. "DDA" scenario: multilateral liberalization in the form of a "Doha Round"

The November 2001 declaration of the Fourth Ministerial Conference of the World Trade Organization in Doha, Qatar, provides the mandate for negotiations known as the "Doha Round". The Doha Development Agenda was to take into account the specific needs of developing countries. So far no agreement has been reached. The July 2008 package is considered a stepping stone on the way to concluding the Doha Round and the December 2008 draft modalities text seems to be widely accepted by WTO members as the basis for further negotiations[10].

Since then, no substantial achievement to conclude the Doha Round has been made, and trade liberalization has on the contrary evolved at the bilateral and regional level.

The DDA scenario[11] is based on the December 2008 modalities (WTO 2008a,b) in a similar scenario than in Bouët and Laborde (2010) . The tariff reduction formula are applied on base rates equal to existing bound tariffs or for currently unbound tariff lines, to average applied MFN rate for 2004 (from MacMapHS6-2.1) plus 25 percent. Details of the state of the negotiations and the tariff reduction formulas and the flexibilities are described in Laborde and Martin (2010a,b). The simulation of Doha in this paper does not include all flexibilities. For non agricultural products, the Swiss tariff-cutting formula with a 8 per cent coefficient is used for all developed countries and a 23 per cent coefficient is chosen for developing countries. Small and vulnerable economies, as defined by the WTO, are allowed to only cut their tariff to the mean between the value found with the Swiss formula with 23 per cent

10 Based on lastest updates of http://www.wto.org/

11 Detailed formula available upon request.

coefficient and their base rate. For agricultural products, the tiered formula is used with the proportional cuts for each tariff band. For developed countries, the cut is 0.685 for tariff above 0.75, 0.685 for tariffs between 0.75 and 0.50, 0.575 for tariffs between 0.50 and 0.25, and 0.50 for tariff under 0.25. Developing countries have larger bands (1.3, 0.8 and 0.3) and cuts in each band are two-thirds those of the developed countries. SVEs can make reductions 10 percent smaller in each band than other developing members. Additional flexibilities are available for the sensitive and special products, defined using the Jean, Laborde and Martin (2005) method[12]: cuts for sensitive products are two-thirds those of those for other agricultural products for both developed and developing countries, and developing countries can make reductions of 15 per cent for special products. The cotton initiative adds free market access by developed countries to LDCs for cotton.

Table 2: Percentage tariff change from a DDA on applied tariffs by sector and region

		Exporter				
Importer	Sector	DVD	EmgEco	Odvg	NoAf	SSA
Dvd	Raw ag	-32.15	-35.58	-36.23	-43.03	-34.49
	Processed ag	-36.24	-43.03	-39.46	-37.66	-35.37
	Fish	-51.47	-55.23	-40.55	-51.16	-51.29
	Other	-33.03	-41.31	-41.49	-43.73	-26.61
EmgEco	Raw ag	-0.21	-0.23	-0.28	-0.54	-0.11
	Processed ag	-5.04	-1.62	-2.83	-6.27	-9.95
	Fish	-25.78	-22.81	-30.39	-27.21	-35.38
	Other	-27.17	-21.27	-29.22	-22.66	-12.90
Odvg	Raw ag	-0.03	-0.28	-0.09	-0.21	-0.22
	Processed ag	-3.93	-2.29	-3.51	-4.28	-7.02
	Fish	-39.58	-28.56	-30.45	-27.15	-29.64
	Other	-12.95	-21.22	-14.77	-12.36	-9.64
NoAf	Raw ag	-0.03	-0.64	-0.09	-0.05	-0.23
	Processed ag	-4.62	-4.81	-6.88	-1.32	-3.04
	Fish	-46.58	-45.65	-51.40	-23.74	-47.99
	Other	-31.16	-35.07	-31.58	-30.59	-35.66
SSA	Raw ag	-7.85	-8.38	-5.04	-23.08	-15.35
	Processed ag	-8.42	-12.92	-12.62	-25.21	-22.87
	Fish	-24.70	-5.37	-9.10	-21.25	-4.77
	Other	-4.21	-7.09	-6.20	-4.88	-5.19

"Dvd" developped countries, "Emg Eco" emerging economies, "Odvg" other developing economies, "NoAF" northern Africa, "SSA" sub-saharan Africa

"Raw ag" raw agricultural products, "Processed ag" processed agriculture products, "Fish" fishing products, "Other" primary and manufactures products and services

Source: Author's calculation (reference group weight aggregating method)

12 Thanking David Laborde for having made that list available.

The tariff shock of a DDA, presented in Table 2 illustrates the fact that issue of sensitive products is crucial to take into account. Even when reduced to a few percentages of the tariff lines, the option to exempt sensitive products from liberalization substantially reduces the effective liberalization of tariff cuts (Bouët 2008). Indeed, in the structure of most developing economies protection pattern, a few tariff lines are highly protected, and account for most of the average protection. Excluding them from tariff reduction widely reduces the effective reduction in protection. Often these products are agricultural products which are export interests for sub-Saharan African countries.

What is noteworthy is that with the exception of agricultural exports from Northern African countries to Developed countries, the tariffs cuts are always higher for "Processed agricultural products" products than for "Raw agricultural products" products, which will tend to reduce the existing tariff escalation.

Furthermore, as a region, Sub-Saharan Africa is not exempted from tariff reduction. The average weighted average tariff cut for the region represents the fact that the richest countries are also the countries trading the most. Hence substantial tariff reduction incur, for instance from Nigeria, some of which benefitting to other Sub-Saharan African countries such as South Africa (Annex 5).

2.3. "DFQF" scenario: preferential multilateral liberalization for Least Developed Countries

It was agreed at the 2005 WTO Ministerial that all developed countries would offer at least 97 per cent duty-free, quota free (DFQF) access for least developed countries. Since 2001, some OECD countries have already proposed a DFQF access to some least developed countries. A number of emerging countries (Turkey, Korea, and China) have also put in place preferential market access albeit covering less products (Elliott 2010). It is crucial to take those preferential agreements that have already happened into account in the pre-experiment because they reduce the potential gains from the DFQF proposal.

Without specifically testing the interaction effects of those different agreements, Berisha-Krasniqi et al. (2008) and more recently Bouët et al. (2010) using a general equilibrium model and partial equilibrium models find that there is little to expect for least developed countries from DFQF market access if this market access doesn't cover 100 per cent tariff lines and is not extended to as many preference-giving countries as possible, including emerging markets economies. Their various simulations include full EPA and regional integration in the various negotiating regions in the baseline and do not consider parallel impacts of DDA. Building from their results, a rather ambitious DFQF scenario is implemented: 100 per cent duty free quota free market access by OECD countries and Brazil, China and India to all least developed countries.

Table 3: Percentage tariff change from a DFQF on applied tariffs by sector and region

		Exporter	
Importer	Sector	Odvg	SSA
Dvd	Raw ag	-0.52	-18.69
	Processed ag	-0.59	-9.37
	Fish	-2.75	-16.82
	Other	-5.34	-2.92
EmgEco	Raw ag	-17.35	-41.67
	Processed ag	-1.76	-23.79
	Fish	-8.94	-44.45
	Other	-1.64	-14.28
Odvg	Raw ag	-0.68	-14.15
	Processed ag	-0.31	-4.22
	Fish	-3.39	-9.21
	Other	-0.62	-5.29

"Dvd" developped countries, "Emg Eco" emerging economies, "Odvg" other developing economies, "NoAF" northern Africa, "SSA" sub-saharan Africa

"Raw ag" raw agricultural products, "Processed ag" processed agriculture products, "Fish" fishing products, "Other" primary and manufactures products and services

Source: Author's calculation (reference group weight aggregating method)

The equivalent average tariff cut presented in Table 3 show that DFQF would mostly benefit the sub-Saharan African region, and the few LDC in the "Other Developing Countries" group. For SSA, the equivalent average tariff cuts are much higher than from DDA. Moreover, tariff cuts are more important in the "Raw agricultural products" sector than in the "Processed agricultural products" sector, even though initial tariffs were higher in the "Processed agricultural products" sector (Table 1). This apparent paradox reflects the fact that LDCs exports more raw agricultural products than "Processed agricultural products" products to OECD countries and emerging economies, and/or that those specific "Raw

agricultural products" products face higher tariffs than "Processed agricultural products" products for those destinations. The major tariff cuts for SSA agricultural exports from a DFQF agreement would come tariff reduction in India, other Asian countries and the USA (Annex 6).

2.4. "DDA+DFQF"scenario

The 100 per cent DFQF is now part of the DDA negotiation as a compensation towards least developed countries for the erosion of preferences they experience in the DDA. Hence a combination of the two is also simulated.

Table 4: Percentage tariff change from a combined DDA and DFQF on applied tariffs by sector and region

		Exporter				
Importer	Sector	DVD	EmgEco	Odvg	RoAf	SSA
Dvd	Raw ag	-32.16	-35.58	-36.56	-43.03	-42.41
	Processed ag	-36.26	-43.03	-39.76	-37.66	-40.86
	Fish	-51.87	-55.23	-42.82	-51.16	-61.67
	Other	-33.04	-41.31	-43.60	-43.73	-28.92
EmgEco	Raw ag	-0.24	-0.23	-17.59	-0.54	-41.69
	Processed ag	-5.12	-1.62	-4.47	-6.27	-29.56
	Fish	-29.13	-22.81	-36.48	-27.21	-66.49
	Other	-27.31	-21.27	-30.55	-22.66	-25.41
Odvg	Raw ag	-0.33	-0.28	-0.78	-0.21	-14.36
	Processed ag	-4.01	-2.29	-3.69	-4.28	-9.91
	Fish	-49.74	-28.56	-32.19	-27.15	-34.27
	Other	-13.00	-21.22	-15.17	-12.36	-14.48
RoAf	Raw ag	-0.03	-0.64	-0.09	-0.05	-0.23
	Processed ag	-4.62	-4.81	-6.88	-1.32	-3.04
	Fish	-46.58	-45.65	-51.40	-23.74	-47.99
	Other	-31.16	-35.07	-31.58	-30.59	-35.66
SSA	Raw ag	-7.85	-8.38	-5.04	-23.08	-15.35
	Processed ag	-8.42	-12.92	-12.62	-25.21	-22.87
	Fish	-24.70	-5.37	-9.10	-21.25	-4.77
	Other	-4.21	-7.09	-6.20	-4.88	-5.19

"Dvd" developped countries, "Emg Eco" emerging economies, "Odvg" other developing economies, "NoAF" northern Africa, "SSA" sub-saharan Africa

"Raw ag" raw agricultural products, "Processed ag" processed agriculture products, "Fish" fishing products, "Other" primary and manufactures products and services

Source: Author's calculation (reference group weight aggregating method)

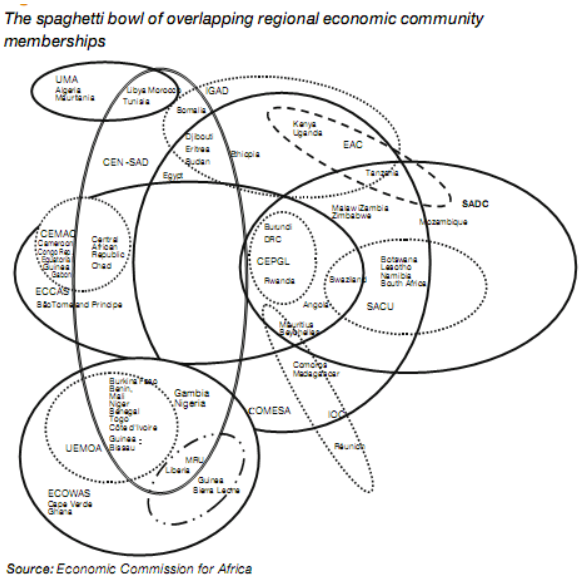
It is noteworthy in Table 4 and Annex 7 that the equivalent tariff cuts are not the exact sum of tariff cuts from the two scenarios alone, since some source of tariff reduction are the same in both agreements.

For instance, an important tariff cut for Malawi is the complete elimination of tariff on the tobacco exported to the USA.

2.5. "Regional FTA" scenario : four regional free trade agreements in sub-Saharan Africa

Despite the substantial number of trade agreements signed within sub-Saharan African States, progresses in regional integration are uneven across the continent (UNECA 2010). In terms of future prospects, it seems most likely that regional integration will continue, but the pace will highly depend on the willingness of the respective government to enforce the agreements they have signed.

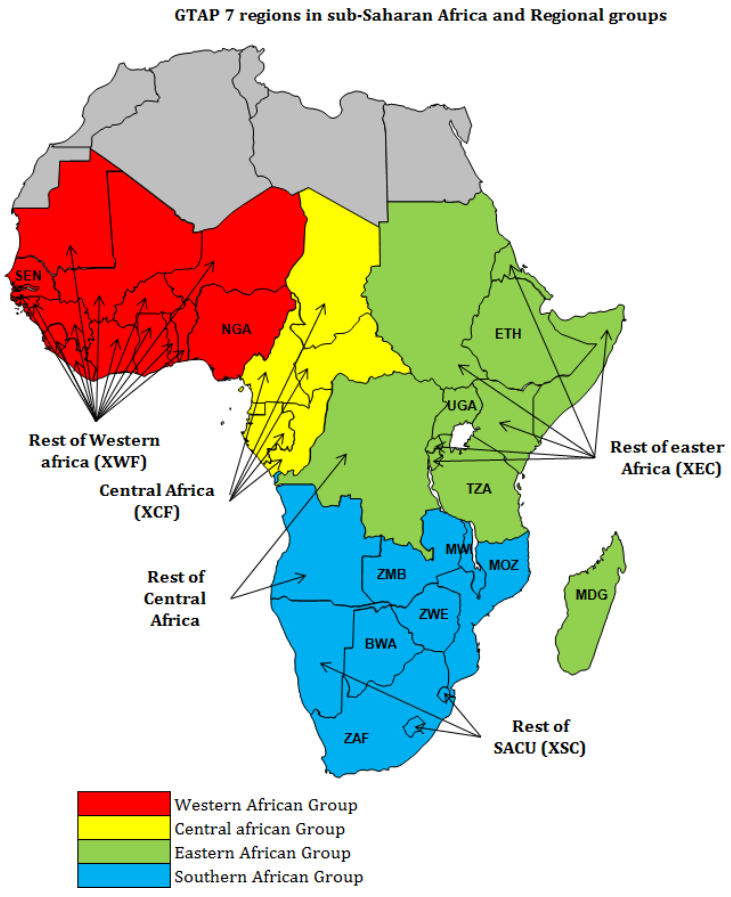
Figure 1: Assessing Regional Integration in Africa from United Nations Economic Comission for Africa, 2006, II: Rationalizing Regional Economic Communities



Considering the overwhelming number of overlapping memberships of sub-Saharan African countries as illustrated in Figure 1, it is necessary to make a choice as regards to which regional economic community to choose. A combination of regional economic communities that covers the entire Sub-Saharan African countries with no overlap is chosen (Figure 2): those are the same broad four economic communities that were used for the EPA regional negotiations in Africa namely a Western African group based on ECOWAS (Economic Community of West African States) members plus Mauritania; a Central African group

based on CEMAC (Monetary and Economic Community of Central Africa) members plus Democratic Republic of Congo and Sao Tome and Principe; a Southern African group named the SADC (Southern African Development Community) group but actually only based on SACU members plus Mozambique and Angola; and an Eastern African group considered as one region but divided in two negotiating groups, one being based on the EAC (East African Community) members and the other one named the ESA (Eastern and Southern Africa) based on some COMESA (Common Market for Eastern and Southern Africa) members.

Figure 2: Regional groups



Data on the effective applied tariff, and the commitments of various agreements being very hard to gather and consolidate, rather drastic regional integration scenarios were chosen. For each sub-Saharan African country, all Ad Valorem Equivalent tariffs applied to imports from other countries of the same region are set to zero, creating four Free Trade Areas.

Table 5: Percentage tariff change from four regional FTA
in Sub-Saharan Africa on average applied tariffs

Importer	Sector	Exporter
		SSA
SSA	Raw ag	-20
	Processed ag	-23
	Fish	-31
	Other	-24

"SSA" sub-saharan Africa

"Raw ag" raw agricultural products, "Processed ag" processed agriculture products, "Fish" fishing products, "Other" primary and manufactures products and services

Source: Author's calculation (reference group weight aggregating method)

Considering the fact that sub-Saharan African countries do not trade only with the countries within the same FTA, at the sub-Saharan African level equivalent tariff cuts (Table 5) from the four FTA are only equal to less than 30 per cent cuts on average sub-Saharan African trade.

Annex 8 illustrates some of the major tariff cuts for SSAn agricultural exports from Regional FTA. It reveals that some countries such as Nigeria, Mozambique and Eastern Africa will have to drastically decrease some of their tariffs.

2.6. "SSA FTA" scenario:

An extended version of regional integration is also chosen in the form of a sub-Saharan African Free Trade Area. For each sub-Saharan African country, Ad Valorem Equivalent tariffs applied on imports from other sub-Saharan African countries are set to zero.

Annex 9 illustrates some of the major tariff cuts for SSAn agricultural exports from SSAn FTA. Most of them would be beneficial to South African and Western African exports.

2.7. Testing alternative baselines and interactions

All the possible interactions between the previously presented scenarios are also tested and the changes of the macroeconomic variables are compared with proper counterfactual scenarios "without" each the agreement which serves as a reference scenario. From each

interaction we find what has been seen with the "DDA+DFQF", that the interaction effect of two scenarios counts and that it is not a mere sum of what happens in the two scenarios alone.

2.7.1. "EPA"scenario: bilateral Economic Partnership Agreements EU-ACP

According to the MacMapHS6 version 2.1 database (Boumellassa et al. 2009), in 2004, Sub-Saharan African region exports 45 per cent of its agricultural exports to the EU with 17 Sub-Saharan countries depending on EU for more than 50 per cent of their agricultural exports. Since the European Union (EU) is the main trade partners for sub-Saharan African countries, the impacts of potential outcomes of the current negotiations between the EU and Sub-Saharan countries should be tested on the baseline and on other scenarios.

In 2007 the WTO waiver for the Cotonou agreements[13] ended, without the expected conclusion of the Economic Partnership Agreements being successfully signed. Initiated as regional negotiations between regional communities in the ACP countries and the EU (which required countries that had overlapping memberships to those regional communities to decide with which to negotiate), the negotiations have now become bilateral negotiations with the EU.

Applied Ad Valorem Equivalent tariffs between the EU and the corresponding ACP regions are set to zero (Annex 10). Tariffs of the sensitive products are excluded from any cuts. As, only the countries that signed Interim EPA (IEPA) have published their list of sensitive products, these lists are extended to the other countries of the same regional group who have not signed the IEPA[14].

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[13] The Cotonou Agreement signed in 2000 had replaced the Lomé Convention which had been the basis for ACP-EU development cooperation since 1975 providing non reciprocal preferential access for all African Caribbean and Pacific countries to the EU market. The Cotonou Agreement however were supposed to be transitional towards the Economic Partnership Agreements in which ACP countries would also provide duty-free access to their own markets for EU exports.

[14] Specifically: In the Western African group, Ghana and Côte d'Ivoire have their own exclusion lists from their individual IEPA. For the other countries, We use Ghana's list. For all Central African countries we use the list of Cameroon's IEPA. In Eastern Africa, EAC countries, Comoros, Madagascar, Maurice, Seychelles, Zambia, Zimbabwe all use their own IEPA exclusion list. For the other countries, we use the EAC exclusion list. For all Southern African countries, we use the SAD-1 IEAP exclusion list. All lists were found at http://ec.europa.eu/trade/wider-agenda/development/economic-partnerships/

Table 6: Percentage tariff change from bilateral ACP-EU EPA on average applied tariffs by sector and region

Importer	Sector	Exporter		
		Dvd	Odvg	SSA
Odvg	Raw ag	0.00		
	Processed ag	0.00		
	Fish	-0.01		
	Other	-0.02		
SSA	Raw ag	-0.15		
	Processed ag	-0.19		
	Fish	-0.04		
	Other	-0.17		
Dvd	Raw ag		0.00	-0.15
	Processed ag		-0.02	-0.35
	Fish		-0.01	-0.11
	Other		-0.01	-0.29

"Dvd" developped countries, "Odvg" other developing economies, "SSA" sub-saharan Africa

"Raw ag" raw agricultural products, "Processed ag" processed agriculture products, "Fish" fishing products, "Other" primary and manufactures products and services

Source: Author's calculation (reference group weight aggregating method)

Overall the EPA are equivalent to tariff cuts ranging from 4 per cent to 19 per cent (Table 6) on tariffs applied by SSA on imports from all developed countries and 11 to 35 per cent on tariffs applied by all developed countries on imports from SSA.

2.7.2. "GSP" scenario : the counterfactual scenario

Considering the difficulties in bringing negotiations forward in the EPA, it is necessary to devise a counterfactual scenario for the case in which the EPA negotiation fail. Since 2008, all countries whose governments initiated the IEPA have benefited from the maintenance of traditional trade preferences from Cotonou. Only the ones that have refused to sign such as Gabon, Congo, Nigeria are no longer Cotonou preference receivers.

Indeed, the EU has preferential programs for developing countries, a "Everything But Arms" (EBA) initiative granting all eligible least developed countries duty-free, quota-free

access for all products but arms[15] and a Generalized System of Preferences (GSP)[16] for other developing countries. In terms of preferences, the EBA is equivalent to the Cotonou agreement for ACP least developed countries, but for the other ACP countries, the GSP would mean an increase in the tariff they face for their exports to the EU[17].

Considering the current situation a drastic counterfactual to the EPA scenario is chosen where no EPA is signed and all ACP countries are transfer to the GSP[18] scheme (least developed countries are granted EBA).

Table 7: Percentage tariff change from ACP GSP on average applied tariffs by sector and region

Importer	Sector	Exporter	
		Odvg	SSA
Dvd	Raw ag	0.00	0.00
	Processed ag	0.03	0.05
	Fish	0.00	0.01
	Other	0.00	0.00

"Dvd" developped countries, "Odvg" other developing economies, "SSA" sub-saharan Africa

"Raw ag" raw agricultural products, "Processed ag" processed agriculture products, "Fish" fishing products, "Other" primary and manufactures products and services

Source: Author's calculation (reference group weight aggregating method)

Overall, the increase in the tariffs applied by the EU would mean a 5 per cent increase in equivalent average tariffs on «Processed agricultural products» exports to all Developed Countries (Table 7). Nevertheless, this average increase hides the fact that impacts would be

[15] I consider that the delayed implementation for sugar, rice and bananas has ended, and include the end of the product protocols in the pre-experiment. Indeed in the case of sugar, from 1 October 2009 to 30 September 2015: ACPs have free access to the EU market the only restriction being an automatic safeguard clause for non-LDC ACPs (Commission Regulation (EC) No 828/2009 of 10 September 2009 laying down detailed rules of application for the marketing years 2009/2010 to 2014/2015 for the import and refining of sugar products of tariff heading 1701 under preferential agreements). Since 1 January 2006, the "Everything But Arms" initiative grants duty-free quota-free access for bananas from Least Developed Countries (LDCs) to the EU market. Non-LDC ACP countries benefit from duty-free and quota-free access under the EPA trade regime since 1 January 2008. All ACP banana exporters concluded negotiations on a full or interim EPA at the end of 2007.

[16] Note that the GSP plus scheme is not considered.

[17] Most countries that have signed Interim EPA (IEPA) so far are non least developed countries African countries highly dependent for a very concentrated part of their exports on their preferential access to the European market: Ivory Cost (banana and cocoa), and Ghana (cocoa) for Western Africa, Cameroon (banana) for Central Africa, Bostwana, Swaziland, Zimbabwe (cattle) and Mozambique for Southern Africa, Kenya (textile) and Seychelles (fish) for Eastern Africa. Some African least developed countries such as Burundi, Rwanda, Tanzania, Uganda, Mozambique, Madagascar and Lesotho also signed.

[18] http://trade.ec.europa.eu/doclib/docs/2009/april/tradoc_143051.pdf

concentrated on the few non LDC ACP countries and on some specific sectors as illustrated in Annex 11, of which sugar (+251 per cent for Mauritius, + 229 per cent for Zimbabwe) or vegetables and fruits (+19 per cent Central Africa, +11 per cent Western Africa).

Taking into account this counterfactual illustrates what non LDC ACP countries have to loose from not signing the Interim Agreements and explains why most did.

3. Results

3.1. Comparative impacts on GDP and Real Income

As found in previous studies such as Bouët et al. 2005, global gains from trade liberalization are small, even at the multilateral level. In our study, they amount globally to a maximum of $53 billion of GDP growth or $32 billion Real Income growth (respectively 0.13 per cent of 2004 World GDP or 0,10 per cent of 2004 World Real Income), reached with a combination of a DDA and a DFQF (Table 8 and 9). Detailed GDP impacts on sub-Saharan African countries can be seen in Annex 13.

Table 8: Impacts of scenarios on GDP volume ($ bln)

Absolute increase in GDP volume ($bln)

(Per Cent change in GDP volume)

	DDA*	DFQF*	DDA+ DFQF*	Reg FTA	SSA FTA	DDA + Reg FTA*	DFQF +Reg FTA*	DDA+ DFQF+Reg FTA*
Developed	40.62 *(0.12)*	0.63 *(0.00)*	40.95 *(0.12)*	-0.02 *(0.00)*	-0.07 *(0.00)*	40.60 *(0.12)*	0.61 *(0.00)*	40.22 *(0.11)*
Emerging Economies	7.60 *(0.26)*	-0.04 *(0.00)*	7.63 *(0.26)*	-0.02 *(0.00)*	-0.06 *(0.00)*	7.58 *(0.26)*	-0.07 *(0.00)*	7.54 *(0.26)*
Other developing economies	2.18 *(0.09)*	0.37 *(0.02)*	2.46 *(0.11)*	-0.01 *(0.00)*	-0.02 *(0.00)*	2.17 *(0.09)*	0.35 *(0.02)*	2.29 *(0.1)*
Subsaharan Africa	0.49 *(0.09)*	0.23 *(0.04)*	0.69 *(0.13)*	0.33 *(0.06)*	0.65 *(0.12)*	0.80 *(0.15)*	0.55 *(0.10)*	0.27 *(0.05)*
Rest of africa	1.27 *(0.47)*	0.00 *(0.00)*	1.27 *(0.47)*	0.00 *(0.00)*	0.00 *(0.00)*	1.27 *(0.47)*	0.00 *(0.00)*	1.27 *(0.47)*

World	52.16	1.18	53.00	0.28	0.51	52.42	1.45	51.60
	(0.13)	*(0.00)*	*(0.13)*	*(0.00)*	*(0.00)*	*(0.13)*	*(0.00)*	*(0.12)*

*scenario with specific treatment of GTAP data issues

These low prospects of gains from trade liberalization are found in similar studies with the MIRAGE model but differ from other more positive estimations of the World Bank and GTAP or HRT models for several reasons (Bouët 2005, Anderson et al. 2005). First, the studies using the MAcMapHS6-2.1 database (most studies with MIRAGE) take into account a precise measurement of protection worldwide especially taking into account the trade preferences, regional agreements, the gap between applied and bound protection (Bouët et al 2008). Secondly, the choice of conservative estimation of behavioral parameters (lower elasticities of substitution for developing countries based on econometric estimations) yields lower trade flows and thus lower gains from liberalization (Bouët 2007) especially in terms of Real Income. More complex theoretical assumptions (such as the imperfect mobility of factors allowed in MIRAGE) hamper reallocation of factors according to the comparative advantage and thus decrease gains (Gérard and Piketty 2008). Third, like all static simulations, our results lack the "dynamic gains of liberalization" (to start with, the increase in factor supply) which increase the results of dynamic simulations. Fourth, more importantly, by excluding Asian travelers's expenditures in Africa from the exports flows being liberalized, more realistic results from multilateral liberalization are found (all scenarios with "*" at the end). Annex 14 explains the issues and the treatment applied in this paper and illustrates the impacts of that treatment on the results from multilateral scenarios. It shows that the world level real income gains are 83% smaller for "DFQF" than without that treatment.

In terms of comparative gains, a combination of the Doha Development Agenda and the Duty Free Quota Free Market Access, the most ambitious scenario in terms of tariff cuts, results in higher global gains both in terms of Real Income and GDP. But the gains from the DDA are mostly driven by the gains of Developed countries whereas an ambitious DFQF rebalances the gains towards least developed countries (in "SSA" and "Other developing economies".

Table 9: Changes in Real Income ($ bln)

Absolute change in Real Income ($ bln)

(Per Cent change in Real Income)

	DDA*	DFQF*	DDA+ DFQF*	Reg FTA	SSA FTA	DDA + Reg FTA*	DFQF +Reg FTA*	DDA+ DFQF+Reg FTA*
Developed	33.58 *(0.12)*	0.13 *(0.00)*	33.58 *(0.12)*	-0.08 *(0.00)*	-0.17 *(0.00)*	33.51 *(0.12)*	0.05 *(0.00)*	33.47 *(0.12)*
Emerging Economies	-0.99 *(-0.05)*	-0.21 *(-0.01)*	-1.11 *(-0.06)*	-0.03 *(0.00)*	-0.08 *(0.00)*	-1.02 *(-0.05)*	-0.24 *(-0.01)*	-1.07 *(-0.06)*
Other developing economies	0.02 *(0.00)*	0.46 *(0.03)*	0.28 *(0.02)*	-0.02 *(0.00)*	-0.04 *(0.00)*	0.00 *(0.00)*	0.44 *(0.02)*	0.31 *(0.02)*
Subsaharan Africa	0.15 *(0.03)*	0.46 *(0.11)*	0.53 *(0.13)*	0.23 *(0.05)*	0.51 *(0.12)*	0.37 *(0.09)*	0.69 *(0.17)*	-0.49 *(-0.12)*
Rest of africa	-0.56 *(-0.28)*	0.00 *(0.00)*	-0.56 *(-0.28)*	0.00 *(0.00)*	0.00 *(0.00)*	-0.56 *(-0.28)*	0.00 *(0.00)*	-0.52 *(-0.26)*
World	32.20 *(0.10)*	0.84 *(0.00)*	32.73 *(0.10)*	0.09 *(0.00)*	0.22 *(0.00)*	32.30 *(0.10)*	0.94 *(0.00)*	31.70 *(0.10)*

*scenario with specific treatment of GTAP data issues

It should be noted that there are interactions effects when combining different trade agreements which make the outcome of the combination different from the arithmetic sum of impacts of each trade agreement alone: the Real Income growth from the "DDA+DFQF" scenario is not the arithmetic sum of the Real Income growth of "DDA" plus the Real Income growth of "DFQF". This discrepancy can be attributed to the fact that both agreements offers some similar gains, but also that some of the gains from preferential access with "DFQF" are lost as a result from multilateral liberalization and erosion of preferences. What is noteworthy is that for other developing economies, gains from "DDA+DFQF" are less than from "DFQF" alone. This illustrates two crucial points: first, simulating interactions is necessary to grasp the complicated effects of simultaneous trade agreements; secondly any preferential trade agreement is jeopardized by increased multilateral trade liberalization as a consequence of erosion of preferences.

As for the understanding of those results, we wish to highlight the fact that interpretation of the figures can lead to diverging conclusion. In terms of percentage change of GDP volume, developing countries may seem to "be the winner" from "DDA+DFQF" since GDP in volume increase more in Developing countries than Developed countries (respectively 0.20 per cent and 0.12 per cent). But turning to the absolute increase in GDP volume which is 46

billion US$ for developed countries and only 12 billion US$ for developing countries, the opposite conclusion can be reached that Developed countries benefit the most from multilateral and bilateral trade liberalization. Furthermore taking into account the headcounts and the repartition of the population worldwide can lead to the conclusion that 20 per cent of the worldwide population in developed countries obtain 78 per cent of the gains (31$/capita), when the 80 per cent of the world population living in developing countries only gain 22 per cent of the gains (2.2$/capita).

By comparing the impacts of our different scenarios on sub-Saharan African GDP in volume and Real Income changes, we can see that regional integration does deliver as much as multilateral integration. Indeed, an ambitious sub continental integration could bring up to $510 mln dollars to sub-Saharan Africa when a combined "DDA+DFQF" would bring $530 mln dollars in Real Income.

3.2. Comparative impacts on production and trade structure

Beyond GDP and Real Income results, the structure of production, the composition and destination of exports are compared. As expected they vary across regions and sectors and according to the level of trade integration, and its modalities.

In terms of exports structure, initially, sub-Saharan Africa is the only region in the world exporting more "Raw agricultural products" products than "Processed agricultural products" products. Considering the stake of agricultural-led growth, the trade integration process should be coherent with the objective of increased value added in agriculture.

Table 10: Change in the export structure of Sub Saharan Africa

Absolute increase in export volume ($ bln)

(Per Cent change in export volume)

	DDA*	DFQF*	DDA+ DFQF*	Reg FTA	SSA FTA	DDA + Reg FTA*	DFQF +Reg FTA*	DDA+ DFQF+Reg FTA*
Raw Ag	0.22 *(1.53)*	0.84 *(5.72)*	0.79 *(5.35)*	0.26 *(1.77)*	0.38 *(2.58)*	0.51 *(3.43)*	1.14 *(7.74)*	0.02 *(0.10)*
Processed Ag	0.16 *(1.42)*	0.56 *(5.09)*	0.64 *(5.82)*	0.53 *(4.80)*	0.99 *(8.95)*	0.67 *(6.08)*	1.08 *(9.8)*	0.22 *(2.03)*
Fishing	0.01 *(2.77)*	0.00 *(-1.25)*	0.01 *(1.59)*	0.00 *(-0.05)*	0.00 *(0.10)*	0.01 *(2.75)*	0.00 *(-1.26)*	0.00 *(0.37)*
Other	1.02	-0.22	0.92	2.85	5.78	3.71	2.58	5.23

	(0.63)	*(-0.14)*	*(0.57)*	*(1.76)*	*(3.58)*	*(2.30)*	*(1.60)*	*(3.23)*
Total	1.41	1.18	2.36	3.64	7.15	4.90	4.80	5.47
	(0.75)	*(0.63)*	*(1.26)*	*(1.94)*	*(3.81)*	*(2.61)*	*(2.56)*	*(2.91)*

*scenario with specific treatment of GTAP data issues

Looking at the evolution of exports of sub-Saharan African countries presented in Table 10, regional integration creates more trade in volume than the multilateral scenarios, mainly because of the creation of trade in "Other" goods (driven by "primary", "other manufactured products" and "textiles"). Adding regional integration to the multilateral scenarios will more than double the exports volumes from the region. Annex 15 presents the distribution of changes in agricultural exports volumes across sub-Saharan African countries. The increased export volumes originate from contrasted countries depending on the scenario. Mostly increase in raw agricultural products are driven by South Africa, Eastern Africa, Zimbabwe and Malawi and increased in processed agricultural products are driven by South Africa, Rest of SACU, Zimbabwe, Eastern Africa and Tanzania.

In terms of processing of the agricultural exports, table 11 reveals that multilateral integration concentrates the exports towards raw agricultural exports: additional agricultural exports created by trade integration are composed of 41% per cent of processed agricultural goods for "DFQF". On the contrary, regional integration tends to increase the ratio of processed agricultural goods in total agricultural exports. The additional agricultural exports created in the "Regional FTA" scenario are composed of 67 per cent of processed agricultural goods, and 72 per cent in the "SSA FTA" scenario.

Table 11: Changes in the structure of production exports and imports

		Share of processed over total agricultural goods in sub Saharan African								
			Increased							
		Initial	DDA*	DFQF*	DDA+ DFQF*	Reg FTA	SSA FTA	DDA + Reg FTA*	DFQF +Reg FTA*	DDA+ DFQF+Reg FTA*
Production		46%	25%	34%	45%	128%	112%	67%	44%	31%
Exports to all destination		43%	41%	40%	45%	67%	72%	57%	49%	94%
Exports to	Developed	41%	38%	38%	46%	52%	57%	26%	34%	63%
Exports to	Emerging Economies	10%	15%	8%	9%	0%	0%	11%	8%	1%
Exports to	Other developing economies	18%	28%	90%	84%	0%	0%	20%	87%	1%
Exports to	Rest of africa	18%	0%	9%	100%	47%	0%	100%	11%	0%

Exports to	Subsaharan Africa	66%	85%	0%	69%	66%	72%	66%	64%	72%
Imports from all destination		74%	90%	67%	77%	66%	72%	66%	63%	72%
Imports from	Developed	74%	64%	73%	72%	n.	n.	0%	65%	n.
Imports from	Emerging Economies	79%	100%	61%	89%	n.	n.	100%	37%	n.
Imports from	Other developing economies	79%	0%	70%	70%	n.	n.	n.	0%	n.
Imports from	Rest of africa	66%	85%	0%	69%	66%	72%	66%	64%	72%
Imports from	Subsaharan Africa	89%	97%	73%	92%	n.	n.	99%	0%	n.

*scenario with specific treatment of GTAP data issues

Table 11 illustrates the fact that the structure of production doesn't necessarily change in the same way the structure of exports does, since changes in production depend on changes in the exports, imports and consumptions structures. Nevertheless, in the end, the structure of production is crucial to take into account to make sure which economy captures the value addition of the final goods created.

The pattern of sub-Saharan African agricultural exports and production observed can be further explained in light of the structure of the destination exports market. The ratio of processed agricultural goods changes drastically depending on the destination market, ranging initially from only 10 per cent of agricultural exports to Emerging Economies being processed to 66 per cent of agricultural exports to other Sub-Saharan African countries being processed. Indeed, looking at the composition of the agricultural trade created, the only destination market where sub-Saharan Africa always exports more processed agricultural goods than unprocessed goods is the regional market. Three factors impact the evolution of the exports structure from increased trade integration. First, depending on the destination to which market access is granted, structure of additional exports follow the existing structure of exports to that destination. Hence, regional trade tend to foster more processed exports than trade to Emerging Economies or even Developed countries. Secondly, evolution in the tariff structure does a play a role. For instance, by setting all tariff to zero, regional integration and DFQF will lead to higher cuts on processed goods than on raw products because of the existing tariff escalation (Table 1). The structure of exports tends to change according to those respective tariff cuts. Indeed following those tariff cuts the ratio of processed to unprocessed agricultural exports to sub-Saharan Africa increases slightly. Third

competition from other exporters receiving similar preferences or benefiting from the same increased liberalization has a crucial impact. In the case of DDA and DFQF, other countries also benefit from the increased market access. They are major competitors. As a consequence, structure of the increased trade flows from sub-Saharan Africa towards developed countries and emerging economies is reorientated towards raw agricultural products, which means that they are not competitive.

Even when in interaction with multilateral integration, regional integration does increase the gains of Sub-Saharan Africa, in terms of GDP growth (Table 9), real income growth (Table 10) and share of agricultural production and exports that are processed (Table 11) as proven by the results of the scenarios "DDA*+ Reg FTA" and "DFQF*+ Reg FTA".

3.3. Some insight on the contrasted country level impact

Sub-Saharan African countries are far from being homogeneously affected by the different forms of trade liberalization simulated.

At the multilateral level, despite similar initial preferential schemes, sub-Saharan African countries have a very wide range of preferential margins. Countries benefiting from a high initial preference margins face erosion of preferences with any trade liberalization at the multilateral level. But countries with a high initial negative margin, such as Malawi which is specialized in the exports of highly protected agricultural products (tobacco, sugar) are offered new opportunities. The extent to which each country is able to grasp those opportunities depends on its level of competitiveness compared to other competitors. Since many sub-Saharan Africa export similar products, and are in competition with Asian LDCs for some products, the distributional impacts within the region are highly contrasted.

At the regional level, the level of tariff barrier that countries apply to each other is very diverse and generally high. At the subcontinental level because of similar agroecological conditions countries tend to produce similar agricultural products hence competition is a real issue. Initial intracontinental trade is also fairly low, which is why regional integration is feared to divert more trade than it creates. Two key factors to take into account with regional integration in sub-Saharan Africa are thus relative competitiveness (accross members but also compared to other trade partners) which is partly captured by the change in terms of

trade and allocation efficiency, and the losses in tariff revenue. Indeed sub-Saharan Africa is highly dependent on tariff revenue which account 30% of GDP, whereas it amounts only to 13% of GDP for Developed countries (2004, GTAP7). Annex 16 shows that for some countries losses in tariff revenue can sum up to 47% of GDP as in the case of Zimbabwe, significantly impacting real income changes. Similarly, changes in terms of trade can affect many countries negatively.

Table 12: Real Income impacts for the SSA countries

		Real income change (mln $)						
	initial	Reg FTA	*SSA FTA*	*DDA**	*DFQF**	DDA+ DFQF*	DDA+ Reg FTA*	DFQF+ Reg FTA*
Botswana	6,000	0.94	-5.35	23.64	-0.36	23.40	24.28	0.52
CentralAf	24,338	-1.56	-24.04	-48.83	5.23	-44.42	-50.24	3.71
Ethiopia	7,417	-0.12	-0.50	2.48	-0.11	2.46	2.34	-0.24
Mada	3,375	-0.14	-1.93	-12.08	11.69	-1.48	-12.28	11.50
Malawi	1,958	-13.18	-14.32	-7.29	32.32	21.42	-20.66	17.87
Mauritius	4,691	-0.18	-30.24	-7.01	-0.77	-6.70	-7.16	-0.71
Mozambique	5,165	-9.44	-11.55	2.05	15.10	14.33	-7.61	7.25
Nigeria	38,263	-93.75	-125.08	140.51	-14.60	128.43	64.73	-106.52
RoEastAf	45,921	9.72	-56.05	25.10	193.42	169.01	35.68	204.12
RoSACU	6,038	18.79	28.19	-24.71	-3.32	-25.35	-5.70	15.84
RoWestAf	50,051	157.76	125.12	-5.52	40.37	31.62	132.96	196.40
Senegal	7,783	4.81	5.97	6.95	51.36	53.14	11.35	55.03
SthAfrica	173,614	213.87	682.43	91.19	8.39	97.73	301.11	226.77
SthCentAf	19,620	-18.91	-17.71	-51.84	33.56	-20.41	-70.70	14.29
Tanzania	10,624	15.06	-7.07	10.32	58.03	65.34	24.92	71.30
Uganda	6,086	2.19	4.54	5.39	19.66	18.91	7.47	21.91
Zambia	4,428	-16.10	-1.64	-1.90	10.87	7.71	-18.24	-5.51
Zimbabwe	3,452	-41.90	-43.56	-3.15	1.85	-2.20	-42.21	-40.68
SSA	418,823	227.86	507.21	145.30	462.69	532.94	370.04	692.85
Numbers of losers		10	13	9	5	6	9	5

*scenario with specific treatment of GTAP data issues

Table 12 shows that the distribution of the real income gains and losses differ depending on the type of trade integration. It is noteworthy that South Africa reaps most of the gains from from regional integration, DDA and is also positively impacted by DFQF. As a consequence, any combination of those scenarios would bring positive significant changes for the country. Nigeria would be negatively impacted by regional integration but gains the

most from the DDA. On the contrary, Rest of Western Africa does benefit the most from regional integration and DFQF but would be negatively impacted by a DDA. Both types of regional integration have a negative impact on a higher number of countries than multilateral integration would have, which could explain why regional integration is harder to agree on for those countries. DFQF reduces the number of loosers the most, leading to losses only for some of the non least developed countries of the region.

Interestingly, the "DFQF+ Reg FTA*" scenario is the one that brings the least numbers of loosers while maximizing total gains for Sub-Saharan Africa. In fact, apart from Ethiopia, Mauritius, Nigeria, who lose from both trade agreement or Zambia and Zimbabwe whose losses from regional integration are not compensated by gains in DFQF, all other countries would gain in that scenario. The highest sub-Saharan African gains woud leave more room for compensation of the losers.

3.4. Sensitivity to the baseline scenario

Considering that the EU is the main trade partners for sub-Saharan African countries, the impacts of potential outcomes of the current negotiations between the EU and Sub-Saharan countries is tested on the baseline and on other scenarios. Main results compared to the previous ones are presented in Table 13.

Table 13: Comparison of main results for Sub-Saharan Africa with alternative scenarios of EPA negotiations

	GDP (volume) per cent change			Real Income (per cent change)			nb of loosers in SSA (Real Income)			share processed in increased agricultural export volume		
	none	EPA	GSP	none	EPA	GSP	none	EPA	GSP	none	EPA	GSP
Baseline	n.a.	0.10	-0.01	n.a.	-0.01	-0.03	n.a.	13	8	n.a.	46%	0%
DDA*	0.09	0.19	0.09	0.03	0.02	0.01	9	11	9	41%	46%	0%
DFQF*	0.04	0.14	0.03	0.11	0.10	0.08	5	5	4	40%	43%	12%
Reg FTA	0.06	0.17	0.05	0.05	0.05	0.03	10	12	8	67%	54%	24%
DDA*+ Reg FTA	0.15	0.05	0.05	0.09	-0.11	-0.11	9	14	14	57%	90%	91%
DFQF*+Reg FTA	0.10	0.09	0.09	0.17	0.02	0.02	5	16	14	49%	73%	75%

*scenario with specific treatment of GTAP data issues

It is noteworthy that both the EPA and its counterfactual scenario by themselves would increase GDP in volume but decrease Sub-Saharan African real income and lead to a high number of losers. Thus it seems logical that their interaction with other scenario could increase GDP (volume) in the case of EPA, but would decrease GDP for GSP and in all case decrease real income.

Similarly to previous results, we find that in terms of welfare and GDP volume, gains are of similar order of magnitude for regional integration and multilateral integration, DDA being the most beneficial in terms of GDP volume, closely followed by Regional FTA, but DFQF being the most beneficial in terms of real income, followed by Regional FTA. Regional integration still fosters a higher share of processed agricultural exports, even if it is reduced by the interaction with either EPA or GSP. Independently of the outcome of EPA negotiations, regional integration brings twice as much losers as DFQF, but is closely followed by DDA.

But contrary to previous results, a combined regional and multilateral integration would highly decrease GDP and welfare gains leading to losses in most sub-Saharan African countries, the gains being concentrated for South Africa, Rest of Western Africa.

Concluding remarks

The shifting trade context induces complex challenges and opportunities for Sub-Saharan African countries pursuing agricultural export led growth. General equilibrium modeling is a convenient way to assess impacts of trade policies in a consistent framework. Many simulations in the past have considered sub-Saharan African interests and constraints, and have highlighted important features of trade liberalization such as the erosion of preferences and the issue of tariffs peaks and tariff escalation at the multilateral level and risk of tariff revenue and terms of trade losses at the regional level. But they have not looked at the question of comparison of different schemes of trade integration. As there is no consensus on whether sub-Saharan Africa should focus on regional or multilateral first, this studies brings new comparable results to fuel the debate, testing also the interactions of various combination of trade integration. Furthermore the main assumption of this study is that not all export growths are equivalent and that an increased processing of agricultural exports is required for a sustainable growth.

First by simulating the Doha Development Agenda combined with an ambitious Duty Free Quota Free and comparing the results with those two trade agreements alone, this study shows that the DFQF proposal would indeed rebalance the gains from the Doha Round towards least developed countries. But it also argues that even in a "DDA+DFQF" scenario developed countries would reap most of the gains from trade integration.

Secondly by simulating different types of regional integration this study reveals that regional integration could deliver as much as multilateral integration for sub-Saharan Africa in terms of GDP, real income growth and agricultural exports volumes.

Third it highlights the fact that patterns of agricultural exports growth do indeed differ between different trade integration schemes since they depend on initial trade patterns and are driven by the relative competitiveness of other exporters granted same market access. The simulations show that this consideration is crucial for Sub-Saharan African agricultural growth perspectives, since any multilateral integration would encourage further specialization of the region in the exports of unprocessed agricultural exports. This trend is not coherent with the view that sub-Saharan African countries should not only diversify their export products but also capture more value added on their exports. On the contrary deeper regional integration would foster the processing of agricultural exports. The implication of those results is that in order for a multilateral integration, even preferential such as the "DFQF", to be coherent with sub-Saharan African countries's stake to capture more value added in agriculture, sub-Saharan African countries need to first increase their competitiveness. Regional integration could be a way to do so, since it would enable most countries to combine increased exports volume and increase value added captured.

Fourth, looking at the distribution of gains and losses across sub-Saharan African countries, this study draws the attention to the fact that more countries would experience a decrease in their national real income with regional integration than with multilateral integration, especially DFQF. But it also reveals that DDA would bring almost the same numbers of losers than regional integration. Furthermore, parts of the losses from regional integration are accruing because of the tariff revenue losses associated with decreased tariff barriers on regional trade. Ways to compensate for those tariff losses might help the countries be more favorable to the regional option.

Finally, this studies wishes to call GTAP data users to caution when simulating drastic market access opening for sub-Saharan African countries. As this study illustrates, some well documented data issues can contribute to significant “virtual trade flows” being created leading to bias towards an overestimation of the potential benefits from multilateral trade integration.

Annexes

Annex 1 Description of the MIRAGE model

This study uses the MIRAGE (Modeling International Relationships in Applied General Equilibrium) model, which is a multisector, multiregion economic model initially developed by the CEPII and ITC for trade policy analysis. It is a relatively standard, neo-classical model which assumes constant returns to scale and perfect competition in the agricultural sectors and allows for the assumption of imperfect competition in industry and services. The model has a sequential dynamic recursive set-up solved in a sequence of static equilibria linked by population and labor force growth, capital accumulation and productivity. The production function assumes perfect complementarity between value-added and intermediate consumption. On the value-added side, production makes use of five factors: land, skilled and unskilled labor, capital, and natural resources. Skilled labor and capital are perfectly mobile across sectors, but land is specific and imperfectly mobile in primary agriculture and natural resources are specific to the extractive sectors.

Full employment is assumed for all factors except for land. The supply of land is endogenous and depends on the land supply elasticity of the country and on the real rate of remuneration. Skilled labor is perfectly mobile across sectors. Unskilled labor is imperfectly mobile between agricultural and nonagricultural sectors according to a CES function. Growth rates of labor supply are set exogenously. The supply of capital is modified each year by depreciation and investment. Installed capital is sector-specific but new capital is allocated amongst sectors according to an investment function that depends on the rates of return and the sector stock of capital.

The sectoral composition of the intermediate consumption aggregate stems from a CES function. For each sector of origin, the nesting is the same as for final consumption, meaning that the sector bundle has the same structure for final and intermediate consumption. On the demand side, the model assumes that each region has a representative agent whose utility function is intratemporal and allocates a fixed share of regional income to savings and uses the rest to purchase final consumption. Below the first-tier Cobb-Douglas function, the preferences for final consumption across sectors are represented by a LES-CES function.

The model assumes that products from developed and developing countries belong to two different quality ranges and the substitutability between products from the same quality range is stronger than between those from different quality ranges. Additionally, within a given quality range, there is less substitutability between domestic products and foreign products than between foreign products from different origins. The model's macroeconomic closure assumes endogenous real exchange rates while maintaining fixed trade balance, equal to the initial value for each region.

Annex 2 Mapping of the regional decomposition: 29 regions of which 18 from Sub-saharan Africa

Simulation Regions	GTAP Description	Zones of interest
EU	AUT, BEL, DNK, FIN, FRA, DEU, GRC, HUN, IRL, ITA, LUX, NLD, POL, PRT, ESP, SWE, GBR, NOR, ROU, BGR	Developped
USA	USA	Developped
Japan	JPN	Developped
Rest of the World	AUS, NZL, XOC, CAN, XNA, CYP, CZE, EST, LVA, LTU, MLT, SVK, SVN, CHE, XEF, ALB, BLR, HRV, RUS, UKR, XEE, XER, KAZ, KGZ, XSU, ARM, AZE, GEO, IRN, TUR, XWS	Developed
Brazil	BRA	Emerging Economies
China	CHN	Emerging Economies
India	IND	Emerging Economies
Asian Tiger	HKG, KOR, TWN, MYS, SGP, THAI	Emerging Economies
Rest of Asia	XEA, KHM, IDN, LAO, MNR, PHL, THA, XSE, BGD, PAK, LKA, XSA	Other Developing Countries
Rest of Southern America	MEX,ARG,BOL,CHL,COL,ECU,PRY,PER,URY,VEN,XSM,CRI,GTM,NIC,PAN,XCA, XCB	Other Developing Countries
Northern Africa	EGY, MAR, TUN, XNF	Other Developing Countries
Bostwana	BWA	Sub-Saharan Africa
Ethiopia	ETH	Sub-Saharan Africa
Madagascar	MDG	Sub-Saharan Africa
Mozambique	MOZ	Sub-Saharan Africa
Mauritius	MUS	Sub-Saharan Africa
Malawi	MWI	Sub-Saharan Africa
Nigeria	NGA	Sub-Saharan Africa
Senegal	SEN	Sub-Saharan Africa
Tanzania	TZA	Sub-Saharan Africa
Uganda	UGA	Sub-Saharan Africa
South Africa	ZAF	Sub-Saharan Africa
Zambie	ZMB	Sub-Saharan Africa
Zimbabwe	ZWE	Sub-Saharan Africa

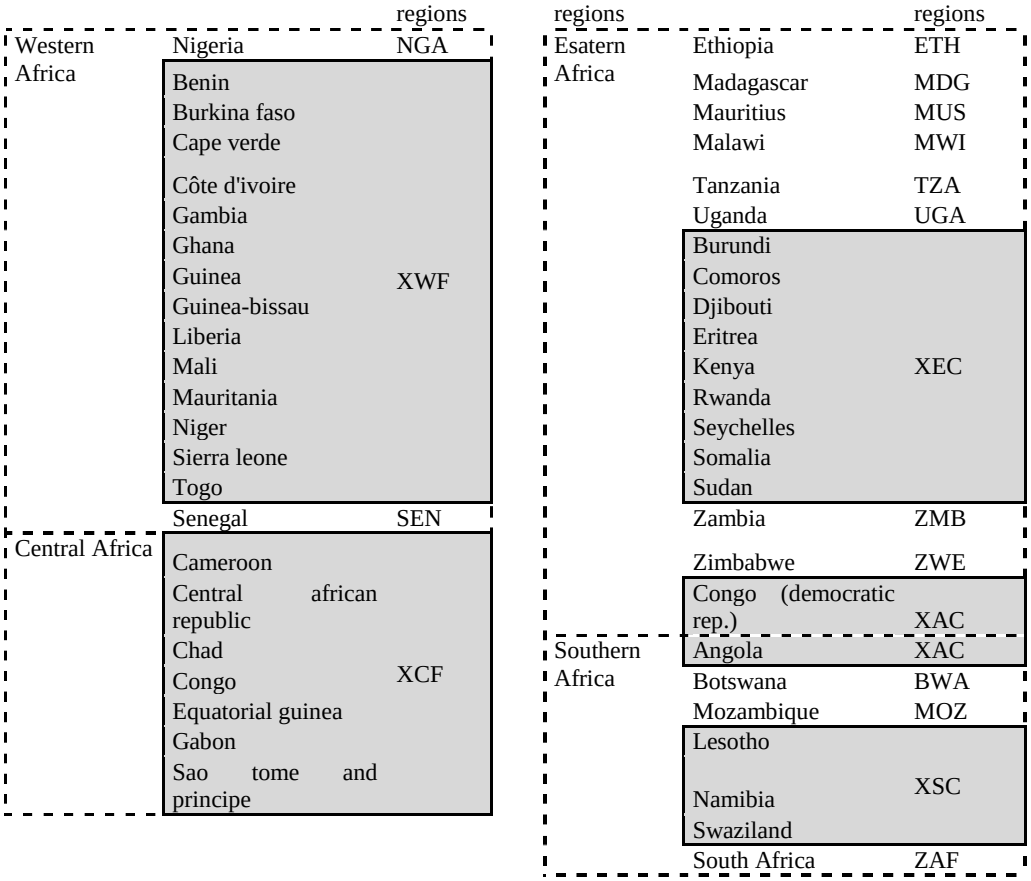
Rest of South Central Africa	XAC	Sub-Saharan Africa
Central Africa	XCF	Sub-Saharan Africa
Rest of Eastern Africa	XEC	Sub-Saharan Africa
Rest of South African Customs Union	XSC	Sub-Saharan Africa
Rest of Western Africa	XWF	Sub-Saharan Africa

Annex 3 Mapping of the sectoral decomposition: 28 sectors of which 20 agricultural

Definition	GTAP sector	Sector of interest
Paddy rice	Pdr	Raw agricultural and food products
Processed rice	Pcr	Raw agricultural and food products
Wheat	Wht	Raw agricultural and food products
Cereals	Gro	Raw agricultural and food products
Cattle	ctl, cmt	Raw agricultural and food products
Milk	Rmk	Raw agricultural and food products
Vegetable and Fruits	v_f	Raw agricultural and food products
Other crops	Ocr	Raw agricultural and food products
Other animal product	Oap	Raw agricultural and food products
Oilseeds	Osd	Raw agricultural and food products
Sugar plants	c_b	Raw agricultural and food products
Plant based fiber	Pfb	Raw agricultural and food products
Other food products	Ofd	Processed agricultural products industries
Other processed meat products	Omt	Processed agricultural products industries
Sugar	Sgr	Processed agricultural products industries
Bevarages and Tobacco	b_t	Processed agricultural products industries
Fishing	Fsh	Fishing
Dairy products	Mil	Food staple
Textile	tex, wap, lea	Other
Wood and paper industry	frs, lum, ppp	Other
Other manufactured products	crp, nmm, omf	Other
Primary	coa, oil, gas, omn, p_c, i_s, nfm, fmp	Other
Services	ely, gdt, wtr, ofi, isr, obs, ros, osg, dwe	Other
Trade	Trd	Other
Transport	atp, cmn, otp, wtp	Other
Transport and Equipment	mvh, otn, ele, ome, cns	Other

Annex 4 The sub-Saharan countries in GTAP 7 and the EPA regions

EPA regions	Country	GTAP 7	EPA	Country	GTAP 7



Annex 5 Top 20 tariff cuts for SSAn agricultural exports in the DDA scenario

Exporters	Importers	Sectors	Tariff cut (as % of initial tariff)	Equivalent tariff reduction	Tariff in the DDA scenario	Initial trade (10^6 $)
Malawi	USA	Exports Crops	-60.79	-0.32	0.20	55.58
Rest of Eastern Africa	Asian Tigers	Oilseeds	-67.71	-0.71	0.34	20.40
Rest of Eastern Africa	Rest of the World	Cattle	-19.01	-0.02	0.08	209.06
Rest of Eastern Africa	Rest of the World	Exportable Crops	-35.08	-0.06	0.12	132.19
Rest of Western Africa	Japan	Other Food products	-41.10	-0.02	0.04	130.66
Rest of Western Africa	Nigeria	Other Food products	-25.96	-0.07	0.19	67.00
Rest of Western Africa	Nigeria	Vegetables and Fruits	-50.00	-0.50	0.50	8.35
Rest of Western Africa	Nigeria	Beverages and Tobacco	-64.50	-0.90	0.50	3.48
South Africa	Asian Tigers	Vegetables and Fruits	-52.39	-0.10	0.09	71.54
South Africa	Asian Tigers	Other Food products	-50.22	-0.07	0.07	69.67
South Africa	Asian Tigers	Sugar	-52.13	-0.11	0.10	40.92
South Africa	Japan	Other Food products	-47.21	-0.06	0.07	64.97
South Africa	Japan	Vegetables and Fruits	-49.54	-0.06	0.06	43.01
South Africa	Japan	Sugar	-30.25	-0.36	0.83	28.46

South Africa	Nigeria	Beverages and Tobacco	-59.73	-0.69	0.47	21.27
South Africa	Nigeria	Other Food products	-35.26	-0.16	0.30	16.81
South Africa	Rest of the World	Vegetables and Fruits	-31.51	-0.04	0.09	203.83
South Africa	Rest of the World	Other Food products	-15.98	-0.02	0.12	153.94
South Africa	Rest of the World	Beverages and Tobacco	-17.71	-0.06	0.29	75.39
Zimbabwe	USA	Exports Crops	-66.51	-0.37	0.18	14.06

Annex 6 Top 20 tariff cuts for SSAn agricultural exports in the DFQF scenario

Exporters	Importers	Sectors	Tariff cut (as % of initial tariff)	Equivalent tariff reduction	Tariff in the DFQF scenario	Initial trade (10^6 $)
Malawi	India	Vegetables and Fruits	-100	-0.44	0.00	3.45
Malawi	Rest of South America	Other Food products	-87	-0.26	0.04	8.44
Malawi	Rest of the World	Other Food products	-15	-0.02	0.14	63.84
Malawi	USA	Other Food products	-100	-0.52	0.00	55.58
Mozambique	India	Vegetables and Fruits	-100	-0.31	0.00	23.85
Mozambique	India	Sugar	-100	-1.00	0.00	2.43
Rest of Eastern Africa	Asian Tigers	Oilseeds	-94	-0.99	0.06	20.40
Rest of Eastern Africa	India	Vegetables and Fruits	-45	-0.16	0.20	9.61
Rest of Eastern Africa	Japan	Exports Crops	-84	-0.06	0.01	53.14
Rest of Eastern Africa	Rest of South America	Exports Crops	-41	-0.07	0.10	29.19
Rest of Eastern Africa	Rest of the World	Cattle	-46	-0.05	0.06	209.06
Rest of Eastern Africa	Rest of the World	Oilseeds	-46	-0.04	0.05	94.94
Rest of Western Africa	Asian Tigers	Oilseeds	-65	-0.23	0.12	5.43
Rest of Western Africa	India	Vegetables and Fruits	-50	-0.16	0.17	157.55
Rest of Western Africa	India	PlantFib	-95	-0.09	0.01	47.91
Rest of Western Africa	Japan	Other Food products	-14	-0.01	0.05	130.66
Tanzania	India	VegFruits	-100	-0.31	0.00	67.55
Tanzania	India	PlantFib	-100	-0.10	0.00	13.04
Tanzania	India	Exports Crops	-100	-0.78	0.00	2.79
Uganda	USA	Exports Crops	-100	-0.15	0.00	17.36

Annex 7 Top 20 tariff cuts for SSAn agricultural exports in the DDA+DFQF scenario

Exporters	Importers	Sectors	Tariff cut (as % of initial tariff)	Equivalent tariff reduction	Tariff in the DDA+ DFQF scenario	Initial trade (10^6 $)
Malawi	USA	Exports Crops	-100	-0.52	0.00	55.58

Mozambique	India	Vegetables and Fruits	-100	-0.31	0.00	23.85
Rest of Eastern Africa	AsianTig	Oilseeds	-98	-1.02	0.02	20.40
Rest of Eastern Africa	Rest of the World	Cattle	-47	-0.05	0.06	209.06
Rest of Eastern Africa	Rest of the World	Exports Crops	-36	-0.07	0.12	132.19
Rest of Eastern Africa	Rest of the World	Oilseeds	-53	-0.05	0.04	94.94
Rest of Western Africa	India	Vegetables and Fruits	-50	-0.16	0.17	157.55
Rest of Western Africa	India	PlantFib	-95	-0.09	0.01	47.91
Rest of Western Africa	Japan	Other Food products	-50	-0.03	0.03	130.66
Rest of Western Africa	Nigeria	Other Food products	-26	-0.07	0.19	67.00
Rest of Western Africa	Nigeria	Vegetables and Fruits	-50	-0.50	0.50	8.35
South Africa	AsianTig	Vegetables and Fruits	-52	-0.10	0.09	71.54
South Africa	AsianTig	Other Food products	-50	-0.07	0.07	69.67
South Africa	AsianTig	Sugar	-52	-0.11	0.10	40.92
South Africa	Japan	Sugar	-30	-0.36	0.83	28.46
South Africa	Nigeria	BevTobac	-60	-0.69	0.47	21.27
South Africa	Rest of the World	Vegetables and Fruits	-32	-0.04	0.09	203.83
South Africa	Rest of the World	BevTobac	-18	-0.06	0.29	75.39
Tanzania	India	Vegetables and Fruits	-100	-0.31	0.00	67.55
Zimbabwe	USA	Exports Crops	-67	-0.37	0.18	14.06

Annex 8 Top 20 tariff cuts for SSAn agricultural exports in the Regional FTA scenario

Exporters	Importers	Sectors	Tariff cut (as % of initial tariff)	Equivalent tariff reduction	Tariff in the Regional FTA scenario	Initial trade (10^6 $)
Rest of SACU	Rest of Southern Africa	Beverage and tobacco	-83	-0.23	0.05	67.50
Rest of Eastern Africa	Rest of Eastern Africa	Other exportable crops	-100	-0.11	0.00	47.62
Rest of Eastern Africa	Rest of Eastern Africa	Other food products	-100	-0.10	0.00	28.36
Rest of Eastern Africa	Rest of Eastern Africa	Vegetables and Fruits	-100	-0.17	0.00	16.41
Rest of western Africa	Nigeria	Beverage and tobacco	-100	-1.40	0.00	3.48
Rest of western Africa	Nigeria	Cattle	-100	-0.19	0.00	40.37
Rest of western Africa	Nigeria	OilFats	-100	-0.69	0.00	6.16
Rest of western Africa	Nigeria	Other food products	-100	-0.26	0.00	67.00
Rest of western Africa	Nigeria	Vegetables and Fruits	-100	-1.00	0.00	8.35
Rest of western Africa	Rest of western Africa	OilFats	-100	-0.04	0.00	75.12
Rest of western Africa	Rest of western Africa	Other food products	-100	-0.08	0.00	213.22
Rest of western Africa	Rest of western Africa	Plant for fibers	-100	-0.05	0.00	182.43
Rest of western Africa	Rest of western Africa	Vegetables and Fruits	-100	-0.12	0.00	39.14
South Africa	Mozambique	Other food products	-100	-0.19	0.00	33.10
South Africa	Mozambique	Vegetables and Fruits	-100	-0.22	0.00	16.56
South Africa	Rest of Southern Africa	Beverage and tobacco	-55	-0.13	0.10	86.37
Tanzania	Rest of Eastern	Other exportable crops	-100	-0.21	0.00	17.88

	Africa					
Tanzania	Rest of Eastern Africa	Other food products	-100	-0.28	0.00	28.25
Uganda	Rest of Eastern Africa	Other exportable crops	-100	-0.11	0.00	35.71
Zimbabwe	Rest of Southern Africa	Sugar	-100	-0.20	0.00	15.86

Annex 9 Top 20 tariff cuts for SSAn agricultural exports in the SSA FTA scenario

Exporters	Importers	Sectors	Tariff cut (as % of initial tariff)	Equivalent tariff reduction	Tariff in the SSA FTA scenario	Initial trade (10^6 $)
Mozambique	Malawi	Exports Crops	-100	*-0.22*	0.00	26.13
Rest of SACU	Rest of Southern Africa	Beverage and Tobacco	-100	*-0.28*	0.00	67.50
Rest of Eastern Africa	Rest of Eastern Africa	Other food crops	-100	*-0.11*	0.00	47.62
Rest of western Africa	Nigeria	Other food crops	-100	*-0.26*	0.00	67.00
Rest of western Africa	Nigeria	Cattle	-100	*-0.19*	0.00	40.37
Rest of western Africa	Nigeria	Vegetable and Fruits	-100	*-1.00*	0.00	8.35
Rest of western Africa	Nigeria	Beverage and Tobacco	-100	*-1.40*	0.00	3.48
Rest of western Africa	Rest of central africa	Other food crops	-100	*-0.24*	0.00	34.31
Rest of western Africa	Rest of western Africa	Other food crops	-100	*-0.08*	0.00	213.22
Rest of western Africa	Rest of western Africa	PlantFib	-100	*-0.05*	0.00	182.43
South Africa	Mauritius	Sugar	-100	*-0.80*	0.00	10.32
South Africa	Mozambique	Other food crops	-100	*-0.19*	0.00	33.10
South Africa	Nigeria	Beverage and Tobacco	-100	*-1.16*	0.00	21.27
South Africa	Nigeria	Other food crops	-100	*-0.46*	0.00	16.81
South Africa	Rest of Eastern Africa	Sugar	-100	*-0.31*	0.00	20.16
South Africa	Rest of Southern Africa	Beverage and Tobacco	-100	*-0.23*	0.00	86.37
South Africa	Zimbabwe	Cereals	-100	*-0.25*	0.00	61.75
South Africa	Zimbabwe	Other food crops	-100	*-0.29*	0.00	30.27
South Africa	Zimbabwe	Exports Crops	-100	*-0.60*	0.00	13.29
Tanzania	Rest of Eastern Africa	Other food crops	-100	*-0.28*	0.00	28.25

Annex 10 Top 20 tariff cuts for SSAn agricultural exports in the EPA scenario

Exporters	Importers	Sectors	Tariff cut (as % of initial tariff)	Equivalent tariff reduction	Tariff in the SSA FTA scenario	Initial trade (10^6 $)
Mauritius	EU	Other food products	-33	-0.03	0.05	0.12
Nigeria	EU	Exports Crops	-52	-0.01	0.01	0.73
Nigeria	EU	Other food products	-63	-0.07	0.04	0.45
Rest of Central Africa	EU	Vegetable and Fruits	-26	-0.04	0.10	0.21
Rest of Esatern Africa	EU	Exports Crops	-22	-0.02	0.05	1.22
Rest of Esatern Africa	EU	Other food products	-40	-0.03	0.04	1.34
Rest of Esatern Africa	EU	Vegetable and Fruits	-12	-0.01	0.08	0.30
Rest of SACU	EU	Other food products	-39	-0.07	0.11	0.62
Rest of Western Africa	EU	Exports Crops	-41	-0.01	0.01	8.67
Rest of Western	EU	Oilseeds	-32	-0.01	0.02	0.38

Africa						
Rest of Western Africa	EU	Other food products	-33	-0.02	0.04	9.76
Rest of Western Africa	EU	Vegetable and Fruits	-17	-0.01	0.06	0.21
South Africa	EU	Beverage and Tobacco	-45	-0.13	0.16	0.06
South Africa	EU	Exports Crops	-45	-0.05	0.06	1.15
South Africa	EU	Meat	-37	-0.02	0.03	1.04
South Africa	EU	Oilseeds	-68	-0.07	0.03	0.06
South Africa	EU	Other food products	-43	-0.08	0.10	0.75
South Africa	EU	Sugar	-54	-0.11	0.10	5.11
South Africa	EU	Vegetable and Fruits	-45	-0.08	0.10	2.33
Zimbabwe	EU	Exports Crops	-53	-0.08	0.07	11.12

Annex 11 Top 20 tariff increases for SSAn agricultural exports to the EU in the GSP scenario

Exporters	Importers	Sectors	Tariff increase (% initial tariff)	Ad Valorem Equivalent tariff increase	Tariff in the GSP scenario	Initial trade (10^6 $)
Mauritius	EU	Other Food products	13	0.01	0.09	0.12
Mauritius	EU	Sugar	251	0.26	0.37	0.11
Nigeria	EU	Other Food products	2	0.00	0.11	0.45
Rest of Central Africa	EU	Oilseeds	2	0.00	0.09	0.00
Rest of Central Africa	EU	Other Food products	6	0.01	0.18	0.02
Rest of Central Africa	EU	Vegetables and Fruits	19	0.03	0.16	0.21
Rest of Eastern Africa	EU	Oilseeds	0	0.00	0.04	1.16
Rest of Eastern Africa	EU	Other Food products	3	0.00	0.07	1.34
Rest of Eastern Africa	EU	Vegetables and Fruits	0	0.00	0.09	0.30
Rest of SACU	EU	Cereals	9	0.01	0.18	0.00
Rest of SACU	EU	Meat	1	0.00	0.06	0.01
Rest of SACU	EU	Other Food products	10	0.02	0.19	0.62
Rest of SACU	EU	Sugar	228	0.21	0.30	0.13
Rest of SACU	EU	Vegetables and Fruits	1	0.00	0.19	0.02
Rest of Western Africa	EU	Exports Crops	0	0.00	0.03	8.67
Rest of Western Africa	EU	Oilseeds	3	0.00	0.04	0.38
Rest of Western Africa	EU	Other Food products	2	0.00	0.06	9.76
Rest of Western Africa	EU	Vegetables and Fruits	11	0.01	0.08	0.21
Zimbabwe	EU	Other Food products	14	0.01	0.09	0.01
Zimbabwe	EU	Vegetables and Fruits	7	0.01	0.13	0.02

Annex 12 List of beneficiaries from preference schemes

Modified from Carrere, C., De Melo, J., 2010, "The Doha Round and Market Access for least developed countriess: Scenarios for the EU and US Markets", Journal of World Trade, Janvier 2010, Volume 44, Issue 1, p. 251-290

Categories of preferences		Countries
Sub-saharan African least developed countries		Angola, Benin, Burkina Faso, Burundi, (Cape Verde), Central Africa, Chad, Comoros, Congo (DR), Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea Biss., Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, S.Tome Princ, Senegal, Sierra Leone, Somalia, Sudan, Tanzania, Togo, Uganda, Zambia
Sub-saharan African non least developed countriess		Botswana, Cameroon, Congo, Gabon, Ghana, Ivory Coast, Kenya, Mauritius, Namibia, Nigeria, Seychelles, Swaziland, Zimbabwe
		+ South Africa
Other Pacific and Caribean Cotonou countries	least developed countries	Haiti, Kiribati, Solomon Island, Timor, Tuvalu, Vanuatu, Samoa
	non least developed countries	Antigua,Bahamas, Barbados, Belize, Cook Islands, Cuba, Dominica, Dominican R., Micronesia, Fiji, Grenada, Guyana, Jamaica, Marshall Island, Nauru, Niue, Palau, Papua N.G., St.Ch.&Nevis, St Lucia, St Vincent, Surinam, Tonga, Trinidad ,Tobago
Other least developed countriess being granted EBA		Afghanistan, Bangladesh, Bhutan, Cambodia, Lao PDR, Maldives, Myanmar, Nepal, Yemen
Other GSP countries (non exhaustive list)		Algeria, Argentina, Armenia, Azerbaijan, Bahrain, Belarus, Bolivia, Brazil, Brunei, Chile, China, Colombia, CostaRica, Ecuador, Egypt, ElSalvador, Georgia, Guatemala, Honduras, India, Indonesia, Iran, Iraq, Jordan, Kasakhstan, Kuwait, Kyrgyz,Republic,Lebanon, Malaysia, Mexico, MoldovaMongolia, Montserrat, Morocco, Nicaragua, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Qatar, Russia, SaudiArabia, SriLanka, Syria, Thailand, Tunisia, U.A.Emirates, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam

Scenario with EPA: All EPA countries are granted the same preferences (SSA least developed countries, SSA non least developed countries and Other Pacific and Caribean Cotonou countries).

Annex 13 Impacts of liberalization on the GDP volume of SSA countries

		Absolute GDP(volume) change (mln $)						
	Initial	Reg FTA	*SSA FTA*	*DDA**	*DFQF**	DDA+ DFQF*	DDA+ RegFTA*	DFQF+ Reg FTA*
Botswana	8,696	0.8	1.9	0.7	0.0	0.8	1.4	0.9
CentralAf	38,273	-1.1	26.3	0.1	1.6	1.3	-1.0	0.5
Ethiopia	7,019	-0.1	-0.2	-0.8	0.1	-0.7	-0.9	0.0
Mada	4,417	0.0	0.0	-2.5	0.6	-1.8	-2.6	0.6
Malawi	1,842	1.3	1.9	-15.4	-6.2	-11.0	-14.6	-8.1
Mauritius	6,240	-0.1	-7.0	-3.9	-0.5	-3.6	-4.0	-0.4
Mozambique	6,072	10.2	10.6	0.7	8.0	7.1	10.9	18.6
Nigeria	68,819	34.9	83.8	330.9	-3.9	327.7	363.1	32.0
RoEastAf	50,600	9.1	-2.1	32.6	113.0	116.4	42.4	123.4
RoSACU	9,103	5.8	9.0	-8.7	-1.6	-9.1	-2.8	4.3
RoWestAf	50,843	83.0	85.4	-0.9	27.5	24.3	69.5	109.8
Senegal	7,222	3.3	4.5	1.1	27.9	26.1	4.1	30.3
SthAfrica	214,356	114.0	346.3	173.3	7.8	179.8	284.3	124.3
SthCentAf	24,785	-6.5	10.3	-12.7	12.7	-2.4	-19.2	5.8
Tanzania	11,537	10.6	11.2	2.9	25.7	27.3	13.2	35.0

Uganda	7,298	0.6	4.8	0.9	6.4	5.0	1.4	7.0
Zambia	5,432	31.6	37.2	-1.4	4.2	2.7	30.1	35.3
Zimbabwe	4,121	29.2	29.9	-4.4	1.6	-3.4	23.6	30.2
SSA	526,675	327	654	492	225	686	799	550

Annex 14 Treatment of some data issues in GTAP7

As already documented by David Laborde[19] and other contributors of the GTAP network, they are several issues in the GTAP7 database that if combined can lead to strong overestimation of gains from trade liberalization. Following is a description of those issues and an example of the extent to which they can affect the results of trade liberalization scenarios.

Starting from the GTAP6 database, travelers' expenditures were added to merchandise trade flows by sector instead of being attributed to a tourism sector. For instance, it means that the consumption by Asian tourists and temporary workers in Africa is accounted in the GTAP7 database as exports of goods from Africa to Asia. These "virtual trade flows" increase the bilateral trade flows on which tariff barriers are applied. Thus by comparing trade databases, we can see that the trade flows from some African countries (mainly Eastern Africa, Tanzania, Senegal and Madagascar) to some Asian countries (mainly Japan, China and India) of goods in GTAP7 are higher than in other trade databases such as COMTRADE.

Since by default tariff barriers are applied to the overall trade flows, if those tariffs are reduced following liberalization such as in the DFQF scenario (and to some smaller extent the DDA scenario), those virtual export flows will also expand. The extent to which they will expand is linked to the height of the initial tariff applied, the importance of the demand for the good in the importing country and the supply capacity of the exporting country.

[19] https://www.gtap.agecon.purdue.edu/databases/v7/v7_data_issues.asp

If initially the sectors were protected by prohibitive tariffs and the demand in importing countries is very high, such as rice in Japan, then this export markets becomes very attractive to countries that were already exporting despite the very high tariff (Senegal Tanzania, Madagascar, Rest of Eastern Africa for instance) and those countries are considered very competitive in exporting there. In the end, the extent to which those countries will increase their rice exports to Japan will depend on their supply capacity. As in MIRAGE land is perfectly substitutable among agricultural sectors, we will observe a shift in agricultural production towards rice in those countries (which is not realistic since rice should be irrigated in Africa). But if additionally in the country level input/output data of GTAP7 rice production requires very low quantity of production factors and intermediate inputs, then the supply increases disproportionally : it is specifically the case of Senegal for which imported wheat is the main intermediate input of processed rice (16% of intermediate consumption and only 12% of paddy rice) and Tanzania for which processed rice is exclusively made of paddy rice (which does not require a lot of land) and almost no factor of production. Those discrepancies are common in developing countries' input/output tables in GTAP7 and stem partly from bad contributed tables, partly from error in the sectoral repartition of intermediate consumption and factor uses.

In this paper, the treatment applied was to consider all trade flows from sub-Saharan African countries to Asian countries in paddy rice, processed rice and raw milk as "virtual flows" which should not be liberalized in the multilateral scenario. The impacts on real income by countries are shown in the following table. "*" indicates scenarios with the treatment of virtual flows.

	Inital Real Income	Absolute change in real income (mln $)								
		DDA	DDA*	DDA* /DDA	DFQF	DFQF*	DFQF* /DFQF	DDA+ DFQF*	DDA+ DFQF	DDA+DFQF* /DDA+DFQF
EU	10,593,543	13,794	13,795	100%	-294	-125	42%	13,541	13,712	101%
USA	10,037,684	4,719	4,720	100%	185	175	94%	4,762	4,754	100%
Japan	3,445,072	10,919	10,890	100%	1,963	69	4%	12,113	10,948	90%
ROW	3,228,432	3,585	3,585	100%	-23	8	-33%	3,571	3,604	101%
RoLatAm	1,204,656	-544	-544	100%	-60	-31	52%	-583	-552	95%
Asian Tiger	893,668	597	596	100%	71	3	4%	615	562	91%
China	892,423	-1,007	-1,007	100%	-85	-105	125%	-1,060	-1,072	101%
RoAsia	579,493	563	564	100%	538	491	91%	857	834	97%
India	509,224	11	11	102%	-50	-61	122%	-19	-23	123%
Brasil	461,614	7	7	100%	-22	-41	192%	3	-15	-594%
NorthAfr	202,237	-558	-558	100%	15	-1	-5%	-547	-559	102%

SthAfrica	173,614	91	91	100%	60	8	14%	146	98	67%
RoWestAf	50,051	-5	-6	105%	73	40	55%	60	32	53%
RoEastAf	45,921	25	25	100%	239	193	81%	209	169	81%
Nigeria	38,263	141	141	100%	-11	-15	139%	132	128	97%
CentralAf	24,338	-49	-49	100%	2	5	302%	-48	-44	93%
SthCentAf	19,620	-52	-52	100%	32	34	106%	-22	-20	93%
Tanzania	10,624	11	10	94%	1,729	58	3%	1,671	65	4%
Senegal	7,783	7	7	99%	459	51	11%	429	53	12%
Ethiopia	7,417	2	2	100%	0.1	-0.1	-157%	3	2	93%
Uganda	6,086	5	5	100%	37	20	53%	34	19	55%
RoSACU	6,038	-25	-25	100%	1	-3	-481%	-21	-25	118%
Botswana	6,000	24	24	100%	-1	-0.4	28%	23	23	104%
Mozambique	5,165	2	2	100%	15	15	99%	14	14	99%
Mauritius	4,691	-7	-7	100%	3	-1	-28%	-3	-7	195%
Zambia	4,428	-2	-2	100%	14	11	78%	11	8	72%
Zimbabwe	3,452	-3	-3	100%	8	2	24%	3	-2	-73%
Mada	3,375	-12	-12	103%	79	12	15%	61	-1	-2%
Malawi	1,958	-7	-7	100%	30	32	107%	19	21	110%
World	32,466,867	32,233	32,203	100%	5,009	843	17%	35,974	32,726	91%

We can see that this does not change the results from DDA much, but that it does reduce the world gains from DFQF by 83%. Indeed most of the gains from untreated DFQF are driven by Tanzania (39%), Japan (35%), Rest of Asia (11%) and Senegal (9%) which are reduced respectively by 97%, 96%, 9% and 89% by the treatment. In the DFQF* simulation, most of the gains are then driven by Rest of East Asia, in which most of Asian LDCs are aggregated and in Africa by Rest of Eastern Africa.

Annex 15 Impacts of liberalization on the agricultural exports volume of SSA countries

			Absolute change in agricultural export volumes (mln $)							
		Initial	Reg FTA	SSA FTA	DDA*	DFQF*	DDA+ DFQF*	DDA + Reg*	DFQF +Reg*	DDA+ DFQF+ Reg*
Botswana	Raw ag	70	0.10	0.09	-0.44	-0.05	-0.47	-0.35	0.05	-0.04
Botswana	Processed ag	63	1.09	1.72	-0.93	-0.13	-0.99	0.18	0.96	-1.71
CentralAf	Raw ag	855	-0.75	30.94	15.12	4.06	17.97	14.22	3.28	15.37
CentralAf	Processed ag	191	-0.29	12.18	2.33	14.16	6.52	2.08	13.88	-19.56
Ethiopia	Raw ag	437	-0.52	-1.51	-10.76	0.55	-10.03	-11.35	-0.03	-12.52
Ethiopia	Processed ag	95	-0.36	-0.68	-2.25	0.24	-2.10	-2.61	-0.13	-1.71
Mada	Raw ag	285	-0.05	0.92	-6.19	-0.19	-3.15	-6.30	-0.45	-10.16
Mada	Processed ag	290	0.75	2.34	14.38	10.58	13.73	14.80	11.40	-0.01
Malawi	Raw ag	336	43.49	48.70	53.34	208.73	180.06	104.59	278.15	48.32
Malawi	Processed ag	76	6.44	3.44	-4.40	-14.66	-14.50	1.79	-9.78	1.78
Mauritius	Raw ag	11	0.16	0.45	0.79	-0.06	0.72	0.95	0.09	1.22
Mauritius	Processed ag	843	-1.86	17.70	-22.18	3.36	-20.16	-23.83	1.55	-275.33
Mozambique	Raw ag	156	45.85	48.77	6.15	63.94	57.06	54.23	121.21	45.38
Mozambique	Processed ag	157	16.27	18.19	-0.08	4.96	4.33	15.89	20.98	9.37
Nigeria	Raw ag	413	12.09	18.90	19.23	1.32	19.39	28.77	13.35	14.91

Nigeria	Processed ag	146	10.46	16.99	7.08	0.64	7.64	17.51	11.20	17.74
RoEastAf	Raw ag	2,046	42.00	95.37	56.02	338.61	241.10	97.29	379.84	-77.38
RoEastAf	Processed ag	994	65.92	89.26	48.72	171.72	245.11	114.77	238.31	61.47
RoSACU	Raw ag	237	1.07	-1.28	9.99	0.97	10.38	10.83	2.14	5.72
RoSACU	Processed ag	1,104	48.71	108.70	31.06	7.82	35.81	74.99	57.05	93.79
Senegal	Raw ag	74	0.15	0.20	-0.09	0.92	0.66	0.03	1.14	-2.58
Senegal	Processed ag	402	5.36	13.67	6.01	45.79	39.09	11.29	50.08	-19.28
SthAfrica	Raw ag	2,708	73.50	78.85	66.86	9.35	73.64	139.48	84.38	-48.83
SthAfrica	Processed ag	3,488	167.17	392.28	49.29	8.04	56.50	218.08	178.28	210.31
SthCentAf	Raw ag	23	0.97	1.81	0.05	15.92	15.75	1.02	17.58	1.27
SthCentAf	Processed ag	62	2.72	15.01	1.65	43.28	19.94	4.36	47.38	11.44
Tanzania	Raw ag	535	20.26	36.28	4.87	112.57	107.61	25.30	130.37	22.38
Tanzania	Processed ag	375	52.06	60.45	9.48	229.18	226.38	61.41	269.28	40.42
Uganda	Raw ag	398	9.24	10.98	3.31	18.75	16.98	12.37	27.79	7.86
Uganda	Processed ag	217	12.74	24.78	5.32	28.65	10.66	17.96	40.51	22.29
Zambia	Raw ag	317	-3.55	-13.17	4.96	10.42	9.74	1.47	6.15	-18.60
Zambia	Processed ag	65	5.42	29.38	0.49	0.33	0.35	6.12	5.75	29.20
Zimbabwe	Raw ag	677	85.92	80.15	26.85	3.21	27.96	113.44	89.87	103.31
Zimbabwe	Processed ag	300	45.18	51.99	-2.86	0.75	-2.16	38.16	46.05	-41.42

Annex 16 Changes in tariff revenue, allocation efficiency and terms of trade

	Change in tariff revenue (%GDP)				Per cent change in terms of trade				Per cent change in allocation efficiency			
	Reg FTA	SSA FTA	DDA*	DFQF*	Reg FTA	SSA FTA	DDA*	DFQF*	Reg FTA	SSA FTA	DDA*	DFQF*
Botswana	-0.1%	0.0%	0.0%	0.0%	-0.03	-0.38	0.87	-0.02	0.01	0.02	0.01	0.00
CentralAf	0.0%	-5.2%	-0.7%	0.1%	-0.01	-0.39	-0.40	0.04	0.00	0.10	0.00	0.00
Ethiopia	0.0%	0.0%	0.0%	0.0%	-0.02	-0.06	-0.25	0.03	0.00	0.00	0.00	0.00
Mada	-0.1%	-1.1%	-0.5%	0.1%	-0.01	-0.10	-0.59	0.66	0.00	0.00	-0.05	0.01
Malawi	-28.4%	-30.0%	1.4%	8.9%	-1.56	-1.73	0.96	6.30	0.08	0.10	0.10	0.72
Mauritius	-0.3%	-19.2%	0.0%	-0.1%	0.00	-0.84	-0.13	-0.01	0.00	0.08	-0.03	-0.01
Mozambique	-15.8%	-16.0%	0.1%	0.5%	-0.87	-1.02	0.06	0.67	0.09	0.09	0.00	0.05
Nigeria	-4.1%	-7.8%	-5.0%	-0.1%	-0.25	-0.43	-0.53	-0.05	0.14	0.23	0.45	-0.01
RoEastAf	-1.8%	-6.2%	-0.8%	2.2%	-0.05	-0.57	0.06	1.47	0.02	0.02	0.07	0.17
RoSACU	-0.2%	-0.1%	-0.5%	-0.1%	0.27	0.34	-0.36	-0.05	0.06	0.09	-0.09	-0.02
RoWestAf	-2.0%	-4.3%	0.2%	0.3%	0.87	0.69	-0.08	0.23	0.08	0.08	0.00	0.03
Senegal	-0.6%	-1.6%	0.1%	2.1%	0.30	0.35	0.23	2.60	0.02	0.03	0.00	0.16
SthAfrica	0.1%	0.5%	-0.9%	0.0%	0.31	0.98	-0.09	0.01	0.05	0.14	0.08	0.00
SthCentAf	-6.1%	-7.3%	-0.2%	0.5%	-0.22	-0.33	-0.37	0.27	-0.04	0.05	-0.05	0.04
Tanzania	-2.0%	-8.5%	0.3%	2.2%	0.68	0.15	0.22	3.41	0.06	0.06	0.02	0.12
Uganda	-1.1%	-3.1%	0.1%	0.6%	0.29	0.45	0.33	1.48	-0.01	0.05	0.01	0.05
Zambia	-18.8%	-19.0%	0.1%	0.6%	-1.94	-1.26	-0.04	0.55	0.60	0.70	-0.03	0.06
Zimbabwe	-47.2%	-47.2%	-1.5%	0.4%	-2.50	-2.63	0.22	0.05	0.75	0.77	0.10	0.03
Subsaharan Africa	-2.1%	-3.9%	-1.1%	0.4%	0.06	0.13	-0.16	0.26				

References

Berisha-Krasniqi V., Bouët A., Mevel S., 2008, Economic partnership agreements between the European Union and African, Caribbean, and Pacific Countries: What is at stake for Senegal, IFPRI discussion papers 765, International Food Policy Research Institute

Bora S., Bouët A. and Roy D., 2007. The marginalization of Africa in world trade, Research briefs 7, International Food Policy Research Institute (IFPRI)

Bouët A., 2008, The Expected Benefits from Trade Liberalization – Opening the Black box of Global Trade Modeling, Washington DC, IFPRI Food Policy Review 8.

Bouët A., Y. Decreux, L. Fontagné, S. Jean and D. Laborde, 2008, Assessing Applied Protection across the World, Review of International Economics, 16(5), 850-863

Bouët A., Bureau J.-C., Decreux Y. and Jean S., 2005, Multilateral Agricultural Trade Liberalization: the Contrasting Fortunes of Developing Countries, The World Economy, September, 28(9): 1329-1354.

Bouët A., Mevel S. and Orden D., 2007, More or less Ambition in the Doha Round: Winners and Losers from Trade Liberalization with a Development Perspective, The World Economy, 30(8): 1253-1280.

Bouët A., Mevel S. and Orden D., 2006, Two Opportunities to Deliver on the Doha Development Pledge. IFPRI Research Brief No. 6

Bouët A., Laborde D., 2010, Eight Years of Doha Trade Talks: Where Do We Stand?", Estey Centre Journal of International Law and Trade Policy, 11(2): 349-70.

Bouët A., Laborde Debucquet D., Dienesch E., Elliott K., 2010, The Costs and Benefits of Duty-Free, Quota-Free Market Access for Poors Countries: Who and What Matters?, CATT WP No. 11.

Bouët A., Roy D., 2008, Does Africa Trade Less than it Should, and If So, Why? The Role of Market Access and Domestic Factors, IFPRI Discussion Paper 00770, May

Boumellassa, H., Laborde D. and Mitaritonna, C. (2009), A consistent picture of protection across the world in 2004: MAcMapHS6 version 2', IFPRI Discussion Paper 167.

Bourguignon F, Bussolo M, Cockburn J, 2010, Macro-Micro Analytics: Background, Motivation, Advantages and Remaining Challenges, Guest Editorial, International Journal of Microsimulation(2010) 3(1) 1-7

Cervantes-Godoy D., Dewbre J., 2010, Economic Importance of Agriculture for Poverty Reduction, OECD Food, Agriculture and Fisheries Working Papers, No. 23,OECD Publishing.

Chemingui M.A., Bchir M. H., 2009, Does multilateral trade liberalization matters for poverty reduction in Africa ? IPAN draft document GTAP 2010 conference paper, unpublished

Davis D., Mishra P., 2007, Stolper-Samuelson is Dead and Other Crimes of Both Theory and Data, in Ann Harrison eds. Globalization and Poverty: University of Chicago Press and the National Bureau of Economic Research, March, 2007

Decreux Y., Valin H., 2007, MIRAGE, Updated Version of the Model for Trade Policy Analysis: Focus on Agriculture and Dynamics CEPII Working Paper, N°2007-15, October 2007

De Janvry A. and Sadoulet E., 2010, Agriculture for Development in Africa: Business-as-Usual or New Departures? *Journal of African Economics (2010) 19(suppl 2): ii7-ii39*

Delgado, C., Hazell, P., Hopkins, J., et al., 1994. Promoting intersectoral growth linkages in rural Africa through agricultural technology and policy reform. American Journal of Agricultural Economics, 76

Diao X., Dorosh P., Rahman S. M., Meijer S., Rosegrant M., Yanoma Y., Li W., 2003, Market opportunities for African agriculture : an examination of demand-side constraints on agricultural growth. DSGD discussion paper n°1. International Food Policy Research Institute

Elliott K. A., 2010, Open Markets for the Poorest Countries, Trade Preferences That Work;The CGD Working Group on Global Trade Preference Reform, April 2010.

FAO, 2010, The state of Food Insecurity in the World.

Fontagné L., Mitaritonna, Laborde, 2008, AN IMPACT STUDY OF THE EU-ACP ECONOMIC PARTNERSHIP AGREEMENTS (EPAS) IN THE SIX ACP REGIONS, report prepared for the Commission of the European Union - Directorate General for Trade

Gérard F., Piketty M. G., 2008, Trade Liberalization on Poverty: Sensitivity of Results to Factors Mobility Among Sectors Working Paper Moisa n° 5/2008

Harrison, McLaren, McMillan, 2010, Recent Findings on Trade and Inequality. NBER Working Paper No. 16425.

Hertel, Keeney, 2009, The poverty Impacts of Global Commodity Trade Liberalisation, Agricultural Distorsion Working Paper

Hertel, Keeney, Ivanic, Winters, 2006, Distributional Effects of WTO Agricultural Reforms in Rich and Poor Countries, GTAP Working Paper N°33

IAASTD, 2008, Agriculture at a crossroads, Full report.

Jean S., Laborde D., Martin W., 2008, Choosing Sensitive Agricultural Products in Trade Negotiations, CEPII Working Paper, N°2008-18

Karam, F., 2009, Migration and Economic Development: A Computable General Equilibrium, Approach of the Moroccan Case, PhD Thesis, Université de Paris I

Keck, Piermartini , 2005, The Economic Impact of EPAs in SADC Countries, WTO Economic Research and Statistics Division Staff Working Paper,

Kowalski P., Sherperd B, 2006, South-South Trade in Goods." OECD Trade Policy Working Paper No. 40, October 16.

Laborde D., Martin W., 2010a, Modalities for Non-agricultural Market Access. 24 October 2010.

Laborde D., Martin W., 2010b, Agricultural Market Access. 24 October 2010

Ng, F., Aksoy, M.A., 2008, Who are the net food importing countries, Trade Team, Development Research Group Paper n°4457, World Bank.

Ng, F., and A. Yeats. 2000. On the Recent Trade Performance of Sub-Saharan African Countries: Cause for Hope or More the Same? The World Bank, Washington, D.C.

Ng F., and A. Yeats. 2002. What can Africa Expect from Its Traditional Exports? Africa Region Working Paper Series, Number 26, The World Bank, Washington, D.C.

Nuetah J.A., Xin X., Zuo T., Does Trade liberalization Make the poor better off ? sub-Saharan Africa and the Doha Agricultural Trade reform GTAP conference paper 2010

Poulton C. Tyler G.,Hazell P., Dorward A., Kydd J., Stockbridge M., 2010, All-Africa review of experiences with commercial agriculture lessons from success and failure, Background paper for the Competitive Commercial Agricultre in Sub-Saharan Africa (CCAA) Study

Reardon T., Timmer P. 2005. Transformation of markets for agricultural output in developing countries since 1950: How has thinking changed? ch. 13 In R.E Evenson, Pingali P. and Schultz T. P. Handbook of Agricultural Economics: Agricultural Development: Farmers, Farm Production and Farm Markets, Vol. 3.

Rodrik, D. 1998. Trade policy and economic performance in Sub-Saharan Africa. NBER Working Paper 6562. Cambridge, Mass.: National Bureau of Economic Research.

Winters A, et al., 2004. Does trade liberalisation reduce poverty? Report to Department for International Development, London.

World Bank, 2008, Agriculture for Development, Development Report 2008

WTO (2008a), Revised draft modalities for agriculture, World Trade Organization, Geneva. 6 December, TN/AG/W/4/Rev.4

WTO (2008b), Draft modalities for non-agricultural market access, World Trade Organization, Geneva. 6 December, TN/MA/W/103/Rev.