

8. TOWARDS A CONTINENTAL FREE TRADE AREA IN AFRICA: A CGE MODELLING ASSESSMENT WITH A FOCUS ON AGRICULTURE

Acknowledgements

This is a chapter from "Cheong, D., Jansen, M. and Peters, R (eds.). 2013. *Shared Harvests: Agriculture, Trade, and Employment*. International Labour Office and United Nations Conference on Trade and Development". The edited volume was produced with the support of the European Union. The contents of this chapter are the sole responsibility of the authors and can in no way be taken to reflect the views of the ILO, UNCTAD, or the European Union.

8.1 INTRODUCTION

The Abuja Treaty¹ envisions the establishment of an African Economic Community, with the creation of a Pan-African Economic and Monetary Union, by 2028 (African Union Commission, 1991). The road towards the ultimate step of regional integration is not straightforward, however, and to date progress within the eight Regional Economic Communities (RECs) recognized by the African Union Commission² has been made at different paces. Nevertheless, the tripartite agreement among the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), and the Southern African Development Community (SADC), which aspires to launch a free trade area (FTA) among these three RECs by 2014, highlights the deep commitment to African regional integration. Moreover, African ministers of trade met in Kigali in November 2010, recommending to fast-track the creation of a Continental Free Trade Area (CFTA) by 2017. This was reaffirmed in Accra, in December 2011, at the 7th Ordinary Session of African Union Ministers of Trade Conference. More recently, at the African Union Summit in Addis Ababa in January 2012, African heads of state and government endorsed Accra's declaration on "Boosting Intra-African Trade and the Establishment of a Continental Free Trade Area", with 2017 as the indicative date.

¹ The treaty was signed on 3 June, 1991 (in Nigeria) and entered into force on 12 May 1994.

² The eight RECs recognized by the African Union are: the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Southern African Development Community (SADC), the Intergovernmental Authority on Development (IGAD), the Economic Community of West African States (ECOWAS), the Community of Sahel-Saharan States (CEN-SAD), the Economic Community of Central African States (ECCAS), and the Arab Maghreb Union (AMU).

The agricultural sector continues to play a vital role on the African continent. Being the primary source of employment, it is pivotal to the livelihoods of the majority of the population.³ Agriculture generally retains a strategic position in the economic growth profiles of these countries, ensuring food security for its people. Further, the sector remains a significant source of Africa's exports, especially within the continent. Agricultural development, and in particular the consolidation of its competitiveness, is seen both as one of the pillars of much-needed structural transformation and as an avenue to reducing poverty. Removing existing trade-related constraints within the African continent is expected to stimulate intra-African trade, helping to push economies towards more diversified structures of production and leading to significant economic benefits necessary to enhance development in Africa. As such, it is crucial to ensure that the expected gains from such an undertaking will be fairly distributed among the population.

Using the computable general equilibrium (CGE) model MIRAGE, this paper aims to assess the economic impacts of establishing FTAs, and in particular the formation of a CFTA, with a focus on the effects of such trade reforms on agriculture and agricultural employment.⁴ The rest of the paper is organized as follows: The second section provides an overview of Africa's main trade-related challenges, highlighting the importance of agriculture for its economies. The third section describes the methodology used for the analysis. The fourth section presents the main results from the modelling of FTA reforms. The concluding section summarizes the findings and offers policy recommendations.

8.2 AFRICA'S TRADE-RELATED CHALLENGES AND THE IMPORTANCE OF AGRICULTURE

Africa is facing a number of trade-related challenges today. Africa's low share in world exports and low intra-African trade, lack of export diversification, and tariff and non-tariff barriers are briefly discussed below. Other challenges such as poor infrastructure and supply-side constraints are important and have been the focus of other publications, for example, UNCTAD (2006) and UNCTAD (2009).

8.2.1 *Share of African exports in total world exports*

The share of Africa's exports in total world exports is only about 4 per cent. In terms of strictly primary products (i.e. coal, oil, gas, and minerals), however, Africa's share

³ According to the United Nations Economic Commission for Africa (UNECA) in *Assessing regional integration in Africa IV: Enhancing intra-African trade* (2010), agriculture accounts for 70 per cent of the continent's full-time employment.

⁴ It should be noted, however, that, due to the poor quality of employment data and the difficulty of measuring it in the informal sector, only full employment is considered in the modelling exercise. Attempts were made to account for unemployment, but, as explained in section 8.3, these were not retained.

Table 8.1: Percentage share of Africa's exports in total world exports by main sectors, 2010

Total	Agricultural and food products	Primary products	Other industrial products	Services
3.9	7.1	16.	2.1	3.6

Source: Authors' calculations based on MIRAGE model (section 8.3 and annex 8.3).

is significantly higher, at 16.7 per cent. The figure for agricultural and food exports alone is 7.1 per cent (table 8.1). This indicates that Africa performs better in exporting primary, agricultural, and food products than it does for categories of industrial products. (See table 8.8 and annex table A8.5 for detailed product classification.)

8.2.2 Share of intra-African trade

Essentially, African exports are directed outside the continent. The share of trade that is intra-African is very low, at 10.2 per cent (table 8.2). Still, agricultural and food products (along with other industrial products) are the products most likely to be traded within the continent, amounting for about one-fifth of the sector's total exports. Primary products, however, are almost entirely exported outside Africa. Adding value to these primary products could enhance the prospects for Africa's economic transformation and cement its place as the new global growth pole.

Table 8.2: Percentage shares of Africa's exports to Africa versus the rest of the world, for each main sector, 2010

Destination	Total	Agricultural and food products	Primary products	Other industrial products	Services
Africa	10.2	20.0	2.5	19.8	2.3
Rest of the world	89.8	80.0	97.5	80.2	97.7
Africa and rest of the world	100.0	100.0	100.0	100.0	100.0

Source: Authors' calculations based on MIRAGE model.

8.2.3 Export diversification

The structure of Africa's exports to the rest of the world reflects a concentration in primary products and a lack of export diversification (table 8.3). Moreover, the market concentration of African exports is also strong. African products directed towards outside the continent go mainly to just a few partners, namely the European Union and the United States of America, receiving 42.8 per cent and 18.1 per cent, respectively, of African exports to the rest of the world in 2010. Nevertheless, the recent developments in trade relationships between Africa and other developing countries, especially emerging economies, translate into significant exports from African coun-

Shared Harvests: Agriculture, Trade and Employment

Table 8.3: Percentage share of Africa's exports by main sectors, according to their destination, 2010

	Africa	Rest of the world	Africa and rest of the world
Agricultural and food products	18.4	8.4	9.4
Primary products	8.8	39.4	36.3
Industrial products	68.6	31.7	35.4
Services	4.2	20.6	18.9
Total	100.0	100.0	100.0

Source: Authors' calculations based on MIRAGE model.

tries to developing partners. Some 30 per cent of African exports to the rest of the world go to developing countries, with the BRIC countries⁵ taking more than half.

In terms of intra-African trade, the picture is considerably different, as trade of agriculture and food products surpasses that of primary products, at 18.4 per cent and 8.8 per cent, respectively. Moreover, manufactured products represent more than two-thirds of intra-African trade. This statistic suggests that trade within African economies is made up more of sophisticated products than is trade with economies outside the continent. The trade of industrial goods in Africa is, however, dominated by South Africa, which accounts for more than two-thirds of African exports of these goods. Furthermore, since a number of African countries have higher shares of agricultural products among their regional exports than among their global exports,⁶ the impact of regional integration on individual countries can vary and should be assessed.

Table 8.4: Percentage share of Africa's imports by main sectors, according to their origin, 2010

	Africa	Rest of the world	Africa and rest of the world
Agricultural and food products	18.4	9.6	10.6
Primary products	8.8	3.2	3.9
Industrial products	68.6	66.4	66.7
Services	4.2	20.7	18.9
Total	100.0	100.0	100.0

Source: Authors' calculations based on MIRAGE model.

⁵ "BRIC" stands for Brazil, Russia, India, and China.

⁶ See e.g. von Uexkull (2012). Computations based on the MIRAGE model show that 56.5 per cent of agricultural exports from SACU were directed towards the continent in 2010. The figure is 54.1 per cent for Zimbabwe. Countries such as Botswana, Malawi, Mozambique, Senegal, and South Africa also have high shares of agricultural exports destined for African partners.

In terms of import shares, those of agriculture and food exceed those of primary products both from the external world and within Africa (table 8.4). In addition, the share of Africa's total imports of agricultural and food products (regardless of origin) is higher than the corresponding share of Africa's exports (regardless to the destination), as are the absolute volumes. This translates into a negative trade balance (exports minus imports) for Africa of US\$4.8 billion for agricultural and food products in 2010.

8.2.4 *Tariff barriers*

The Abuja Treaty, signed in 1991, provides a clear roadmap detailing six stages⁷ for regional integration in Africa, with the ultimate objective to establish an African Economic Community (AEC) by 2028. Currently in the midst of stage 3, the RECs are expected to move towards the formation of regional FTAs, followed by regional customs unions, to be effective by 2017. Not all the RECs are advancing at the same speed. COMESA, EAC, SADC, ECCAS, and ECOWAS appear on track, having made significant efforts to lower internal tariff barriers, and the EAC in particular is in an advanced stage. IGAD and CEN-SAD are lagging behind. Furthermore, even though tariff barriers on goods have started decreasing within the RECs, they remain quite significant between RECs (figure 8.1).

In this context tariff barriers still constitute significant obstacles to trade within Africa.⁸ African countries generally have relatively good access when exporting to the rest of the world, with a 2.6 per cent average level of protection, thanks to numerous

⁷ Firstly, African countries had until the year 1999 to join an existing economic community or to establish new ones where they did not exist. Secondly, before 2007 each REC was expected to consolidate internal taxes and trade and non-trade barriers and to plan their future reductions. In addition, actions were to be taken to coordinate and harmonize activities among the RECs as well as to enhance sectoral integration in all areas of activities at both regional and continental levels. Thirdly, the RECs were to pursue their regional integration by establishing free trade areas; they have until 2017 to adopt Common External Tariffs (CETs), becoming Regional Customs Unions. Fourthly, no later than 2019, the RECs must set up a continental customs union by coordinating and harmonizing tariffs and non-tariffs systems with the objective of defining a CET band structure for Africa. Fifthly, by 2023 persons must be able to move freely within African states and to establish their residence or firms anywhere on the continent. This will result in the creation of an African Common Market. Finally, a sixth and last step – which must be accomplished by 2028 – leads to the establishment of the AEC and in particular the creation of a Pan-African Economic and Monetary Union.

⁸ All tariff barriers mentioned in this paper correspond to data for 2004 computed from the MAcMap-HS6v2 database using the TASTE software. Unfortunately, the 2004 data are the most recent available on market access at the disaggregated level required for CGE modelling. A newer version of the MAcMap-HS6 database, including data for the year 2007, is currently being developed. Protection structures did not significantly evolve in Africa between 2004 and 2007, however; changes have occurred more recently and essentially within the RECs, thanks in particular to the COMESA–EAC–SADC tripartite initiative. However, we made a comparison with the latest tariff data available from the United Nations Conference on Trade and Development (UNCTAD) TRAINS database and found that the general patterns are essentially unchanged (see section 8.3.1, on methodology, for more details). For more information about the MAcMap-HS6v2 database and tariff aggregation methods, see Boumellassa et al. (2009). For more information about the TASTE software, see Horridge and Laborde (2008).

Shared Harvests: Agriculture, Trade and Employment

Table 8.5: Africa's average protection imposed/faced on their imports/exports⁹

Average imposed protection on imports								Average faced protection on exports							
TOTAL		Agricultural and food		Primary products		Industrial products		TOTAL		Agricultural and food		Primary products		Industrial products	
From Africa	From rest of world	From Africa	From rest of world	From Africa	From rest of world	From Africa	From rest of world	To Africa	To rest of world	To Africa	To rest of world	To Africa	To rest of world	To Africa	To rest of world
8.7%	13.6%	12.4%	19.4%	2.3%	4.7%	9.0%	13.1%	8.7%	2.6%	12.4%	9.5%	2.3%	1.1%	9.0%	2.3%

Source: Authors' calculations based on TASTE software and MacMap-HS6v2 database.

preferential agreements: the Generalized System of Preferences (GSP), the Everything but Arms (EBA) initiative, and the African Growth Opportunity Act (AGO). In contrast, the average protection they face when exporting to African partners is significantly higher, at 8.7 per cent.

These aggregated numbers hide very unequal average protection structures at the product level. The average tariff barriers faced by African countries on primary goods exported both externally as well as within Africa are very low, at 1.1 per cent and 2.3 per cent, respectively. Significant differences appear for other products, however. On one hand, on goods excluding agriculture, food, and primary products exported to the rest of the world, Africa faces relatively low tariff barriers, at 2.3 per cent on average. Protection for these products *within* Africa is considerably higher, at 9.0 per cent on average. On the other hand, exporting agricultural and food products – which are of great importance for African economies, as noted previously – is much more complex due to higher tariff barriers. This remains true whatever the destination, with average protection rates of 9.5 per cent faced by African countries on their exports to non-African partners and 12.4 per cent on Africa's exports to African countries. These high rates partly explain the low levels of intra-African trade.

At the country level tariff barriers imposed or faced are considerably different and reveal extremely complex and heterogeneous protection structures (table 8.5). For example, Swaziland faces the highest average tariff when exporting its agricultural and food products to non-African countries, at 96.7 per cent; Seychelles imposes the highest average tariff on agricultural and food products imported from its African partners, at 53.6 per cent (annex table A8.1).

Tariffs may impede trade, but they also provide revenues for governments. In many African countries the receipts generated by enforcing tariff duties represent an important share of the government's income – nearly 40 per cent of the continent's total tax revenues in 2010¹⁰ – and, therefore, these countries are particularly reluctant

⁹ The MacMap-HS6v2 database does not provide protection data on services.

¹⁰ Authors' calculation based on the MIRAGE model. Tariff revenues represent less than 6 per cent of gross domestic product (GDP) for any African country (World Bank, 2011).

to remove them. More than three-quarters (77.4 per cent) of tariff revenues come from tariffs imposed on non-African countries.¹¹ This is not surprising, as Africa's imports mainly come from outside the continent and also African countries impose, on average, higher tariff rates on non-African imports than on those originating from their African partners (table 8.5). As a consequence, liberalization reforms within the continent will not, in general, entail considerable loss of tariff revenue.

8.2.5 Non-tariff barriers

In addition to tariff barriers, many non-tariff barriers (NTBs) limit African trade. They take multiple forms, such as lengthy customs procedures, sanitary and phytosanitary measures, product standards, anti-dumping measures, countervailing duties, and licensing, as well as lack of infrastructure (even though this is not an NTB per se). This list is not exhaustive, and, moreover, NTBs are often difficult to quantify. Nonetheless, some estimates have attempted to assess the strength of certain non-tariff barriers. For example, according to the World Bank, *Doing Business 2012: Doing business in a more transparent world*, sub-Saharan Africa has made significant improvements over the last few years, implementing reforms aimed at easing trade across borders. However, Africa still lags behind other regions. Indeed, it takes on average 31.5 days to export from a sub-Saharan African country and 37.1 days to import to a sub-Saharan African country. In contrast, these averages are 10.5 days and 10.7 days for high-income OECD countries¹² (table 8.6). This situation is especially challenging for the agricultural and food sectors as, generally, NTBs are higher than for other sectors (see Kee et al., 2009). In particular, agricultural and food products are perishable and subject to strong sanitary and phytosanitary constraints. Therefore, any delay in the export/import process is generally more costly than for other categories of products, as it can result in the loss of the merchandise.

Table 8.6: Average time to export/import by main regions

	Average time to export*	Average time to import*
OECD high income	10.5 days	10.7 days
Latin America & Caribbean	17.8 days	19.6 days
Middle East & North Africa	19.7 days	23.6 days
East Asia & Pacific	21.9 days	23.0 days
Eastern Europe & Central Asia	27.0 days	28.8 days
Sub-Saharan Africa	31.5 days	37.1 days

* Includes inland transport, customs procedures, and port handling.
Source: World Bank (2012).

¹¹ At the country level there are a few exceptions, however (see annex table A8.2).

¹² These figures are average time spent on inland transport, customs procedures, and port handling in the export or import processes.

Considering the high trade protection levels, elimination of tariff barriers following the establishment of FTAs among African economies could lead to substantial increases in trade flows within the continent. This will, however, entail adjustment costs such as tariff revenue losses. If accompanied by other policies – for example, the reduction of non-tariff barriers – benefits could be considerably enhanced and related adjustment costs, offset. Agricultural and food products could reap important gains from such trade policies, as current barriers to trade are particularly significant for these products. The trade-creating effect could lead to higher demand for imports from African countries and, thus, to higher production. Empirical evidence suggests that more trade also could lead to an increase in productivity (Alcala and Ciccone, 2004). In addition, as the majority of the African population relies on agriculture and food production for its livelihood, it is very likely that any economic gains would not be limited to the strictly trade sphere. Also, purchasing power, at least that of those engaged in activities related to agriculture and food, could increase, and, implicitly, poverty could be reduced, as long as employment is also favoured.

To verify the possible effects of reducing trade barriers, a quantitative assessment using a computable general equilibrium (CGE) model was conducted. The methodology chosen for the analysis and the trade reforms analysed are presented briefly in the following section.

8.3 METHODOLOGY AND TRADE REFORMS ANALYSED

8.3.1 Methodology

The analysis employs the MIRAGE multi-country and multi-sector CGE model in its recursive dynamic version. The model is especially well designed for assessing economic impacts of trade policies.¹³ Thanks to many interconnected equations representing behaviours of economic agents and various economic linkages, global CGE models are capable of capturing multiple interactions taking place within the world economy. However, this analysis requires a significant amount of very detailed data. In this analysis the Global Trade Analysis Project (GTAP) database, version 7, is used as a global social accounting matrix (SAM) for the model. It provides information for 53 sectors and 113 countries/regions for the year 2004.¹⁴

For information on protection structures, we rely on the MAcMap-HS6 database, version 2. It provides exhaustive information on market access at the bilateral level for 220 exporter countries and 169 importer countries and for as many as 5,113 products for a particular year. Most notably, it includes all preferential schemes currently

¹³ MIRAGE stands for Modelling International Relationships in Applied General Equilibrium. The model was initially developed at the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) in Paris and is now used in several well-know research centres and international organizations around the world. For the main features of the model, see annex 8.3. A full description of the MIRAGE model can be found in Decreux and Valin (2007).

¹⁴ The GTAP database was developed at Purdue University, Indiana, United States of America. A full description of the database can be obtained from Narayanan and Walmsley, eds. (2008).

active, as well as offering an intuitive aggregation methodology that lends itself to a useful description of tariff barriers to worldwide trade at a specific point in time. Indeed, not only is it possible to aggregate tariff lines using trade weights, but also MACMap-HS6 offers the option to aggregate protection data using a so-called “reference group weight”; in this case the weight used for aggregation does not strictly reflect the trade for the country considered but rather that of a group of countries (group of reference) to which a country belongs according to its income level. As a consequence, the reference group weight limits possible endogeneity bias between trade and protection.¹⁵ Finally, the MACMap-HS6 database, version 2, has an integrated “GTAP scaling” module such that trade flows associated with tariff lines are kept consistent with the trade information from the GTAP database used in the CGE model. For our analysis tariff barriers are first aggregated at the level of sectors and countries/regions of the GTAP database, using the “reference group weight”, before being aggregated at the level of sectors and countries/regions selected for the model following the same aggregation method.

As noted, the protection data from MACMap-HS6v2, which are used for the analysis, are for the year 2004, which is the latest year available at this time (see footnote 8). Although this may appear somewhat outdated, it is critical to note that CGE models are very demanding in terms of data and therefore require very detailed tariff barrier information, which can then be mapped with the GTAP database. MACMap is one of the very few sources that can meet such requirements. The TRAINS database¹⁶ also provides protection data at a quite disaggregated level in both geographic and sectoral dimensions. Computations made using TRAINS for the year 2010 indicate that, although average protection has been lowered since 2004, trade patterns generally have changed little. Specifically, average protection within Africa remains considerably higher than protection faced by African countries on their exports to the rest of the world; average protection in agriculture is the highest of any sector; and average protection in Africa is high, especially between, but also within, regional groups. However, it is very difficult to compare tariffs from different sources and with different methods of tariff aggregation. Unlike the MACMap database, the TRAINS database does not allow for aggregation using a reference group weight, and it also does not offer the possibility to compute aggregated tariffs using trade information fully consistent with the GTAP database. Overall, due to recent average protection reductions within African RECs that are not reflected in the MACMap-HS6v2 database, findings from liberalization scenarios could be slightly overestimated. Nonetheless, the simulations reflect changes that are to be implemented over the long term following a dynamic approach. Therefore, and considering the substantial hindrance to trade opportunities posed by both tariff and non-tariff barriers, the outcomes of the analysis must not be dismissed.

¹⁵ For example, in the case of a prohibitive tariff, imports are discouraged. Thus, if the “trade weight” aggregation method is used, there will be no weight associated with such a tariff line. The “reference group weight” yields more satisfactory outcomes, as it will allow some weight on non-traded tariff lines.

¹⁶ More information can be obtained at the following Internet address: <http://wits.worldbank.org/wits/>.

8.3.2 Geographic and sectoral decompositions

Due to technical restrictions, it is usually advised not to run the MIRAGE model with more than 30 countries/regions and 30 sectors. Therefore, the geographic decomposition for the simulations was limited to 27 countries/regions, with a focus on Africa. All the 16 African countries and the six African regions¹⁷ of the GTAP database, as well as their main partners, the European Union, the United States of America, and the BRIC countries, were maintained; the rest of the countries were aggregated into Rest of Developed Countries and Rest of Developing Countries (table 8.7 and annex table A8.4).

With respect to sectors, key products for African economies were considered, namely, agricultural products and a few industrial sectors such as primary products, petroleum and coal products, mineral and metal products, and also textiles, wearing apparel, and leather products. In other words, the sectoral decomposition takes into account a total of 21 sectors – 12 agricultural sectors, 7 industrial sectors, and 2 services sectors (table 8.8 and annex table A8.5).

8.3.3 Trade reforms analysed

For comparative purposes, two sets of scenarios were designed: regional FTAs and a CFTA, both fully implemented by 2017. In addition, each case considers FTA reforms alone as well as FTA reforms complemented by the improvement of trade facilitation measures. The improvement of the trade facilitation measures is in line with the Action Plan for Boosting Intra-African Trade that the African countries agreed in January 2012 at the African Union Summit. The Action Plan contains other measures besides tariff liberalization that are necessary to improve the performance of intra-African trade. Trade facilitation measures are considered a priority, especially where non-tariff barriers continue to hinder regional trade.

Regarding regional FTAs, full elimination of tariff barriers on goods within, as opposed to between, two regional groups is taken into account. In other words, protection is removed between all the countries belonging to a same specific group, but tariffs between the countries belonging to different groups are maintained. Groupings were determined based on the limitations of the GTAP database (see footnote 17), the multiple overlapping memberships,¹⁸ and the current state of regional integration processes, especially the COMESA–EAC–SADC Tripartite initiative.¹⁹ As a conse-


¹⁷ One of the main limitations of the GTAP database, version 7, is that the detail for African countries is rather sparse. Indeed, only Botswana, Egypt, Ethiopia, Madagascar, Malawi, Mauritius, Morocco, Mozambique, Nigeria, Senegal, South Africa, the United Republic of Tanzania, Tunisia, Uganda, Zambia, and Zimbabwe are represented. The rest of the countries of the continent are gathered into six heterogeneous regions, namely, Rest of North Africa, Rest of Western Africa, Central Africa, Rest of South Central Africa, Rest of Eastern Africa, and Rest of South African Customs Union.

¹⁸ Many African countries belong to more than one REC (table 8.7).

¹⁹ Some 26 African country members of COMESA, EAC, and SADC have agreed to establish a Tripartite FTA by 2014.

Table 8.7: Geographic decomposition

Country/Region	Africa/ Non-Africa	Main regional economic communities								
		COMESA	EAC	SADC	IGAD	ECOWAS	CEN-SAD	ECCAS	UMA	
#										
1 Egypt	Africa									
2 Morocco	Africa									
3 Tunisia	Africa									
4 Rest of North Africa	Africa									
5 Nigeria	Africa									
6 Senegal	Africa									
7 Rest of Western Africa	Africa									
8 Rest of Central Africa	Africa									
9 Rest of South Central Africa (Angola & DRC)	Africa									
10 Ethiopia	Africa									
11 Madagascar	Africa									
12 Malawi	Africa									
13 Mauritius	Africa									
14 Mozambique	Africa									
15 Tanzania	Africa									
16 Uganda	Africa									
17 Zambia	Africa									
18 Zimbabwe	Africa									
19 Rest of Eastern Africa	Africa									
20 Botswana	Africa									
21 South Africa	Africa									
22 Rest of South African Customs Union	Africa									
23 BRIC countries	Non-Africa									
24 Rest of developing countries	Non-Africa									
25 European Union	Non-Africa									
26 United States	Non-Africa									
27 Rest of developed countries	Non-Africa									

 Country/region fully part of the Regional Economic Community (REC)


 At least one country (but not all) in the corresponding region is part of the REC

Table 8.8: Sectoral decomposition

#	Sector	Category
1	Paddy and processed rice	Agriculture
2	Wheat	Agriculture
3	Cereals	Agriculture
4	Oilseeds	Agriculture
5	Sugar cane and sugar beet	Agriculture
6	Cattle, sheep, goats, and horses	Agriculture
7	Animal products and wool	Agriculture
8	Other agricultural products	Agriculture
9	Milk and dairy products	Agriculture
10	Meat products	Agriculture
11	Sugar	Agriculture
12	Other food products	Agriculture
13	Forestry	Industry
14	Fishing	Industry
15	Other primary products	Industry
16	Textile, wearing apparel, and leather products	Industry
17	Petroleum, coal products	Industry
18	Mineral and metal products	Industry
19	Other manufactures products	Industry
20	Transport	Services
21	Other services	Services

quence, one FTA was assumed between COMESA, EAC, SADC, and IGAD,²⁰ while another was considered between ECOWAS, CEN-SAD, ECCAS, and AMU.²¹ In the case of the Continental FTA scenario, all tariff barriers on goods are fully removed within the African continent.

For modelling trade facilitation measures, a database on trade costs related to time currently required for export and import processes, from Minor and Tsigas (2008),²² was employed. More specifically, estimations are used, by country and products, of the percentage of exports and imports lost due to a delay of one day in customs processing and port handling. Decreux and Fontagne (2009) aggregated data on costs at the border at the GTAP level from Minor and Tsigas.²³ Following their methodology, trade costs at the region/sector level of the study were aggregated to allow for calibration of these costs in the model. Reductions of these trade costs – modelled as “iceberg costs”²⁴ – were then applied to reflect improved trade facilitation

²⁰ IGAD is not part of the Tripartite FTA. However, except for Somalia, all country members of IGAD belong to at least one of the three RECs of the Tripartite FTA.

²¹ Of the 28 country members of ECOWAS, ECCAS, or AMU, 16 are also members of CEN-SAD.

²² Hummels (2001) initiated the construction of the database, which was then pursued by the United States Agency for International Development (2007) and further improved by Minor and Tsigas (2008).

²³ Trade weights are used for the aggregation process.

²⁴ “Iceberg costs” imply that when 100 units of a product are exported, 100 or fewer units reach the destination.

between African countries. In other words, we assume that customs procedures and port handling in import and export processes become twice as efficient within Africa by 2017 as they were in 2010.²⁵

Finally, although we considered various scenarios allowing for unemployment in the labour market so as to implement a wage curve in the model following Blanchflower and Oswald's methodology (2005), we present only results based on the assumption of full employment.²⁶ This is obviously imperfect, as it does not reflect well the situation of African economies. However, there are several reasons that motivate such a decision. First, assuming full employment or assuming unemployment – modelled as briefly described above – for the labour factor in the CGE model does not lead to great differences in the results. Moreover, the lack of availability and reliability of unemployment rates for African economies can render the exercise very questionable. Second, another way to represent unemployment in CGE models is to assume that nominal or real wages are fixed. However, this assumption is a source of intense debate, as it does not consider the wage determination process in developing countries (Ben Hammouda and Osakwe, 2006). Third, the full employment assumption appears to be coherent with the medium- to long-term effects of shocks analysed with CGE models (Bouët et al., 2010). Moreover, under a fixed employment hypothesis, a decrease (*increase*) in employment does not necessarily imply increasing (*decreasing*) unemployment in reality. Indeed, the total labour force is constrained yearly (but varies over time in both the baseline and the simulations based on demographic forecasts²⁷), and there will be re-allocation of workers to the sector where remuneration becomes relatively more attractive. In other words, employment in the model will increase where wages become the highest and decrease elsewhere. Therefore, the assumption of fixed employment is likely to slightly underestimate the potential benefits from regional trade liberalization. With unemployment allowed in the labour market, increased demand leads to higher employment, and this expansion of resources could lead to higher gains from trade liberalization.

8.4 PRESENTATION OF MAIN RESULTS WITH A FOCUS ON AGRICULTURE

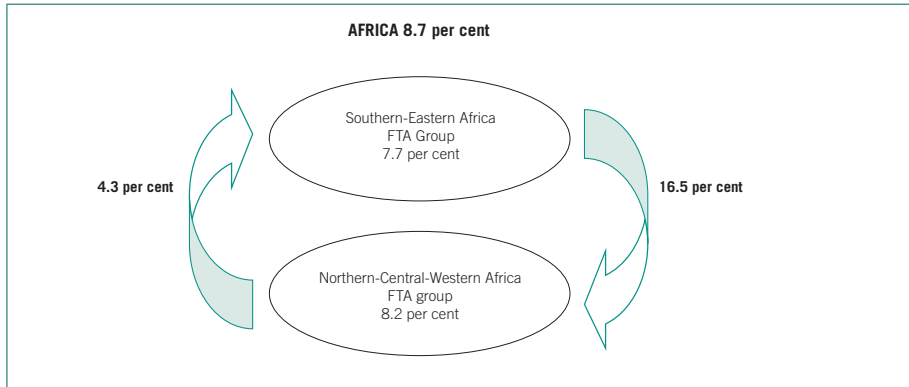
As indicated in section 8.2 (table 8.5), African countries impose relatively high tariff barriers of 8.7 per cent, on average, on their African partners; while those on primary

²⁵ Due to lack of data, we are not accounting for a certain number of other trade costs, such as those associated with the time merchandise is in transit or the costs generated by relatively poor infrastructure per se. For this reason we may underestimate impacts from trade facilitation. Nevertheless, we do not take into account the price to pay for the improvements in trade costs considered in the analysis. Making customs processing or port handling more efficient certainly requires substantial investments (for example, investments in workforce training or in newer equipment).

²⁶ The full employment hypothesis assumes wage flexibility, as there is a fixed aggregate employment in all regions.

²⁷ See annex 8.3 for more details.

Figure 8.1: Average protection structures in Africa



Source: Authors' calculations based on TASTE software and MAcMap-HS6v2 database.

product imports are relatively low, at 2.3 per cent, on average; barriers imposed on industrial and on agricultural and food products are quite significant, at 9.0 per cent and 12.4 per cent, respectively. Therefore, removing protection within defined areas of the African continent could potentially improve considerably market access between African economies and is expected to bring large increases in intra-trade flows. Moreover, while protection within the two defined regional groups, namely, Southern-Eastern Africa FTA group and Northern-Central-Western Africa FTA group, are below the continental average, at 7.7 per cent and 8.2 per cent, respectively, average tariff barriers between regional groups can be as high as 16.5 per cent when countries of the Southern-Eastern Africa FTA group export to those of the Northern-Central-Western Africa FTA group (figure 8.1). This lends support to the case for a CFTA that would fully remove trade barriers within the continent, hence avoiding large tariff distortions between specific groups of countries. However, the elimination of duties will inevitably result in tariff revenue losses. In that respect, trade reforms will be beneficial for African countries overall only if other gains more than compensate for tariff revenue losses.

8.4.1 Exports

Results from the simulations confirm that, at the global level, total exports of African countries would increase with the establishment of larger FTAs. While the formation of two regional FTAs would increase Africa's export to the world by 2.8 per cent (or US\$17.6 billion) in 2022 over the baseline scenario, which assumes no change from 2004 trade policies,²⁸ the creation of a CFTA would increase Africa's exports by 4.0

²⁸ Although we assume that trade reforms are fully implemented by 2017, we compare results by 2022 in order to leave time for variables to adjust in the model. Indeed, due to the dynamics of the model, shocks occurring today will affect certain economic behaviour only tomorrow. For example, investment made this year may bear fruit only in subsequent years.

Table 8.9: Total export volumes by main region – percentage and value changes compared with the baseline scenario, 2022

	Regional FTAs		Continental FTA	
	%	US\$ billion	%	US\$ billion
Africa total	2.8	17.6	4.0	25.3
Developed countries excluding Africa	0.0	-2.1	0.0	-2.9
Developed countries	0.0	-3.2	-0.1	-5.0
World	0.1	12.3	0.1	17.4

Source: Authors' calculations based on MIRAGE model.

per cent (or \$25.3 billion). Other regions that do not implement any trade reforms would see their exports slightly reduced (table 8.9).

As shown in table 8.10, total African exports of agriculture and food products to the world would be the most stimulated by the trade reforms, with 7.2 per cent (or \$3.8 billion) more exports in the case of regional FTAs and 9.4 per cent (or \$5.0 billion) more exports in the case of the continental FTA in 2022 than under the reference scenario. In fact, exports in all agricultural and food sectors would increase

Table 8.10: Africa's export volumes by agricultural and food sectors as well as main sectors – percentage changes compared with the baseline scenario – 2022

	Regional FTAs	Continental FTA
Agriculture and food	7.2	9.4
Paddy and processed rice	1.1	3.2
Wheat	25.7	26.0
Cereals	16.3	16.9
Oilseeds	2.4	3.9
Sugar cane and sugar beet	41.2	38.6
Cattle, sheep, goats, and horses	4.3	4.2
Animal products and wool	0.6	0.5
Other agricultural products	1.1	1.7
Raw milk and dairy products	72.7	101.0
Meat products	13.8	26.2
Sugar	13.7	16.5
Other food products	13.6	17.0
Industry	3.2	4.7
Services	-0.5	-0.6
All sectors	2.8	4.0

Source: Authors' calculations based on MIRAGE model.

with the implemented reforms. The greatest increase would occur in sectors such as wheat, cereals, sugar, meat, milk and dairy, and other food products. Industrial exports at the continental level also would increase, by 3.2 per cent (or \$14.4 billion) when Regional FTAs are established, or 4.7 per cent (or \$21.1 billion) with a CFTA,²⁹ thanks to significant increases in textile and apparel and in other manufactured products (annex tables A8.8 and A8.9). Services exports from Africa experience a trade diversion effect at the global level. Indeed, although the trade reforms increase trade in services within Africa, African exports of services to the rest of the world decrease more than the intra-African trade increases. This reflects the lack of reduction of trade barriers in services in the analysed scenario. Services trade makes up a relatively small share of total African trade.

These projected export variations denote that the reforms would be largely trade-creating for Africa. Indeed, trade-creation effects would more than compensate for trade diversion effects.³⁰ Reductions of African exports to non-African developing countries³¹ and to developed countries³² would be strongly offset by a rise in African exports within the continent (figure 8.2). This would be true in agriculture and food as well as in industrial sectors. For services, however, as mentioned earlier, the increase within Africa would not fully compensate for the decrease in African exports to the external partners.

Overall, the reforms would considerably stimulate intra-African trade, increasing it by 35.7 per cent (or \$23.6 billion) with the establishment of regional FTAs and by 52.3 per cent (or \$34.6 billion) under a CFTA, compared with the baseline, in 2022 (figure 8.2). This would result from exchanges within Africa increasing in all the main sectors. African exports within the continent would rise most in the industrial sector, by 53.3 per cent (or \$27.9 billion) compared with the baseline, in 2022, if a CFTA is established. This would enhance the “sophistication” of intra-African trade, dominated by industrial products, as indicated in tables 8.3 and 8.4. In the same vein, trade of agricultural and food products within the continent also would increase strongly, by 53.1 per cent (or \$5.7 billion) in 2022. Intra-African trade in services would also rise significantly, by 31.9 per cent (or \$1.0 billion), albeit from a lower base, as intra-African trade in services is relatively limited at the onset (tables 8.3 and 8.4).

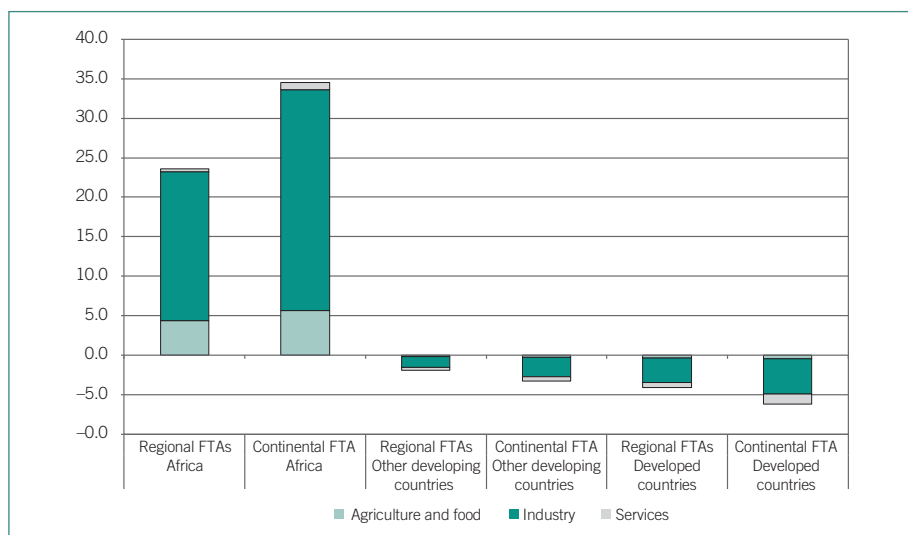
²⁹ In absolute terms African industrial exports would increase the most, as they initially represent a larger share of total African exports.

³⁰ This finding is rather reassuring. Indeed, Krugman (1995) explains that, when most trade is already regional before the establishment of a RTA, it can be expected that trade reform will not greatly reduce trade from outside. However, in the case of Africa, and as intra-African trade is initially low, it is difficult to prejudge whether trade creation or trade diversion will dominate after the formation of RTAs. In that sense, it would not be unreasonable to imagine that trade diversion could have outweighed trade creation after establishment of FTA reforms in Africa.

³¹ African imports from non-African developing countries would decrease by 0.9 per cent (or \$1.9 billion) and by 1.6 per cent (or \$3.2 billion) with regional FTAs and the continental FTA, respectively.

³² African imports from developed countries would decrease by 1.2 per cent (or \$4.1 billion) and by 1.7 per cent (or \$6.2 billion) with regional FTAs and the continental FTA, respectively.

Figure 8.2: Exports of African countries by destinations and main sectors – changes compared with the baseline scenario, 2022 (in US\$ billions)



Source: Authors' calculations based on MIRAGE model.

In other words, following the creation of a CFTA assumed to be effective by 2017, the share of intra-African trade would be enhanced by 52.0 per cent over a 12-year period, rising from 10.2 per cent in 2010 to 15.5 per cent in 2022 (table 8.11). Considering only agricultural and food products, the share of intra-African trade would grow from 20.0 per cent to 28.3 per cent during the same time horizon. Thanks to a considerable increase of trade flows within African economies following the full elimination of tariff barriers, the initially large shares of African industrial and services exports to the rest of the world would be reduced, dropping from 89 per cent in 2010 to 83 per cent in 2022 in industry and from 97.7 per cent to 96.6 per cent in services.

Table 8.11: Evolution of the percentage share of intra-African trade by main sectors, 2010 and 2022

	2022			
	2010	Baseline	Regional FTAs	Continental FTA
Total	10.2%	10.6%	14.0%	15.5%
Agriculture and food	20.0%	20.2%	26.5%	28.3%
Industry	11.0%	11.6%	15.3%	17.0%
Services	2.3%	2.6%	2.9%	3.4%

Source: Authors' calculations based on MIRAGE model.

Shared Harvests: Agriculture, Trade and Employment

Table 8.12: Real income variations by main regions – percentage and value changes compared with the baseline scenario, 2022

	Regional FTAs		Continental FTA	
	%	US\$ billion	%	US\$ billion
Africa total	0.14	203.4	0.20	296.7
Developed countries excluding Africa	0.00	-62.5	-0.01	-97.1
Developed countries	0.00	-69.7	0.00	-106.1
World	0.00	71.3	0.07	93.4

Source: Authors' calculations based on MIRAGE model.

8.4.2 Income

Thanks to significant and positive intra-African trade variations, the formation of FTAs at the regional level would result in an increase in real income of 0.14 per cent (or \$203.4 million) for Africa, compared with the reference case, in 2022. The implementation of a CFTA would bring nearly 50 per cent more gains, amounting to 0.20 per cent (or \$296.7 million). Hence, although real income increases for Africa are relatively small, the analysis implies that Africa as a whole would be better off despite tariff revenue losses resulting from the trade reforms. Non-African countries that do not implement the liberalization reforms and that lose markets to Africa would see their real income diminish in absolute terms as regional integration deepens in Africa (table 8.12).

8.4.3 Wages

In addition, the trade reforms have a positive, although small, impact on real wages for all categories of African workers. Unskilled workers employed in non-agricultural sectors register the highest increase in income, at 0.70 per cent and 0.80 with regional FTAs and a CFTA, respectively. For their unskilled counterparts in the agricultural sector, real wages would increase 0.65 per cent and 0.74 per cent with FTAs at regional and continental levels, respectively. Both trade reforms also would improve the income of skilled workers, but to a lesser extent (table 8.13). These wage increases are in line with the intra-African trade increase highlighted in figure 8.2, showing industrial exports rising more than agricultural exports as a consequence of the implemented liberalization reforms.

8.4.4 Employment

As indicated in table 8.14, in response to larger salary increases for unskilled workers employed in non-agricultural sectors than for those in agriculture, employment in Africa would most likely fall slightly in the agriculture sector, while it would rise

Table 8.13: Real wages in Africa by main qualifications and main sectors of activity – percentage changes compared with the baseline scenario, 2022

	Unskilled real wages in agriculture	Unskilled real wages in non-agricultural sectors	Skilled real wages
Regional FTAs	0.65	0.70	0.49
Continental FTA	0.74	0.80	0.54

Source: Authors' calculations based on MIRAGE model.

Table 8.14: Employment in Africa by main sectors of activity – percentage changes compared with the baseline scenario, 2022

	Employment in agricultural sectors	Employment in non-agricultural sectors
Regional FTAs	-0.07	0.02
Continental FTA	-0.08	0.02

Source: Authors' calculations based on MIRAGE model.

slightly in the industrial sector if the assumption of fixed labour endowment were relaxed and unemployment were considered. These changes would be extremely small, however.

8.4.5 Country-level effects

At the country level results are more ambiguous. While FTA reforms would stimulate exports of all African countries,³³ with higher increases associated with larger areas

³³ Botswana's exports, however, would be unchanged with the FTA reforms. Moreover, only three countries/regions – Botswana, Mozambique, and the rest of SACU – would not benefit more from a continental FTA than from regional FTAs. One reason is that these countries are initially among the least diversified economies in terms of products and market of imports and exports. In terms of imports, these economies depend heavily on South Africa: 34 per cent, 65 per cent, and 71 per cent of Mozambique's, rest of SACU's, and Botswana's imports, respectively, come from South Africa, while 33 per cent of rest of SACU products are exported to South Africa. Some 67 per cent of Mozambique's exports and 76 per cent of Botswana's exports go to the European Union. In addition, mineral and metal products constitute 54 per cent of Mozambique's exports, while 71 per cent of Botswana's exports are primary products.

Shared Harvests: Agriculture, Trade and Employment

free of tariff barriers on goods, real income impacts from implemented FTAs would be very unequal across countries (table 8.15). Although real income variations are rather modest, nearly half of African countries/regions would see their real income decrease with the trade reforms. There are two main reasons for such a situation. First, following the establishment of FTAs, governments have to renounce tariff revenues, which often constitute a significant portion of their incomes.³⁴ Second, the reduction of tariff barriers results in greater competition in African markets. As some

Table 8.15: Exports and real income by African country/region – percentage changes compared with the baseline scenario, 2022

	Exports		Real Income	
	Regional FTAs	Continental FTA	Regional FTAs	Continental FTA
Angola and Democratic Republic of Congo	1.0	1.5	-0.3	-0.3
Ethiopia	4.7	5.0	0.2	0.3
Madagascar	0.5	0.6	0.0	0.1
Malawi	12.3	12.4	-0.6	-0.6
Mauritius	4.3	4.6	-0.9	-0.8
Mozambique	9.5	9.3	-0.5	-0.5
United Republic of Tanzania	16.2	17.0	0.2	0.3
Uganda	3.0	4.9	0.1	0.4
Zambia	17.1	18.5	-0.5	-0.2
Zimbabwe	14.7	14.9	-1.5	-1.4
Rest of Eastern Africa	6.3	7.1	-0.3	-0.2
Botswana	0.0	0.0	-0.2	-0.4
South Africa	2.2	4.2	0.4	0.7
Rest of South African Customs Union	2.1	2.0	1.1	1.1
Egypt	0.4	2.6	0.0	0.3
Morocco	2.7	4.8	0.2	0.0
Tunisia	6.0	6.9	0.6	0.6
Rest of North Africa	1.3	1.8	0.0	-0.1
Nigeria	1.3	2.2	-0.1	-0.4
Senegal	5.9	6.5	0.3	0.3
Rest of Western Africa	6.9	7.9	0.6	0.6
Central Africa	2.8	5.6	0.1	-0.1
Africa	2.8	4.0	0.1	0.2

Source: Authors' calculations based on MIRAGE model.

³⁴ Countries with initially higher tariff structures are generally the most adversely affected in terms of real income due to tariff revenue losses. For example, Zimbabwe's real income would decrease the most with establishment of regional FTAs and a CFTA, by 1.5 per cent and 1.4 per cent, respectively. Zimbabwe initially imposes an average tariff of 21.5 per cent on its imports of agricultural products from African economies, and its initial import share of agricultural products is among the highest in Africa.

imports from some African countries are replaced by imports from other African partners who benefit more from easier access following tariff reductions, terms of trade (i.e. prices of exports relative to prices of imports) may be affected.³⁵ In addition, the real income of net food importing countries, such as Angola and the Democratic Republic of Congo, Botswana, Mozambique, rest of North Africa, Nigeria, and Central Africa, tends to be adversely affected as world prices of food products rise slightly with FTA reforms. A significant number of African countries/regions, such as South Africa, being more diversified in terms of product and geographic origin of their imports (or being less dependent on food imports), register welfare gains as a result of trade reforms.

Because FTA reforms lead to higher exports of agricultural and food products by all African countries/regions (annex tables A8.7 and A8.8), in nearly all African countries/regions real wages of unskilled workers employed in agriculture and food sectors increase, compared with the baseline scenario (table 8.16). This is especially true in countries/regions highly specialized in exporting these products, such as Malawi and Zimbabwe³⁶ (table 8.16) and with the formation of a continent-wide FTA. Nevertheless, unskilled agricultural workers see a decrease in real wages in the main oil exporter countries – Angola, Egypt, Nigeria, rest of Eastern Africa (including Kenya) – as well as Zambia (69 per cent of Zambia's exports are mineral and metal products; see annex table A8.6) and Mauritius (mainly exporting textile, wearing apparel, and leather products).

As observed at the global level, whenever the real wages of unskilled labour employed in non-agricultural sectors increase (decrease) more (less) than those for unskilled workers engaged in agriculture, employment slightly decreases in agriculture and increases elsewhere. However, for some countries (Botswana, Ethiopia, Malawi, Morocco, South Africa, Zimbabwe, and rest of SACU), the establishment of FTAs would favour agricultural employment, thanks to the higher real wages for unskilled workers in the sector (table 8.17).

8.4.6 Trade facilitation

While results from the analysis focusing on the establishment of larger free trade areas and especially the CFTA are rather positive at the global level for Africa, the increase in the share of intra-African trade may not appear sufficient. Indeed, in January 2012 at the 18th African Union Summit of Heads of State and Government, AU Member States expressed the desire to see the share of intra-African trade double within the next ten years. (Our simulations projected an increase of only 52.0 per cent.) Moreover, country-level results can reasonably raise concerns due to real income losses for some African economies.

³⁵ For some countries, such as Malawi, Mozambique, Zambia, and Zimbabwe, exchanges shift from relatively efficient to less efficient partners, implying that relatively cheap imports are replaced by more expensive ones, leading to trade diversion, a decrease in terms of trade, and lower real income.

³⁶ For Zimbabwe 38 per cent and for Malawi 56 per cent of initial exports are concentrated in agriculture and food (annex table A8.6).

Shared Harvests: Agriculture, Trade and Employment

Table 8.16: Real wages by main qualifications and main sectors of activity – percentage changes compared with the baseline scenario, 2022

	Regional FTAs			Continental FTA		
	Unskilled real wages in agriculture	Unskilled real wages in non agricultural sectors	Skilled real wages	Unskilled real wages in agriculture	Unskilled real wages in non agricultural sectors	Skilled real wages
Angola and Democratic Republic of Congo	-0.24	-0.06	-0.28	-0.12	0.04	-0.31
Ethiopia	1.09	0.21	-0.48	1.18	0.25	-0.45
Madagascar	0.03	0.05	0.09	0.20	0.09	0.17
Malawi	3.14	1.95	1.01	3.33	1.97	0.99
Mauritius	-0.11	1.12	0.64	-0.16	1.25	0.71
Mozambique	0.56	1.09	0.27	0.58	1.06	0.26
United Republic of Tanzania	1.10	1.10	1.44	1.13	1.17	1.55
Uganda	0.29	0.41	0.38	0.48	0.91	0.82
Zambia	-0.05	1.12	1.24	0.48	1.42	1.40
Zimbabwe	8.12	4.97	3.15	8.14	5.00	2.99
Rest of Eastern Africa	-0.20	0.37	0.25	-0.13	0.47	0.40
Botswana	0.34	-0.06	-0.18	0.50	-0.18	-0.40
South Africa	0.86	0.30	0.46	0.93	0.56	0.80
Rest of South African Customs Union	1.59	0.86	1.06	1.83	0.82	1.00
Egypt	-0.02	0.04	0.07	0.32	0.28	0.28
Morocco	0.81	0.26	0.33	1.41	0.38	0.47
Tunisia	0.36	1.28	1.48	-0.58	1.42	1.65
Rest of North Africa	0.19	0.24	0.22	0.12	0.25	0.18
Nigeria	-0.26	0.23	-0.02	-0.54	0.12	-0.42
Senegal	0.28	0.84	0.47	0.25	0.97	0.71
Rest of Western Africa	0.27	1.94	1.65	0.40	2.15	1.81
Central Africa	0.27	0.42	0.30	0.46	0.64	0.38
Africa	0.65	0.70	0.49	0.74	0.80	0.54

Source: Authors' calculations based on MIRAGE model.

In that sense it is crucial to investigate the possible impact of additional policy measures that could complement the strict elimination of tariff barriers in goods and potentially augment the relatively small positive effects and counterbalance the minor negative effects associated with the FTA reforms. Recognizing the considerable challenges faced by Africa in terms of non-tariff barriers to trade within the continent (see section 8.2.), our analysis also considers trade facilitation measures – defined as an increase in the efficiency of customs procedures combined with a reduction of the time that merchandise spends at African ports – in addition to trade reforms.

If it is assumed that customs procedures become twice as efficient and the delay of merchandise at African ports is reduced by half by 2017, all of the aforementioned

results are strongly affected. Table 8.18 indicates a much higher increase in exports and real income when trade facilitation measures complement FTA reforms. Also, while country-level results in terms of exports, especially effects on real income and real wages, appear moderate and mixed with the implementation of only regional FTAs or a CFTA, the improvement of customs procedures and port handling would lead to positive results in all Africa economies almost without exception³⁷ (annex tables A8.9 and A8.10).

Table 8.17: Employment by main sectors of activity – percentage changes compared with the baseline scenario, 2022

	Regional FTAs		Continental FTA	
	Employment in agricultural sectors	Employment in non-agricultural sectors	Employment in agricultural sectors	Employment in non-agricultural sectors
Angola and Democratic Republic of Congo	-0.07	0.02	-0.06	0.02
Ethiopia	0.20	-0.24	0.22	-0.25
Madagascar	-0.01	0.00	0.03	-0.02
Malawi	0.40	-0.18	0.45	-0.21
Mauritius	-0.54	0.07	-0.62	0.08
Mozambique	-0.17	0.09	-0.16	0.08
United Republic of Tanzania	0.00	0.00	-0.01	0.01
Uganda	-0.02	0.04	-0.07	0.15
Zambia	-0.42	0.16	-0.34	0.13
Zimbabwe	1.23	-0.25	1.23	-0.25
Rest of Eastern Africa	-0.18	0.10	-0.19	0.11
Botswana	0.19	-0.01	0.33	-0.01
South Africa	0.27	-0.01	0.18	0.00
Rest of South African Customs Union	0.35	-0.02	0.48	-0.02
Egypt	-0.02	0.01	0.02	0.00
Morocco	0.23	-0.05	0.42	-0.09
Tunisia	-0.38	0.08	-0.82	0.17
Rest of North Africa	-0.02	0.00	-0.06	0.01
Nigeria	-0.10	0.14	-0.14	0.19
Senegal	-0.15	0.12	-0.20	0.16
Rest of Western Africa	-0.19	0.64	-0.20	0.67
Central Africa	-0.05	0.02	-0.06	0.03
Africa	-0.07	0.02	-0.08	0.02

Source: Authors' calculations based on MIRAGE model

³⁷ Mauritius would see a slight decrease in real income.

Shared Harvests: Agriculture, Trade and Employment

Table 8.18: Exports and welfare with and without adoption of trade facilitation measures on top of FTA reforms – percentage changes compared with the baseline scenario, 2022

	Exports		Real Income	
	Regional FTAs	Continental FTA	Regional FTAs	Continental FTA
FTA reforms only	2.8	4.0	0.1	0.2
FTA reforms accompanied by trade facilitation measures	7.9	10.2	0.8	1.0

Source: Authors' calculations based on MIRAGE model.

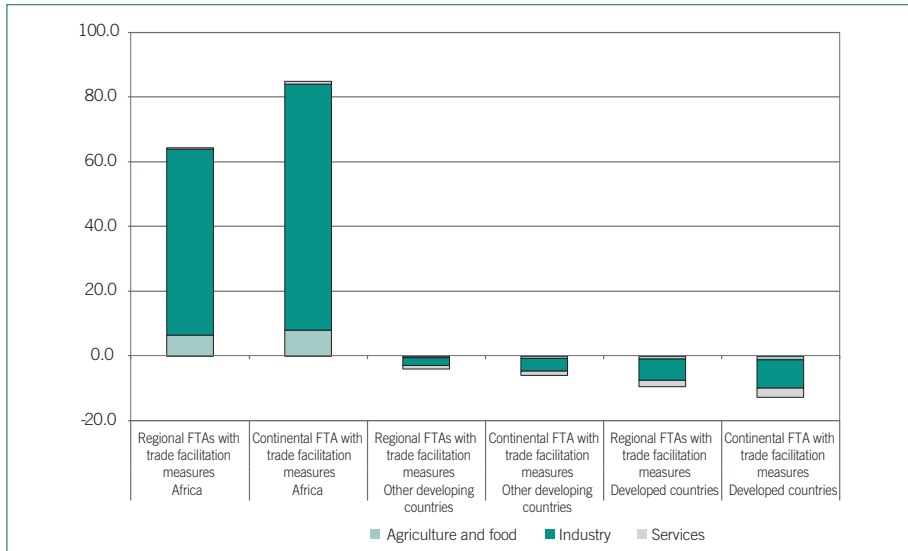
With the addition of trade facilitation measures, agricultural and food exports, as well as industrial exports, would increase considerably (table 8.19). In particular, compared with the effects of FTAs alone, a strong increase in exports of sugar and other food products would drive the increase in agricultural and food exports. However, in percentage terms exports of industrial products would grow more than those of agricultural and food exports – the reverse of the pattern when only FTA

Table 8.19: Exports by agricultural sectors and mains sectors with adoption of trade facilitation measures on top of FTA reforms – percentage changes compared with the baseline scenario, 2022

	Regional FTAs with trade facilitation measures	Continental FTA with trade facilitations measures
Agriculture and food	9.0	11.3
Paddy and processed rice	1.5	3.0
Wheat	24.4	24.0
Cereals	16.3	16.4
Oilseeds	1.1	2.4
Sugar cane and sugar beet	81.2	77.8
Cattle, sheep, goats, and horses	3.5	3.1
Animal products and wool	-0.4	-1.2
Other agricultural products	0.0	0.3
Raw milk and dairy products	75.7	104.7
Meat products	14.4	25.6
Sugar	11.5	13.8
Other food products	21.2	25.5
Industry	10.4	13.5
Services	-2.1	-2.7
All sectors	7.9	10.2

Source: Authors' calculations based on MIRAGE model.

Figure 8.3: Exports of African countries by destinations and main sectors with adoption of trade facilitation measures on top of FTA reforms – changes in US\$ billion compared with the baseline scenario, 2022



Source: Authors' calculations based on MIRAGE model.

reforms are considered. This implies that the trade facilitation measures considered in the analysis would strongly enhance the industrialization of African trade.

After introduction of trade facilitation measures on top of elimination of tariff barriers, intra-African trade increases by 97.2 per cent (or \$64.4 billion) via regional FTA and 128.4 per cent (or \$85.0 billion) through a CFTA, compared with the baseline, in 2022. This large rise would be explained mostly by an increase in industrial trade among African economies – by 110.0 per cent (or \$57.6 billion) following regional reforms and 145.4 per cent (or \$76.1 billion) following continental trade reforms. Intra-African trade of agriculture and food products as well as services also would increase with similar reforms, but to a lesser extent – by 73.8 per cent (or \$7.9 billion) and 30.8 per cent (or \$1.0 billion), respectively (figure 8.3).

The share of intra-African trade would increase more than two-fold between 2010 and 2022, rising from 10.2 per cent to 21.9 per cent, through the adoption of a more efficient system of trading across borders along with establishment of a CFTA (table 8.20). As a share of total exports, African exports to their partners from the continent would grow at similar paces for agriculture and food products (57.6 per cent) and for services (52.9 per cent) between 2010 and 2022. Intra-African trade of industrial products would grow at a much higher rate, from 11.6 per cent in 2010 to 25.0 per cent in 2022 (i.e. a growth rate of 126.1 per cent). Although not all of the industrial products are necessarily sophisticated products, this indicates an expansion of intra-African trade in more elaborated products if an FTA at the continental level is implemented and complemented by trade facilitation measures.

Shared Harvests: Agriculture, Trade and Employment

Table 8.20: Percentage increases in intra-African trade volumes with adoption of trade facilitation measures on top of FTA reforms

	2022			
	2010	Baseline	Regional FTAs	Continental FTA
Total	10.2%	10.6%	19.3%	21.9%
Agriculture and food	20.0%	20.2%	29.5%	31.5%
Industry	11.0%	11.6%	22.0%	25.0%
Services	2.3%	2.6%	3.0%	3.5%

Source: Authors' calculations based on MIRAGE model.

As a consequence of the shift of trade and production towards more industrial products, real wages for both skilled and unskilled workers in non-agricultural activities increase. With FTA reforms alone, real wages of skilled workers increase less than those of unskilled workers employed in either agricultural or non-agricultural activities, whereas, when trade facilitation measures are introduced as well, skilled labourers register greater salary increase. Thanks to increased production, consumption, and exchanges of agricultural and food products, trade reforms also would increase the real wages of unskilled agricultural workers, but to a lesser extent than for other categories of workers (table 8.21).

Therefore, the inclusion of trade facilitation measures on top of FTA reforms tend to favour employment and salaries for workers engaged in non-agricultural

Table 8.21: Real wages by main qualifications and main sectors of activity with and without adoption of trade facilitation measures on top of FTA reforms – percentage changes compared with the baseline scenario, 2022

	Regional FTAs			Continental FTA		
	Unskilled workers employed in agriculture	Unskilled workers employed in non-agricultural sectors	Skilled workers	Unskilled workers employed in agriculture	Unskilled workers employed in non-agricultural sectors	Skilled workers
FTA reforms only	0.65	0.70	0.49	0.74	0.80	0.54
FTA reforms accompanied by trade facilitation measures	1.81	2.73	3.07	1.94	2.93	3.23

Source: Authors' calculations based on MIRAGE model.

Table 8.22: Employment by main sectors of activity with and without adoption of trade facilitation measures on top of FTA reforms – percentage changes compared with the baseline scenario, 2022

	Regional FTAs		Continental FTA	
	Employment in agricultural sectors	Employment in non-agricultural sectors	Employment in agricultural sectors	Employment in non-agricultural sectors
FTA reforms only	-0.07	0.02	-0.07	0.02
FTA reforms accompanied by trade facilitation measures	0.21	0.07	0.24	0.07

Source: Authors' calculations based on MIRAGE model.

activities in response to a relatively greater increase in demand for industrial products within Africa. Correspondingly, wages and employment in the agricultural sector decline (tables 8.22 and 8.23). If the model assumptions were changed to allow for unemployment, it could be expected that employment would increase in both agriculture and industry in Africa, considering the large increased demand in all categories of products. However, given the model's assumption of fixed employment – and because the increase in industrial output strongly dominates the increase in agricultural and food production (table 8.23) – employment of workers in agricultural and food activities slightly decreases. The greater the increase in industrial output relative to the output in agriculture and food, the greater the decrease in employment for workers in agricultural sectors.

Results at the county level are very heterogeneous and certainly more meaningful (annex tables A8.11 and A8.12). Indeed, due to the introduction of the trade reforms, imports of agriculture and food products strongly increase, adversely affecting domestic production of these products in almost half of the African countries/regions considered in the analysis. Where imports increase more than exports, countries register a decrease in production, and employment falls. In contrast, in the case of industrial products, production, employment, and wages increase nearly everywhere, thanks to higher demand and stronger exports than imports (annex tables A8.10, A8.11, and A8.12).

Overall, however, at the continental level production of agricultural and food products as well as manufactured goods increases with the establishment of the reforms. In other words, Africa as a whole would be better off if regional integration is deepened. This is particularly true if trade facilitation measures are implemented along with the reduction/removal of tariff barriers on goods (table 8.23).

Shared Harvests: Agriculture, Trade and Employment

Table 8.23: Output by main sectors with and without adoption of trade facilitation measures – percentage changes compared with the baseline scenario, 2022

	Regional FTAs			Continental FTA		
	Agriculture and food	Industry	Services	Agriculture and food	Industry	Services
FTA reforms only	0.22	0.34	-0.03	0.26	0.43	-0.06
FTA reforms accompanied by trade facilitation measures	0.30	1.40	0.18	0.34	1.67	0.17

Source: Authors' calculations based on MIRAGE model.

8.5 CONCLUSIONS AND POLICY RECOMMENDATIONS

African ministers of trade recommended in November 2010, in Kigali, that Africa should fast-track its regional integration process. This political will was reaffirmed during the 18th African Union Summit held in Addis Ababa in January 2012, as African heads of state and government endorsed an action plan for “boosting intra-African trade and the establishment of the continental free trade area”, with 2017 set as the tentative date for the creation of the CFTA.

The foregoing analysis, using a computable general equilibrium model, shows that such trade reform would benefit Africa as a whole. The results indicate that, for Africa as a whole, the establishment of regional FTAs would increase continental exports, real income, and real wages for all categories of workers, although the estimated changes are small. The formation of a larger FTA at the continental level would amplify these gains. In particular, agricultural and food exports would be significantly stimulated following the removal of relatively high initial tariff barriers, and unskilled workers employed in agriculture would see their purchasing power enhanced. Moreover, with the increase in trade of industrial products, as well as the dominant trade-creating effects of the FTA reforms, intra-African trade as a share of Africa's total trade would increase by about half over a 12-year period, from 10.2 per cent in 2010 to 15.5 per cent in 2022.

However, the formation of a CFTA would not increase the share of intra-African trade as much as the AU Member States desire; they recently affirmed the wish to see the share of intra-continental trade double within the next ten years. Moreover, the relatively small gains in production, real income, and real wage – small in part due to the decrease of revenues from tariff duties – tend to limit the overall benefits of the trade reform. Furthermore, at the country level, results are varied, with some African economies registering a decrease in real income due to tariff revenue losses and/or negative terms of trade and/or net negative food trade balances. Also, in some countries certain categories of workers – especially those engaged in agricultural ac-

tivities – see their real wages decline with the reforms due to employment contractions as domestic production in agriculture is hurt by the excess of imports over exports.

For these reasons, implementing an FTA alone would not be sufficient to generate benefits for every African economy. One possible path could be to address non-tariff barriers as well. These barriers are quite high within the continent, limiting potential exchanges. Therefore, it is paramount that additional measures aiming at easing trade across borders accompany FTA reforms. The analysis assesses the additional effect of making customs procedures twice as efficient as well as halving the time that merchandise is held at African ports. These improvements would lead to positive exports and real income increases in all African countries. With these non-tariff barriers reduced and a CTFA effectively implemented, the share of intra-African trade more than doubles, rising from 10.2 per cent in 2010 to 21.9 per cent³⁸ in 2022. Moreover, introducing trade facilitation measures would expand the exchanges of industrial products, thus increasing the sophistication of intra-African trade. In percentage terms the increase of Africa's industrial exports would surpass that of Africa's agricultural and food exports, leading to higher wage increase for skilled and unskilled workers employed in non-agricultural activities than for their counterparts in agriculture.

While real wages in agriculture would still increase significantly, employment in agriculture in Africa is projected to decrease slightly because labour demand in the industrial sector would increase relatively more and because of the model's assumption of fixed employment. The decrease in agricultural employment does not necessarily mean that unemployment is rising, but rather it reflects a reallocation of workers from one sector to another. Since the industrial sector is in general more productive than the agricultural sector (the 65 per cent of labour force engaged in agriculture in Africa contributes 32 per cent of GDP), this change would mean an increase in total productivity. Structural change that contributes to growth is very much needed in Africa. McMillan and Rodrik (2011) observe a growth-reducing structural change for Africa between 1990 and 2005, that is to say, on balance, resources were moved from more productive sectors into less productive ones. Therefore, a CFTA that could help production and export structures of African economies to move away from primary commodities and give more weight to industry would facilitate the transition in the right direction. However, efforts will be necessary to ensure appropriate human capital to properly meet the challenge. This requires greater focus on men's and women's education and initiatives that devote sufficient resources to encouraging creativity and innovation. Measures aiming at developing productive capacities will also be essential and could help promote competitiveness and export diversification.

The CGE analysis undertaken entails several limitations, in particular regarding the representation of African economies, such as the lack of data in the GTAP database,

³⁸ This corresponds to a growth rate of nearly 115 per cent over the 12-year period.

Shared Harvests: Agriculture, Trade and Employment

the assumption of a single representative consumer for each economy, and the assumption of full employment of labour. Still, these caveats should not detract from the message of the above findings. They clearly show that, despite mitigated gains at the country level, the larger the FTA reforms, the greater the overall benefits for Africa. Complementary measures such as trade facilitation are critical to ensure that gains are better redistributed, and they could benefit all African countries. Tackling non-tariff barriers to trade effectively and improving infrastructure should certainly be seen as a key priority in the regional integration process. Finally, the expected impacts of the reforms on the agriculture sector, which engages the major part of the continent's population, are also encouraging, although also suggesting the importance of diversifying economies further towards more industrialized structures. In that respect, education policies should seek to produce better qualified men and women for the African labour market.

ANNEXES

Table A8.1: Average protection (tariff rate) imposed on faced by African countries' imports/exports, 2004

	Average imposed protection on imports						Average faced protection on exports										
	Total			Industry			Total			Industry							
	From Africa	From rest of world	Primary	From Africa	From rest of world	From rest of world	From Africa	To rest of world	Primary	To rest of world	To rest of world	Industry					
Algeria	13.6	13.9	14.7	15.3	6.8	6.7	13.9	13.8	5.8	0.4	34.9	10.3	4.4	0.2	5.9	1.1	
Angola	10.8	6.9	16.3	9.9	21.7	24.2	8.2	6.1	8.2	4.6	18.5	8.5	1.3	0.4	10.7	2.1	
Benin	5.5	11.4	7.0	13.5	1.8	3.5	5.0	10.7	8.7	4.6	5.7	4.2	6.1	1.8	11.8	6.5	
Botswana	0.5	8.1	0.9	20.4	0.0	0.2	0.3	7.8	11.1	3.1	18.3	67.8	7.8	0.9	11.3	1.0	
Burkina Faso	5.4	11.4	7.0	13.5	1.8	3.5	4.9	10.7	5.2	4.9	6.0	6.4	7.8	7.4	3.5	3.5	
Burundi	12.2	21.6	16.3	25.3	7.1	14.6	10.2	20.9	6.4	3.5	4.2	5.4	2.5	2.3	7.7	2.2	
Cameroon	14.7	15.0	21.2	20.0	13.5	15.9	14.0	10.6	11.8	11.8	11.8	9.5	1.2	0.7	10.9	0.6	
Central African Republic	14.2	15.0	20.6	20.0	13.5	15.9	12.1	14.0	8.5	0.6	5.3	2.2	2.2	0.0	9.4	0.2	
Chad	14.8	15.9	23.3	19.8	10.4	10.0	12.2	14.6	7.9	0.6	3.3	1.1	17.6	0.5	6.8	0.7	
Comoros	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.4	0.9	5.7	1.3	3.2	6.5	8.7	0.7	
Congo	14.9	15.9	23.3	19.8	10.4	10.0	12.3	14.6	8.4	0.9	8.7	19.2	6.0	0.6	9.8	0.9	
Congo (Democratic Rep.)	11.7	10.9	14.7	12.4	10.7	5.5	11.0	10.4	8.4	1.5	14.5	17.5	3.1	0.4	11.3	1.5	
Côte d'Ivoire	4.1	10.0	4.5	12.1	0.1	2.6	6.8	9.7	10.9	2.8	9.4	3.9	3.5	0.8	11.6	1.4	
DRC	19.7	29.9	14.6	14.6	33.3	22.5	31.6	22.5	8.5	9.8	15.2	9.8	8.7	21.0	8.7	7.5	
Egypt	13.7	15.2	23.7	19.8	11.9	10.4	11.0	14.6	12.7	1.3	30.0	10.5	11.7	7.4	13.1	0.3	
Equatorial Guinea	11.3	18.3	16.2	29.9	8.1	2.0	9.0	16.2	7.6	5.2	8.5	26.4	3.6	6.4	3.3	3.3	
Eritrea	3.8	6.9	4.7	7.9	3.9	2.3	3.3	6.7	8.0	9.3	12.1	32.4	9.0	1.8	2.3	2.5	
Ethiopia	13.3	10.9	21.9	17.5	6.1	5.5	11.8	10.2	19.5	3.3	20.2	3.3	17.3	0.5	17.0	3.4	
Gabon	14.3	15.2	23.8	19.8	12.0	10.4	11.8	14.6	8.5	0.7	14.4	5.0	1.9	0.7	10.9	0.8	
Gambia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12.5	7.1	15.6	7.8	4.3	1.6	10.7	6.7	
Ghana	11.2	14.0	13.4	19.0	0.6	8.0	16.1	13.1	10.1	2.5	13.4	2.3	4.7	1.1	9.1	3.3	
Guinea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4.7	3.1	11.7	22.4	4.2	0.3	2.2	3.6	
Guinea-Bissau	11.3	18.3	16.2	29.9	8.1	2.0	9.0	16.2	7.6	5.2	8.5	26.4	3.6	6.4	3.3	3.3	
Kenya	1.2	9.9	5.5	13.0	0.2	0.1	0.4	10.2	3.0	0.2	8.4	2.6	0.0	0.0	3.4	0.2	
Lesotho	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6.9	1.0	8.1	4.0	4.2	0.7	6.7	1.0	
Liberia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	22.9	4.1	0.5	11.8	7.3	3.3	0.2	4.3	2.7
Libyan Arab Jamahiriya	9.6	21.0	5.3	10.9	42.0	25.3	7.5	22.9	4.1	0.5	11.8	7.3	3.3	0.2	4.3	2.7	
Madagascar	1.8	4.5	4.0	3.9	0.2	0.1	1.5	4.6	8.9	1.7	13.4	3.1	1.1	1.6	5.7	0.6	
Malawi	8.4	11.7	10.1	13.9	1.0	2.0	8.3	11.3	4.1	17.9	3.5	20.4	3.8	1.5	5.6	2.0	
Mali	2.3	11.4	6.7	13.5	1.8	3.5	3.2	10.7	4.7	1.6	4.3	1.9	4.9	0.3	6.6	1.1	
Mali	2.3	11.4	6.7	13.5	1.8	3.5	3.2	10.7	4.7	1.6	4.3	1.9	4.9	0.3	6.6	1.1	
Mauritania	13.8	19.6	18.7	17.7	3.1	1.3	12.8	19.9	4.0	13.6	4.3	49.5	6.1	2.5	3.9	1.0	
Mauritius	11.3	19.7	14.6	44.3	16.4	11.4	10.4	17.5	15.2	2.2	22.4	5.2	7.0	1.5	9.7	1.3	
Mozambique	9.4	10.0	15.2	9.0	3.9	4.9	7.9	10.4	10.1	1.4	13.4	9.3	5.8	0.8	6.7	0.3	
Namibia	0.7	8.5	3.2	13.5	0.0	0.1	0.3	8.3	4.0	5.6	7.6	18.1	0.9	0.1	1.4	1.7	
Niger	5.4	11.4	7.0	13.5	1.8	3.5	4.9	10.7	7.3	1.9	7.5	16.4	9.2	0.7	6.8	0.5	
Nigeria	28.1	24.2	46.9	34.0	13.5	14.9	25.2	22.5	2.2	2.2	15.8	3.0	1.0	2.7	13.5	2.0	
Rwanda	3.5	7.4	5.1	10.8	3.8	4.2	3.0	7.3	6.3	1.9	6.6	8.7	4.5	0.3	6.7	4.6	
Senegal	2.6	10.1	4.4	11.4	0.1	3.7	6.1	10.0	5.3	5.9	8.3	2.0	5.5	1.4	4.3	9.2	
Sierra Leone	22.2	33.5	53.6	45.1	23.1	17.8	37.1	32.7	10.0	2.7	12.8	3.4	2.2	1.2	6.0	1.4	
Sierra Leone	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11.7	1.5	13.8	3.3	6.5	0.1	11.5	2.4	
Somalia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17.0	8.3	22.3	13.0	9.0	5.8	9.8	3.0	
South Africa	0.8	7.2	2.2	12.1	0.0	0.0	1.1	7.7	12.4	3.3	21.6	9.9	11.4	0.5	11.1	3.1	
Sudan	12.9	19.1	13.5	24.6	6.3	4.9	12.8	18.2	5.5	3.7	4.8	21.9	10.2	0.5	5.5	2.9	
Swaziland	0.7	8.5	3.0	13.5	0.0	0.1	0.3	8.3	4.2	27.7	10.8	96.7	3.4	2.0	2.5	3.6	
Tanzania	3.9	10.2	4.1	12.9	0.1	2.2	6.1	9.8	7.0	3.6	6.1	14.0	2.7	1.5	7.3	4.2	
Togo	11.0	17.9	27.0	42.9	3.6	16.2	12.2	15.2	13.0	2.6	19.9	26.5	6.9	0.2	11.8	1.0	
Uganda	4.6	6.7	5.7	9.2	8.6	13.0	4.3	6.1	8.3	2.1	8.2	2.1	5.6	2.0	8.5	2.0	
Zambia	8.6	8.7	11.5	14.7	5.6	5.1	8.2	9.1	5.3	2.8	6.7	5.0	5.8	5.6	4.9	2.4	
Zimbabwe	12.4	15.8	21.5	19.4	8.2	9.9	11.3	15.6	2.4	8.6	5.3	14.5	0.2	2.0	1.6	2.1	
Africa	8.7	13.6	12.4	19.4	2.3	4.7	9.0	13.1	8.7	2.6	12.4	9.5	2.3	1.1	9.0	2.3	

Source: Authors' calculations based on TASTE software and MacMap-HS6v2 database.

Shared Harvests: Agriculture, Trade and Employment

Table A8.2: Share of tariff revenues collected by African countries on their imports from African partners versus the rest of the world, 2010

	Africa	Rest of the world		Africa	Rest of the world
Algeria	29.2%	70.8%	Libyan Arab Jamahiriya	10.5%	89.5%
Angola	8.6%	91.4%	Madagascar	4.8%	95.2%
Benin	50.7%	49.3%	Malawi	7.5%	92.5%
Botswana	5.1%	94.9%	Mali	46.1%	53.9%
Burkina Faso	37.5%	62.5%	Mauritania	55.9%	44.1%
Burundi	13.7%	86.3%	Mauritius	2.2%	97.8%
Cameroon	17.5%	82.5%	Morocco	19.8%	80.2%
Cape Verde	50.1%	49.9%	Mozambique	26.9%	73.1%
Central African Republic	31.4%	68.6%	Namibia	16.3%	83.7%
Chad	12.4%	87.6%	Niger	30.1%	69.9%
Comoros	13.9%	86.1%	Nigeria	4.3%	95.7%
Congo	22.9%	77.1%	Rwanda	28.0%	72.0%
Congo (Democratic Rep.)	12.6%	87.4%	Sao Tome and Principe	39.5%	60.5%
Côte d'Ivoire	36.7%	63.3%	Senegal	33.6%	66.4%
Djibouti	44.7%	55.3%	Seychelles	16.0%	84.0%
Egypt	15.4%	84.6%	Sierra Leone	41.5%	58.5%
Equatorial Guinea	6.4%	93.6%	Somalia	38.2%	61.8%
Eritrea	11.7%	88.3%	South Africa	33.3%	66.7%
Ethiopia	33.0%	67.0%	Sudan	4.4%	95.6%
Gabon	26.6%	73.4%	Swaziland	13.4%	86.6%
Gambia	25.0%	75.0%	United Republic of Tanzania	31.3%	68.7%
Ghana	37.1%	62.9%	Togo	70.9%	29.1%
Guinea	33.2%	66.8%	Tunisia	19.0%	81.0%
Guinea-Bissau	6.7%	93.3%	Uganda	58.0%	42.0%
Kenya	22.0%	78.0%	Zambia	32.6%	67.4%
Lesotho	13.1%	86.9%	Zimbabwe	10.2%	89.8%
Liberia	27.9%	72.1%	Africa	22.6%	77.4%

Source: Authors' calculations based on TASTE software and MAcMap-HS6v2 database.

Annex 8.3: Brief description of the MIRAGE CGE model

On the demand side of the model, a single representative agent is assumed in each region; this agent allocates a fixed share of its income for savings and devotes the rest to consumption of goods. A Linear Expenditure System–Constant Elasticity of Substitution (LES–CES) function is used to represent the agent’s preferences across sectors.³⁹ The model allows for vertical (quality) as well as horizontal (variety) differentiations in goods. The goods produced by developed countries are assumed to have a higher quality than the ones produced by developing countries (Armington hypothesis⁴⁰).

On the supply side, the model relies on a Leontief function assuming perfect complementarity between intermediate consumption and value added. Five factors of production contribute to value added: unskilled labour, skilled labour, capital, land, and natural resources. Skilled labour and capital are supposed to be more substitutable for one another than with other combinations of factors. The full employment of factor endowments is assumed. Labour is country-specific. Skilled labour is perfectly mobile between sectors, In contrast, in the case of unskilled labour, there is imperfect mobility between agricultural and non-agricultural sectors, but the mobility is perfect among each group of sectors, while there is immobility across countries. Labour mobility across the two sets of sectors is represented through the assumption that total labour is a Constant Elasticity of Transformation bundle of the two labour types. The rates of variations of labour are exogenously set following the demographic forecasts provided by the World Bank.⁴¹ Land is imperfectly mobile between sectors, while natural resources and capital are sector-specific. Natural resources are constant, while capital is accumulative. The sole adjustment variable for capital stocks is the investment, such that the capital stock for the current year depends on the investment made for the same year and the capital stock from the previous year, which has depreciated.

The macroeconomic closure of the MIRAGE model is obtained by keeping the current account of each region constant and fixed to the base year. The real exchange rate is allowed to adjust in order to balance any possible disequilibrium of the current account. In other words, when a trade reform, such as reduction of tariff barriers, stimulates trade, the real exchange rates appreciate when exports increase more than imports and depreciate when the exports increase less than the imports.

³⁹ A LES-CES function indicates that the demand structure of each region depends on its income level. In MIRAGE developed countries are assumed to be constrained to a lower minimum level of consumption than developing countries. Ideally, findings of household surveys should be used to represent the demand structures in each region, but this requires a significant amount of data collection.

⁴⁰ The Armington hypothesis stipulates that consumer choices can be influenced by the geographic origin of the goods.

⁴¹ Population growth rates are based on IBRD/World Bank projections, *Global economic prospects 2005: Trade, regionalism, and development*. Available at <http://siteresources.worldbank.org/INTGEP2005/Resources/gep2005.pdf>.

Shared Harvests: Agriculture, Trade and Employment

Table A8.4: GTAP countries/regions and correspondences with geographic aggregation chosen for the study

#	GTAP code	GTAP label	Model label
1	AUS	Australia	Other developed countries
2	NZL	New Zealand	Other developed countries
3	XOC	Rest of Oceania	Other developing countries
4	CHN	China	BRIC countries
5	HKG	Hong Kong	Other developing countries
6	JPN	Japan	Other developed countries
7	KOR	Korea	Other developed countries
8	TWN	Taiwan	Other developing countries
9	XEA	Rest of East Asia	Other developing countries
10	KHM	Cambodia	Other developing countries
11	IDN	Indonesia	Other developing countries
12	LAO	Lao People's Democratic	Other developing countries
13	MMR	Myanmar	Other developing countries
14	MYS	Malaysia	Other developing countries
15	PHL	Philippines	Other developing countries
16	SGP	Singapore	Other developing countries
17	THA	Thailand	Other developing countries
18	VNM	Vietnam	Other developing countries
19	XSE	Rest of Southeast Asia	Other developing countries
20	BGD	Bangladesh	Other developing countries
21	IND	India	BRIC countries
22	PAK	Pakistan	Other developing countries
23	LKA	Sri Lanka	Other developing countries
24	XSA	Rest of South Asia	Other developing countries
25	CAN	Canada	Other developed countries
26	USA	United States of America	United States
27	MEX	Mexico	Other developing countries
28	XNA	Rest of North America	Other developing countries
29	ARG	Argentina	Other developing countries
30	BOL	Bolivia	Other developing countries
31	BRA	Brazil	BRIC countries
32	CHL	Chile	Other developing countries
33	COL	Colombia	Other developing countries
34	ECU	Ecuador	Other developing countries
35	PRY	Paraguay	Other developing countries
36	PER	Peru	Other developing countries
37	URY	Uruguay	Other developing countries
38	VEN	Venezuela	Other developing countries
39	XSM	Rest of South America	Other developing countries
40	CRI	Costa Rica	Other developing countries
41	GTM	Guatemala	Other developing countries
42	NIC	Nicaragua	Other developing countries
43	PAN	Panama	Other developing countries
44	XCA	Rest of Central America	Other developing countries
45	XCB	Caribbean	Other developing countries
46	AUT	Austria	European Union
47	BEL	Belgium	European Union
48	CYP	Cyprus	European Union
49	CZE	Czech Republic	European Union
50	DNK	Denmark	European Union
51	EST	Estonia	European Union
52	FIN	Finland	European Union
53	FRA	France	European Union
54	DEU	Germany	European Union
55	GRC	Greece	European Union
56	HUN	Hungary	European Union
57	IRL	Ireland	European Union
58	ITA	Italy	European Union
59	LVA	Latvia	European Union
60	LTU	Lithuania	European Union
61	LUX	Luxembourg	European Union
62	MLT	Malta	European Union
63	NLD	Netherlands	European Union
64	POL	Poland	European Union
65	PRT	Portugal	European Union
66	SVK	Slovakia	European Union
67	SVN	Slovenia	European Union
68	ESP	Spain	European Union
69	SWE	Sweden	European Union
70	GBR	United Kingdom	European Union
71	CHE	Switzerland	Other developed countries
72	NOR	Norway	Other developed countries
73	XEF	Rest of European Free Trade Association	
74	ALB	Albania	Other developing countries
75	BGR	Bulgaria	European Union
76	BLR	Belarus	Other developing countries
77	HRV	Croatia	Other developing countries

8: Towards a continental free trade area in africa

Table A8.4: GTAP countries/regions and correspondences with geographic aggregation chosen for the study
(continued)

#	GTAP code	GTAP label	Model label
78	ROU	Romania	European Union
79	RUS	Russian Federation	BRIC countries
80	UKR	Ukraine	Other developing countries
81	XEE	Rest of Eastern Europe	Other developing countries
82	XER	Rest of Europe	Other developing countries
83	KAZ	Kazakhstan	Other developing countries
84	KGZ	Kyrgyzstan	Other developing countries
85	XSU	Rest of Former Soviet Union	Other developing countries
86	ARM	Armenia	Other developing countries
87	AZE	Azerbaijan	Other developing countries
88	GEO	Georgia	Other developing countries
89	IRN	Iran, Islamic Republic of	Other developing countries
90	TUR	Turkey	Other developing countries
91	XWS	Rest of Western Asia	Other developing countries
92	EGY	Egypt	Egypt
93	MAR	Morocco	Morocco
94	TUN	Tunisia	Tunisia
95	XNF	Rest of North Africa - Algeria - Libyan Arab Jamahiriya	Rest of North Africa
96	NGA	Nigeria	Nigeria
97	SEN	Senegal	Senegal
98	XWF	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 Western Africa
99	XCF	Rest of Central Africa - Cameroon - Central African Republic - Chad - Congo - Equatorial Guinea - Gabon - Sao Tome and Principe	Rest of Central Africa
100	XAC	Rest of South Central Africa - Angola - Congo, Democratic Republic of the	Rest of South Central Africa
101	ETH	Ethiopia	Ethiopia
102	MDG	Madagascar	Madagascar
103	MWI	Malawi	Malawi
104	MUS	Mauritius	Mauritius
105	MOZ	Mozambique	Mozambique
106	TZA	United Republic of Tanzania	United Republic of Tanzania
107	UGA	Uganda	Uganda
108	ZMB	Zambia	Zambia
109	ZWE	Zimbabwe	Zimbabwe
110	XEC	Rest of Eastern Africa - Burundi - Comoros - Djibouti - Eritrea - Kenya - Mayotte - Reunion - Rwanda - Seychelles - Somalia - Sudan	Rest of Eastern Africa
111	BWA	Botswana	Botswana
112	ZAF	South Africa	South Africa
113	XSC	Rest of South African Customs Union - Lesotho - Namibia - Swaziland	Rest of South African Customs Union

BRIC=Brazil, Russia, India, China

Shared Harvests: Agriculture, Trade and Employment

Table A8.5: GTAP sectors and correspondences with sector decomposition chosen for the study

#	GTAP code	GTAP label	Model label
1	PDR	Paddy rice	Paddy and processed rice
2	WHT	Wheat	Wheat
3	GRO	Cereal grains nec	Cereals
4	V_F	Vegetables, fruit, and nuts	Other agricultural products
5	OSD	Oil seeds	Oilseeds
6	C_B	Sugar cane and sugar beet	Sugar cane and sugar beet
7	PFB	Plant-based fibres	Other agricultural products
8	OCR	Crops nec	Other agricultural products
9	CTL	Bovine cattle, sheep and goats, and horses	Cattle, sheep, goats and horses
10	OAP	Animal products nec	Animal products and wool
11	RMK	Raw milk	Milk and dairy products
12	WOL	Wool and silk-worm cocoons	Animal products and wool
13	FRS	Forestry	Forestry
14	FSH	Fishing	Fishing
15	COA	Coal	Other primary products
16	OIL	Oil	Other primary products
17	GAS	Gas	Other primary products
18	OMN	Minerals nec	Other primary products
19	CMT	Bovine meat products	Meat products
20	OMT	Meat products nec	Meat products
21	VOL	Vegetable oils and fats	Other food products
22	MIL	Dairy products	Milk and dairy products
23	PCR	Processed rice	Paddy and processed rice
24	SGR	Sugar	Sugar
25	OFD	Food products nec	Other food products
26	B_T	Beverages and tobacco products	Other food products
27	TEX	Textiles	Textile, wearing apparel and leather products
28	WAP	Wearing apparel	Textile, wearing apparel and leather products
29	LEA	Leather products	Textile, wearing apparel and leather products
30	LUM	Wood products	Other manufactured products
31	PPP	Paper products and publishing	Other manufactured products
32	P_C	Petroleum and coal products	Petroleum and coal products
33	CRP	Chemical, rubber, and plastic products	Other manufactured products
34	NMM	Mineral products nec	Mineral and metals products
35	I_S	Ferrous metals	Mineral and metals products
36	NFM	Metals nec	Mineral and metals products
37	FMP	Metal products	Mineral and metals products
38	MVH	Motor vehicles and parts	Other manufactured products
39	OTN	Transport equipment nec	Other manufactured products
40	ELE	Electronic equipment	Other manufactured products
41	OME	Machinery and equipment nec	Other manufactured products
42	OMF	Manufactures nec	Other manufactured products
43	ELY	Electricity	Other manufactured products
44	GDT	Gas manufacture and gas distribution	Other manufactured products
45	WTR	Water	Other services
46	CNS	Construction	Other services
47	TRD	Trade	Other services
48	OTP	Transport nec	Transport
49	WTP	Water transport	Transport
50	ATP	Air transport	Transport
51	CMN	Communication	Other services
52	OFI	Financial services nec	Other services
53	ISR	Insurance	Other services
54	OBS	Business services nec	Other services
55	ROS	Recreational and other services	Other services
56	OSG	Public Administration, Defense, Education, and Health	Other services
57	DWE	Dwellings	Other services

nec=not elsewhere classified

Table A8.6: Initial export structures (percentage distribution) by country/region and sector, 2004

	Paddy and processed rice	Wheat	Cereals	Oilseeds	Sugar cane and sugar beet	Cattle, sheep, goats, and horses	Animal products and wool	Other agricultural products	Milk and dairy products	Meat products	Sugar	Other food products	Total agriculture and food products	Forestry	Fishing	Other primary products of world	Textile, wearing apparel, and leather product	Petroleum and coal products	Mineral and metal p roducts	Other manufactured products	Total industrial products	Transport	Other services	Total services
Angola and Democratic Republic of Congo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.01	0.15	0.15	0.46	1.84	0.01	92.74	0.02	0.26	0.48	1.40	96.74	0.87	1.93	2.80
Ethiopia	0.00	0.04	0.32	5.41	0.00	0.23	2.38	17.67	0.08	1.33	0.84	2.02	30.31	2.09	0.01	0.38	3.54	0.00	6.52	1.52	14.07	21.13	34.49	55.62
Madagascar	0.01	0.00	0.00	0.03	0.00	0.00	0.32	13.27	0.00	0.03	0.57	12.32	26.57	0.45	0.29	23.20	21.19	0.04	0.51	5.56	51.23	10.07	12.13	22.20
Malawi	0.02	0.02	0.19	0.79	0.00	0.00	0.11	45.41	0.00	0.00	8.95	7.70	56.20	0.01	0.06	25.19	6.25	0.03	0.47	4.70	36.71	3.53	3.55	7.09
Mauritius	0.01	0.00	0.00	0.00	0.00	0.00	0.54	0.22	0.05	0.01	9.19	3.56	13.58	0.01	0.02	15.45	23.74	0.02	1.05	10.11	50.40	20.48	15.53	36.01
Mozambique	0.02	0.00	0.18	0.52	0.00	0.00	0.03	6.44	0.00	0.01	0.87	5.50	13.58	1.42	0.06	1.13	0.28	0.02	54.00	19.39	76.30	4.13	6.00	10.12
United Republic of Tanzania	0.01	0.22	0.29	1.16	0.00	0.00	0.88	17.08	0.01	0.00	0.70	9.45	29.81	0.79	0.37	4.83	3.61	0.01	11.87	4.35	25.83	12.55	31.81	44.36
Uganda	0.10	0.00	0.51	0.27	0.00	0.00	0.60	16.90	0.19	0.03	0.07	10.20	28.88	0.03	0.23	39.58	1.74	0.06	7.08	3.88	52.61	6.65	11.86	18.51
Zambia	0.06	0.00	1.43	1.52	0.00	0.00	0.27	11.03	0.02	0.04	1.61	0.81	16.78	0.01	0.02	3.56	1.92	0.06	68.50	4.77	78.83	1.79	2.60	4.39
Zimbabwe	0.01	0.00	0.03	0.09	0.00	0.01	0.76	28.75	0.21	0.33	3.45	4.28	37.92	0.12	0.01	11.39	2.92	0.35	25.55	11.00	51.33	3.10	7.65	10.75
Rest of Eastern Africa	0.00	0.05	0.06	1.49	0.00	1.83	0.65	12.48	0.03	0.69	0.39	6.05	23.72	0.69	0.08	30.13	2.63	1.37	3.88	6.59	45.37	9.13	21.77	30.91
Botswana	0.03	0.00	0.05	0.01	0.00	0.00	0.14	0.02	0.00	1.28	0.00	0.59	2.11	0.02	0.00	71.27	1.83	0.00	4.66	5.42	83.21	4.72	9.96	14.68
South Africa	0.05	0.06	0.28	0.04	0.00	0.04	0.35	3.28	0.22	0.23	0.37	3.99	8.90	0.10	0.20	13.59	1.74	2.28	27.93	30.97	76.82	4.66	9.62	14.28
Rest of South African Customs Union	0.01	0.00	0.01	0.00	0.00	1.02	0.18	1.00	0.08	1.56	3.64	11.47	18.97	0.28	0.62	16.94	11.81	0.01	6.88	31.49	68.03	2.32	10.68	13.00
Egypt	1.10	0.00	0.01	0.12	0.01	0.00	0.35	3.24	0.25	0.02	0.23	1.73	7.06	0.01	0.02	3.45	6.01	6.24	10.35	8.20	34.29	26.59	32.07	58.65
Morocco	0.00	0.00	0.00	0.00	0.00	0.00	0.24	4.53	0.36	0.12	0.06	6.98	12.28	0.04	0.93	4.37	18.83	1.18	3.04	23.22	51.62	12.96	23.15	36.11
Tunisia	0.00	0.00	0.05	0.00	0.00	0.00	0.04	1.00	0.08	0.01	0.00	6.44	7.63	0.02	0.30	4.58	30.95	0.30	3.54	26.19	65.88	11.54	14.95	26.49
Rest of North Africa	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.01	0.00	0.00	0.10	0.20	0.00	0.02	73.55	0.05	10.50	1.73	2.84	88.68	3.02	8.10	11.12
Nigeria	0.00	0.00	0.00	0.08	0.00	0.00	0.01	0.87	0.01	0.00	0.01	0.32	1.29	0.06	0.00	87.65	0.63	0.32	0.35	0.93	89.95	1.61	7.15	8.76
Senegal	0.60	0.00	0.00	0.16	0.00	0.00	0.51	3.56	0.29	0.10	0.10	18.17	23.49	0.14	2.93	2.14	1.46	1.58	4.76	26.81	39.82	10.66	26.03	36.69
Rest of Western Africa	0.03	0.01	0.12	0.47	0.00	0.28	0.05	26.59	0.14	0.04	0.26	10.41	38.39	0.64	0.26	15.47	1.98	1.98	6.66	21.48	47.45	4.84	9.31	14.15
Central Africa	0.00	0.00	0.01	0.00	0.00	0.01	0.04	6.13	0.01	0.00	0.05	0.95	7.21	4.79	0.01	61.74	0.07	1.57	2.15	8.73	79.07	3.31	10.41	13.72
BRIC countries	0.11	0.11	0.12	0.51	0.00	0.00	0.14	0.74	0.04	0.65	0.23	2.35	5.00	0.22	0.08	9.01	17.28	2.49	10.59	47.08	86.75	1.90	6.34	8.25
Other developing countries	0.19	0.13	0.13	0.26	0.00	0.05	0.12	1.38	0.13	0.34	0.19	3.17	6.08	0.14	0.13	14.95	8.78	3.28	7.77	40.55	75.60	4.05	14.28	18.32
European Union	0.01	0.09	0.03	0.02	0.00	0.05	0.16	0.40	0.42	0.35	0.06	2.77	4.37	0.03	0.03	1.26	3.15	1.50	6.44	55.48	67.89	6.26	21.48	27.74
United States	0.10	0.54	0.68	0.69	0.00	0.00	0.23	1.28	0.11	0.55	0.01	2.10	6.32	0.15	0.07	0.81	2.06	1.63	4.73	59.54	68.98	4.72	19.97	24.70
Other developed countries	0.01	0.34	0.09	0.14	0.00	0.05	0.25	0.34	0.35	0.63	0.05	1.45	3.68	0.08	0.20	6.09	1.89	1.11	8.76	57.54	75.68	3.17	17.47	20.64

BRIC=Brazil, Russia, India, China. Source: Authors' calculations based on MIRAGE model.

Shared Harvests: Agriculture, Trade and Employment

Table A8.7: Export volumes by African country/region and sector, regional FTAs scenario – percentage changes compared with the baseline scenario, 2022

	Raddy and process rice	Wheat	Cereals	Oilseeds	Sugar cane and sugar beet	Cattle, sheep, goats, and horses	Animal products and wool	Other agricultural products	Milk and dairy products	Meat products	Sugar	Other food products	Total agriculture and food products	Forestry	Fishing	Other primary Products of work	Textile, wearing apparel, and leather product	Petroleum and coal products	Mineral and metal p roducts	Other manufactured products	Total industrial products	Transport	Other services	Total services
Angola and Democratic Republic of Congo	0.0	0.0	8.0	3.9	0.0	3.4	3.4	3.9	-2.5	15.5	-1.8	6.1	3.2	2.8	3.0	0.7	11.1	1.4	9.6	5.5	0.9	2.6	3.1	3.0
Ethiopia	-2.0	520.5	26.2	-1.8	0.0	16.0	-2.3	5.3	50.4	0.1	4.5	19.1	5.4	47.1	204.2	109.1	12.1	29.6	-0.2	9.3	18.4	-0.7	0.0	-0.3
Madagascar	0.2	0.0	0.1	-1.0	0.0	0.0	0.2	0.3	0.5	5.0	0.0	0.2	0.3	0.1	-0.1	4.0	1.0	-1.3	0.9	0.8	0.6	0.2	0.8	0.5
Malawi	3.9	1.3	-6.9	3.5	0.0	0.0	4.2	9.1	188.6	-32.1	5.7	-6.5	8.3	2.0	1.1	4.0	70.6	-4.2	21.5	18.1	19.2	9.2	4.9	6.8
Mauritius	2.0	0.0	46.7	2.5	0.0	3.6	3.8	3.9	-1.4	3.1	4.2	6.1	4.6	3.6	2.4	1.5	8.3	2.7	12.0	6.3	5.8	1.5	2.4	1.9
Mozambique	138.4	0.0	29.6	6.8	0.0	0.0	4.5	20.1	73.7	20.5	15.4	7.7	15.4	2.5	5.1	2.1	319.1	16.1	8.5	9.0	9.5	5.1	2.2	3.2
United Republic of Tanzania	74.0	1.7	58.2	-0.8	0.0	19.8	-0.3	2.1	97.2	40.9	0.8	38.0	12.5	-4.1	5.6	5.0	141.9	35.4	28.6	41.7	47.6	-1.6	-1.1	-1.2
Uganda	23.9	44.9	-0.1	-1.6	-7.7	-1.0	-0.8	1.8	-2.8	60.2	22.8	3.7	2.6	-1.3	-0.5	-0.3	1.6	12.7	4.5	38.0	4.4	0.6	-0.5	-0.1
Zambia	7.7	22.8	-4.6	7.0	0.0	-0.1	7.1	1.9	2.8	6.8	11.6	-3.6	2.8	10.3	3.8	9.2	10.6	2.7	22.1	7.5	20.1	5.6	4.2	4.7
Zimbabwe	-1.6	16.4	10.6	12.1	0.0	19.9	13.8	8.4	42.4	51.7	32.8	17.6	12.1	-1.9	7.2	15.0	44.5	11.8	15.9	21.7	18.7	11.4	8.6	9.3
Rest of Eastern Africa	11.3	47.3	4.9	4.3	13.0	2.8	4.1	4.9	93.7	15.2	13.3	9.6	6.6	4.9	2.7	2.8	19.2	4.6	15.3	21.5	8.3	2.2	2.9	2.7
Botswana	0.2	1.4	3.1	32.9	0.0	8.1	0.1	25.2	-0.2	-0.1	78.5	4.3	1.9	-1.4	0.0	-0.3	4.6	0.0	1.4	7.0	0.0	-0.4	0.1	-0.1
South Africa	5.6	4.9	21.3	1.6	1.0	-0.4	-1.4	1.3	14.1	28.4	33.6	11.4	8.9	-0.5	-1.3	-2.5	14.7	6.3	-0.5	6.5	2.5	-2.4	-2.7	-2.6
Rest of South African Customs Union	1.3	6.0	1.1	12.0	-9.1	-0.4	-1.2	-1.6	34.4	-2.9	20.5	9.7	9.7	-1.7	-2.3	-3.1	-2.0	21.4	-2.2	5.6	1.6	-4.4	-4.8	-4.7
Egypt	-0.3	9.4	-0.7	0.3	44.4	1.8	1.1	0.2	8.8	0.2	-7.9	3.6	1.1	-0.7	0.0	-0.3	1.1	0.1	0.1	1.1	0.5	-0.1	0.4	0.1
Morocco	0.0	50.8	13.2	-2.9	0.0	-2.7	-1.4	0.4	22.7	-2.7	3.7	28.9	17.3	-0.7	-0.8	1.1	0.0	6.3	8.3	2.7	2.1	-1.2	-0.5	-0.7
Tunisia	0.0	33.0	8.8	38.9	0.0	-2.7	-1.9	15.8	382.7	54.2	113.7	18.6	23.2	3.5	-2.0	0.1	-2.1	0.9	59.5	13.1	8.2	-3.8	-3.1	-3.4
Rest of North Africa	1.3	0.0	0.0	173.1	0.0	-0.1	9.5	73	2058.1	-0.2	3.5	98.6	218.6	114.6	12.5	-0.1	106.9	1.2	27.0	11.1	1.0	-0.3	0.3	0.1
Nigeria	142.8	0.0	17.3	4.9	58.1	0.0	3.0	3.3	205.5	351.9	259.6	9.6	8.7	-0.3	1.4	0.2	20.6	3.5	19.0	56.2	1.1	6.8	1.2	2.3
Senegal	0.3	0.0	0.0	6.4	0.0	0.1	-0.8	-0.2	33.0	56.8	1.5	7.2	6.2	-1.5	-0.8	29.1	21.3	17.2	10.8	12.0	12.5	-2.6	-2.3	-2.4
Rest of Western Africa	24.1	-5.1	3.4	4.2	0.0	16.5	4.1	-1.6	64.3	66.6	-1.8	9.5	1.4	-5.7	4.8	-8.0	199.2	90.5	5.7	16.1	14.8	-3.8	-4.7	-4.4
Central Africa	-0.1	0.0	2.7	-2.8	0.0	-0.7	1.7	0.5	36.7	2.2	-1.8	9.8	1.6	1.7	0.6	-0.2	19.5	14.0	9.6	21.3	3.4	0.0	0.6	0.5
Africa	1.1	25.7	16.3	2.4	41.2	4.3	0.6	1.1	72.7	13.8	13.7	13.6	7.2	3.3	-0.1	-0.1	7.8	6.6	4.6	9.1	3.2	-0.6	-0.5	-0.5

Source: Authors' calculations based on MIRAGE model.

Table A8.8: Export volumes by African country/region and sector, continental FTA scenario – percentage changes compared with the baseline scenario, 2022

	Paddy and processed rice	Wheat	Cereals	Oilseeds	Sugar cane and sugar beet	Cattle, sheep, goats, and horses	Animal products and wool	Other agricultural products	Milk and dairy products	Meat products	Sugar	Other food products	Total agriculture and food products	Forestry	Fishing	Other primary Products of world	Textile, wearing apparel and leather product	Petroleum and coal products	Mineral and metal p roducts	Other manufactured products	Total industrial products	Transport	Other services	Total services
Angola and Democratic Republic of Congo	0.0	0.0	10.0	9.0	0.0	76.7	4.0	7.5	108.6	19.4	50.5	21.3	27.0	3.1	3.4	0.7	51.8	9.5	19.5	16.5	1.3	3.3	4.4	4.1
Ethiopia	-2.5	516.9	26.3	-2.3	0.0	18.2	-2.9	5.8	41.8	-0.9	3.9	18.7	5.5	52.7	204.2	106.6	11.9	25.9	-0.9	11.9	19.5	-1.1	0.6	0.0
Madagascar	-0.8	0.0	-0.5	-1.5	0.0	0.0	-0.5	0.9	-1.1	136.4	-0.7	-0.3	0.6	0.3	-0.4	0.9	0.4	0.4	0.9	0.7	0.7	-0.3	1.3	0.6
Malawi	4.2	1.3	-4.5	5.0	0.0	0.0	3.4	9.4	187.0	-28.3	5.4	-3.0	8.6	0.8	0.6	4.1	70.6	-4.2	23.3	18.1	19.3	8.2	4.6	6.2
Mauritius	1.5	0.0	47.1	2.1	0.0	3.1	3.4	3.5	-0.8	20.2	3.8	6.6	4.5	3.0	2.1	1.8	9.5	2.8	17.2	6.4	6.5	1.0	2.5	1.7
Mozambique	140.0	0.0	30.5	6.8	0.0	0.0	5.3	20.2	75.1	20.1	18.7	8.0	15.7	2.0	6.4	1.6	326.0	16.5	7.7	10.0	9.1	4.7	2.9	3.5
United Republic of Tanzania	80.2	4.0	58.3	-1.7	0.0	19.4	-0.9	1.9	82.8	38.5	0.2	38.6	12.5	-5.2	10.8	4.7	149.8	35.6	28.3	50.4	50.8	-2.4	-1.3	-1.6
Uganda	51.4	40.1	-1.1	-5.6	14.9	-2.5	-3.8	0.4	-1.0	58.2	68.2	8.4	3.7	-5.3	-2.3	-1.7	11.2	13.1	16.3	61.6	8.3	-1.6	-3.1	-2.6
Zambia	179.1	15.2	-3.7	5.1	0.0	-1.0	5.7	-1.6	135.5	307.0	54.2	43.5	7.9	12.8	2.0	43.3	21.2	39.8	18.0	43.0	21.2	2.2	1.3	1.7
Zimbabwe	7.6	18.9	10.9	11.9	0.0	33.0	27.9	7.9	42.6	50.8	32.4	27.3	13.2	-3.0	6.6	15.5	45.1	17.3	14.5	23.4	18.6	10.1	8.0	8.5
Rest of Eastern Africa	50.5	46.9	4.9	4.0	14.0	2.3	4.3	5.0	102.0	16.9	13.2	11.7	7.1	4.1	2.4	2.5	21.0	7.1	20.7	24.1	9.3	1.6	4.1	3.4
Botswana	0.8	2.6	4.4	37.6	0.0	11.6	0.3	25.9	-24.9	0.1	81.3	6.8	2.9	-2.2	0.0	-0.4	6.4	0.0	1.6	8.2	-0.1	-0.7	0.7	0.2
South Africa/African Customs Union	13.2	5.3	21.8	1.3	-0.2	-0.9	-2.9	2.1	19.1	52.2	38.2	20.2	14.2	-1.1	-2.3	-0.8	20.2	16.0	0.0	10.1	4.8	-4.5	-4.5	-4.5
Rest of South Egypt	0.9	6.7	1.0	10.5	-10.4	0.8	1.1	-1.7	23.7	-2.8	21.6	12.1	11.4	-0.9	3.5	-3.4	-2.7	19.8	-3.7	5.2	1.1	-5.2	-5.0	-5.0
Morocco	0.5	4.8	12.8	35.4	41.5	0.2	2.3	3.8	24.8	-2.6	-5.9	14.6	7.0	15.3	-1.0	-4.2	-1.1	-0.6	11.0	17.3	7.3	-1.8	-1.1	-1.4
Tunisia	0.0	48.9	12.4	-3.3	0.0	-3.3	-1.6	-0.1	109.2	-2.4	3.9	27.9	21.0	-1.2	-0.8	6.2	1.2	13.1	9.4	5.4	4.5	-0.7	0.7	0.2
Rest of North Africa	0.0	39.4	10.0	50.0	0.0	0.0	0.0	0.7	18.6	393.0	61.2	110.5	20.9	25.6	27.6	-1.8	-0.5	-1.3	1.3	57.4	14.4	9.0	-3.6	-2.0
Nigeria	3.9	0.0	0.0	100.7	0.0	0.5	9.7	9.5	2047.3	1.1	4.1	96.4	217.1	15.7	12.6	-0.1	118.4	3.7	29.0	13.4	1.5	0.0	1.1	0.8
Senegal	148.9	0.0	19.2	8.4	29.7	0.0	5.9	7.0	218.0	355.6	92.4	14.0	11.1	0.3	2.8	0.9	28.5	4.2	25.2	63.8	1.9	8.9	4.0	5.0
Rest of Western Africa	0.5	0.0	0.3	6.9	0.0	11.5	0.8	0.0	33.2	51.6	1.8	8.2	7.0	-1.2	-0.4	26.4	28.6	15.3	6.6	12.6	12.6	-2.2	-0.8	-1.2
Central Africa	23.9	-4.9	3.2	4.4	0.0	16.0	4.1	-1.4	67.7	213.7	-0.7	9.3	1.8	-5.8	5.0	-7.4	199.8	87.1	8.1	18.5	16.3	-3.2	-3.5	-3.4
Africa	-1.5	0.0	8.9	11.0	0.0	-5.8	4.1	3.1	36.5	8.3	-15.6	16.8	4.7	3.2	2.3	1.5	40.9	24.4	22.4	27.2	6.1	2.5	3.6	3.4
	3.2	26.0	16.9	3.9	38.6	4.2	0.5	1.7	101.0	26.2	16.5	17.0	9.4	4.4	0.2	0.4	8.8	9.8	6.2	13.1	4.7	-1.3	-0.3	-0.7

Source: Authors' calculations based on MIRAGE model.

Shared Harvests: Agriculture, Trade and Employment

Table A8.9: Export volumes and real income by African country/region, FTA reforms with introduction of trade facilitation (TF) measures – percentage changes compared with the baseline scenario, 2022

	Exports		Real Income	
	Regional FTAs with TF measures	Continental FTA with TF measures	Regional FTAs with TF measures	Continental FTA with TF measures
Angola and Democratic Republic of Congo	3.7	4.8	0.6	0.8
Ethiopia	12.2	12.7	0.9	1.0
Madagascar	1.8	1.9	0.6	0.7
Malawi	24.4	24.4	2.9	2.8
Mauritius	7.5	7.9	-0.3	-0.1
Mozambique	17.0	16.4	1.5	1.4
United Republic of Tanzania	32.6	34.5	1.4	1.5
Uganda	13.0	17.6	1.8	2.3
Zambia	41.0	42.4	2.3	2.6
Zimbabwe	29.1	29.3	4.2	4.2
Rest of Eastern Africa	16.8	18.2	0.3	0.4
Botswana	7.3	7.3	4.4	4.0
South Africa	9.8	14.3	1.0	1.7
Rest of South African Customs Union	32.4	32.1	10.9	10.9
Egypt	1.1	4.9	0.1	0.5
Morocco	4.4	6.7	0.3	0.2
Tunisia	10.1	11.2	1.3	1.2
Rest of North Africa	2.1	2.8	0.1	0.0
Nigeria	2.6	4.5	0.2	0.1
Senegal	20.8	21.5	1.6	1.6
Rest of Western Africa	18.2	20.2	2.0	2.2
Central Africa	6.1	11.5	0.5	0.6
Africa	7.9	10.2	0.8	1.0

Source: Authors' calculations based on MIRAGE model.

Table A8.10: Real wages by African country/region, FTA reforms with introduction of trade facilitation (TF) measures – percentage changes compared with the baseline scenario, 2022

	Regional FTAs with TF measures			Continental FTA with TF measures		
	Unskilled, agriculture	Unskilled, non-agricultural sectors	Skilled	Unskilled, agriculture	Unskilled, non-agricultural sectors	Skilled
Angola and Democratic Republic of Congo	0.84	1.05	1.56	1.12	1.46	1.92
Ethiopia	1.44	1.79	0.34	1.53	1.83	0.36
Madagascar	0.44	0.77	1.20	0.60	0.79	1.26
Malawi	8.45	6.82	7.37	8.45	6.75	7.17
Mauritius	0.70	2.35	1.81	0.60	2.49	1.80
Mozambique	1.76	3.24	2.46	1.78	3.14	2.40
United Republic of Tanzania	2.31	2.40	3.84	2.33	2.70	4.17
Uganda	1.12	3.21	4.22	1.25	4.26	5.12
Zambia	2.64	4.99	7.92	3.18	5.29	7.97
Zimbabwe	15.95	12.10	11.53	15.60	11.97	11.07
Rest of Eastern Africa	0.33	1.29	1.44	0.40	1.45	1.65
Botswana	3.20	5.07	7.69	3.56	4.80	7.21
South Africa	1.24	0.93	1.39	1.22	1.42	2.09
Rest of South African Customs Union	4.25	9.98	13.61	4.61	9.92	13.39
Egypt	-0.08	0.09	0.13	0.17	0.41	0.39
Morocco	0.99	0.41	0.55	1.67	0.57	0.73
Tunisia	0.79	2.07	2.57	-0.17	2.23	2.76
Rest of North Africa	0.30	0.39	0.41	0.27	0.45	0.42
Nigeria	0.19	0.76	0.51	0.15	0.93	0.42
Senegal	0.06	2.38	1.27	0.21	2.61	1.74
Rest of Western Africa	0.15	4.62	4.47	0.51	5.26	5.23
Central Africa	0.61	1.01	1.04	1.33	1.66	1.80
Africa	1.81	2.73	3.07	1.94	2.93	3.23

Source: Authors' calculations based on MIRAGE model.

Shared Harvests: Agriculture, Trade and Employment

Table A8.9: Export volumes and real income by African country/region, FTA reforms with introduction of trade facilitation (TF) measures – percentage changes compared with the baseline scenario, 2022

	Regional FTAs with TF measures			Continental FTA with TF measures		
	Agriculture and food	Industry	Services	Agriculture and food	Industry	Services
Angola and Democratic Republic of Congo	-1.3	-0.6	0.5	-1.4	-0.5	0.5
Ethiopia	-0.3	-1.0	-0.9	-0.4	-1.0	-1.0
Madagascar	-0.1	-0.2	0.5	0.0	-0.3	0.5
Malawi	2.6	3.2	0.9	2.6	3.4	0.7
Mauritius	-0.6	2.4	-0.1	-0.8	3.0	-0.3
Mozambique	-3.1	5.6	0.3	-2.8	5.2	0.3
United Republic of Tanzania	1.0	3.9	1.4	0.9	4.5	1.3
Uganda	-0.1	5.7	0.8	-0.2	9.0	0.5
Zambia	-1.3	10.0	3.1	0.0	9.0	2.7
Zimbabwe	0.8	4.1	0.8	1.5	3.8	0.5
Rest of Eastern Africa	-0.3	0.8	0.0	-0.3	1.0	0.1
Botswana	0.1	2.2	1.9	0.7	2.2	1.7
South Africa	1.9	1.0	0.3	2.4	1.5	0.4
Rest of South African Customs Union	1.1	11.4	1.7	2.1	11.3	1.6
Egypt	-0.1	0.2	0.0	0.0	1.3	-0.3
Morocco	2.3	-0.1	0.0	2.5	0.2	0.0
Tunisia	0.2	3.6	-0.2	-0.1	3.9	-0.2
Rest of North Africa	0.3	0.4	0.0	0.2	0.5	0.0
Nigeria	-0.8	0.3	0.2	-1.4	-0.2	0.0
Senegal	-0.6	8.6	-1.0	-0.3	7.9	-0.8
Rest of Western Africa	-0.6	15.7	-0.3	v0.6	16.4	-0.2
Central Africa	-0.7	0.7	0.0	-1.3	-0.1	0.1
Africa	0.3	1.4	0.2	0.3	1.7	0.2

Source: Authors' calculations based on MIRAGE model.

REFERENCES

- African Union Commission. 1991. *Treaty establishing the African economic community* (Addis Ababa).
- Alcala, F.; Ciccone, A. 2004 “Trade and productivity”, in *The Quarterly Journal of Economics*, Vol. 119, No. 2, pp. 613–646.
- Ben Hammouda, H.; Osakwe, P.N. 2006. *Global trade models and economic policy analyses: Relevance, risks, and repercussions for Africa*, ATPC Work in Progress, No. 47 (Addis Ababa, United Nations Economic Commission for Africa).
- Blanchflower, D.G.; Oswald, A.J. 2005. *The wage curve reloaded*, NBER Working Paper, No. 11338 (Cambridge, MA, National Bureau of Economic Research).
- Bouët, A.; Dimaranan, B.; Valin, H. 2010. *Modeling the global trade and environment impacts of biofuel policies*, IFPRI Discussion Paper No. 01018 (Washington, D.C., International Food Policy Research Institute).
- Boumellassa, H.; Laborde, D.; Mitaritonna, C. 2009. *A picture of tariff protection across the world in 2004: MAcMap—HS6, Version 2*, IFPRI Discussion Paper, No. 00903 (Washington, D.C., International Food Policy Research Institute).
- Decreux, Y.; Fontagne, L. 2009. *Economic impact of potential outcome of the DDA*, CEPII Working Paper, No. 2009–01 (Paris, Centre d’Etudes Prospectives et d’Informations Internationales).
- Decreux, Y.; Valin, H. 2007. *MIRAGE, updated version of the model for trade policy analysis: Focus on agricultural and dynamics*, CEPII Working Paper, No. 2007–15 (Paris, Centre d’Etudes Prospectives et d’Informations Internationales).
- Horridge, J.M.; Laborde, D. 2008. “TASTE: A program to adapt detailed trade and tariff data to GTAP-related purposes”, *GTAP Technical Paper* (West Lafayette, IN, Center for Global Trade Analysis, Purdue University).
- Hummels, D. 2001. “*Time as a trade barrier*” (West Lafayette, IN, Purdue University).
- Krugman, P. (1995). “*Development, geography, and economic theory*”, MIT Press (Cambridge).
- Kee, H.L.; Nicita, A.; Olarreaga, M. 2009. “Estimating trade restrictiveness indices”, in *Economic Journal*, Vol. 119, pp. 172–199.
- McMillan, M.; Rodrik, D. 2011. “Globalization, structural change and productivity growth”, in M. Bachetta and M. Jansen (eds.): *Making globalization socially sustainable* (Geneva, International Labour Office and World Trade Organization).
- Minor, P.; Tsigas, M. 2008. Impact of better trade facilitation in developing countries: Analysis with a new GTAP database for the value of time in trade, research report submitted to GTAP 11th Annual Conference, Helsinki, Finland.
- Narayanan, B.; Walmsley, T.L. (eds.). 2008. *Global trade, assistance, and production: The GTAP 7 database* (Lafayette, IN, Center for Global Trade Analysis, Purdue University).
- United Nations Conference on Trade and Development (UNCTAD). 2006. *The least developed countries report: Developing productive capacities* (New York and Geneva, United Nations).
- . 2009. *Economic development in Africa report: Strengthening regional economic integration for Africa’s development* (New York and Geneva, United Nations).
- United Nations Economic Commission for Africa; African Union Commission; African Development Bank. 2010. *Assessing regional integration in Africa IV: Enhancing intra–African trade* (Geneva, United Nations).

Shared Harvests: Agriculture, Trade and Employment

United States Agency for International Development. 2007. *Calculating tariff equivalents for time in trade* (Washington, D.C.).

Von Uexkull, E. 2012. "Regional trade and employment in ECOWAS", *Employment Working Paper*, No. 114 (Geneva, International Labour Office).

World Bank. 2011. *World development indicators* (Washington, D.C.).

-. 2012. *Doing Business 2012: Doing business in a more transparent world* (Washington, D.C.).