Potential Impacts of the African Continental Free Trade Area (AfCFTA) on Selected Countries

Kenan Bagci
The Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC), Ankara, Turkey, kbagci@sesric.org

Abdouramane Diallo
Islamic Trade Financing Corporation (ITFC), Jeddah, Saudi Arabia

Anisse Terai
Harvard Kennedy School (HKS), Harvard University, Massachusetts, USA

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Potential Impacts of the African Continental Free Trade Area (AfCFTA) on Selected Countries: Case of Cote d'Ivoire, Egypt, Guinea, Mozambique, Tunisia and Uganda

Kenan Bagci [a],[*],[1], Abdouramane Diallo [b], Anisse Terai [c]

[a] The Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC), Ankara, Turkey
[b] Islamic Trade Financing Corporation (ITFC), Jeddah, Saudi Arabia
[c] Harvard Kennedy School (HKS), Harvard University, Massachusetts, USA

Abstract

This study investigates the potential impacts of the African Continental Free Trade Agreement (AfCFTA) on production and trade in six selected African countries, namely, Cote d'Ivoire, Egypt, Guinea, Mozambique, Tunisia, and Uganda. To estimate the potential long-term effects of the agreement on these countries, the study uses the computable general equilibrium model developed by the Global Trade Analysis Project (GTAP) considering two alternative scenarios: full tariff elimination and partial liberalization. The GDPs of the six countries are expected to be affected at different rates. Overall, countries with higher initial levels of protection tend to see higher benefits from being part of a regional trade agreement due to the elimination of high barriers. Countries with more liberal trade regimes and greater openness, however, experience relatively lower welfare benefits resulting from the further liberalization of trade. Gains would be higher if supplemented with additional trade reforms, with trade facilitation and capital mobility significantly boosting the gains. However, structural adjustment costs and associated social tensions may be higher in countries with greater ex-ante protectionism.

1. Introduction

A chieving the Sustainable Development Goals (SDGs) in Africa requires a multidimensional and multisectoral intervention that includes trade and investment. In this regard, the operationalization of the African Continental Free Trade Agreement (AfCFTA) is a critical milestone in the sustainable development journey of Africa. The AfCFTA is even more important in the context of the recovery from COVID-19 induced economic and financial crises, trade restrictions and exacerbated

the US\$120 billion trade finance gap in Africa (Gonzalez-Behar & Terai, 2020; Terai, 2017). The free trade agreement will certainly be a pivotal component of the African response to boost economic and commercial activities during the post-pandemic period.

On January 1, 2021, the AfCFTA became operational with the ratification of 34 African Union (AU) member states, which later increased to 47 as of August 2023 (TRALAC, 2023). This is a major step towards boosting regional trade and economic integration among the African countries. The

AfCFTA is expected to facilitate, harmonize and better coordinate trade regimes, and eliminate challenges related to overlapping trade agreements across the continent. The expected gains are not to be limited to international trade only. The agreement would support greater economic integration, foster competitiveness of the domestic industries, facilitate better allocation of resources and help to attract greater foreign direct investments.

The estimated benefits for the continent are considerable. The African Development Bank finds that intraregional trade increases by 14.6% when bilateral tariffs are removed (African Development Bank, 2019). When non-tariff barriers (NTBs) are also removed, a large boost in intra-African trade of around 107% is expected, together with 44% increase in exports to other regions. World Bank (2020) estimates that the volume of total exports would increase by almost 29% relative to business as usual. Intra-continental exports would increase by more than 81%, while exports to non-African countries would rise by 19%. It would also contribute to lifting an additional 98 million people from extreme and moderate poverty. Real income gains from full implementation of the agreement could increase by 7%, or nearly US$450 billion. Even greater gains would come from lowering trade costs by reducing nontariff barriers and improving efficiency at the borders. Similarly, Abrego et al. (2020) find limited welfare gains from tariff elimination only (0.05%), while this effect becomes stronger (1.7%) when NTBs are also reduced by 35%. Vanzetti et al., 2018 find an overall welfare gain of about US$3.6 billion in the long run. By considering alternative assumptions, Saygili et al. (2018) estimate the welfare gains worth about US$16.1 billion when all tariffs are removed. If each country exempts one sector, total gains drop to US$11 billion. Even if different assumptions yield different results, there is an obvious gain from AfCFTA.

Evidently, there are huge welfare gains expected from the AfCFTA. However, if supplemented with additional trade reforms, the gains are expected to be much higher. Most of the Organization of Islamic Cooperation (OIC) countries in Africa have been active in taking advantage of the Agreement. Among the 27 OIC countries in Africa, 23 countries (Niger, Chad, Djibouti, Guinea, Mali, Mauritania, Uganda, Côte d'Ivoire, Senegal, Togo, Egypt, Gambia, Sierra Leone, Burkina Faso, Gabon, Tunisia, Cameroon,

List of abbreviations	
AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
AU	African Union
GDP	Gross Domestic Product
GTAP	Global Trade Analysis Project
HKS	Harvard Kennedy School
ITFC	Islamic Trade Financing Corporation
LDCs	Least Developed Countries
NTBs	Non-Tariff Barriers
OIC	Organization of Islamic Cooperation
RECs	Regional Economic Communities
SDGs	Sustainable Development Goals
SESRIC	The Statistical, Economic and Social Research and Training Centre for Islamic Countries
TFA	Trade Facilitation Agreement
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa

Nigeria, Algeria, Morocco, Guinea-Bissau, Comoros, and Mozambique, in order of ratification) have already started trading under AfCFTA. When the overall readiness of OIC member countries in Africa is evaluated, it is found that Egypt, Nigeria, Algeria, Morocco, Tunisia, Côte d'Ivoire and Uganda are among the OIC countries with the highest readiness scores (Annex Table A3).

This study aims to estimate the potential impacts of the AfCFTA on selected OIC countries in Africa, namely Côte d'Ivoire, Egypt, Guinea, Mozambique, Tunisia and Uganda. These six countries are selected from ITFC's "AfCFTA Relative Readiness Index". The index suggests a country has some level of technical and administrative capacity to conduct and implement a continental policy implementation process on its own and benefit from it. It also assumes the country has financial resources and the depth of market, products and services. It combines 10 different dimensions to assess African OIC countries in terms of human development, governance, economic power, infrastructure and competitiveness. Accordingly, the index identifies three tiers of OIC African countries: advanced, ready and preparing countries (see Annex Table A3 for the list of countries in each tier). The countries of the study were chosen from each group to have a balanced geographical representation of OIC membership in Africa and evaluate the impacts of

free trade agreement on countries with different levels of readiness for the AfCFTA membership.[2] The six selected countries are believed to offer also an interesting depth of sectoral diversification to trade with each other's.

In this connection, this study assesses output, trade and welfare effects for these six countries and provide some policy directions towards better utilizing the Agreement based on the projected outcomes. The rest of the article is organized as follows. While section 2 provides brief information on the current trade patterns of the selected OIC countries and section 3 discusses the model and estimation methodology. The following section present the findings on total GDP, welfare, sectoral outputs, total and sectoral trade, bilateral trade and factor demands. Before concluding, the study presents further findings by extending the previous assumptions.

2. Current trade patterns and tariff barriers to trade

Although the participation of African countries in global trade is important to increase their productivity and competitiveness, they only account for a minor share in global trade as compared to their share in global population. In this regard, the AfCFTA agreement to eliminate tariffs on most goods, liberalize trade of key services and reduce nontariff barriers to intra-regional trade is a critical step forward towards creating a continental single market with free movement of labour and capital, which is expected to boost intra-continental trade.

As for the trade patterns of the six selected countries, the value of total exports and imports in goods and services remained highly diverse (Table 1). Among them, Egypt is the top exporter with an average value of exports reaching US$ 45 billion during 2010–2019, as compared to US$ 29 billion during 2000–2009. However, its imports have doubled during the same period, leading to a sharp increase in the average trade deficit in Egypt. On the other hand, total value of exports of Guinea was as low as US$ 1.1 billion during 2000–2009, which increased to 2.8 billion during 2010–2019. Even though its exports grew more than two times, the value of imports tripled during the period under consideration, raising again trade deficits sharply in Guinea. A similar situation was observed in Mozambique and Uganda. Even if they attained a

Table 1. Total exports and imports of goods and services (average of period).

		Exports Current Billion US$)	Imports Current Billion US$)	Share of Trade in GDP (%)
2000–2009	CIV	8.0	6.6	85.9
	EGY	28.8	33.8	55.9
	GIN	1.1	1.6	63.1
	MOZ	2.0	3.2	63.2
	TUN	14.6	15.4	94.2
	UGA	1.7	2.8	43.6
2010–2019	CIV	13.1	11.8	61.3
	EGY	44.9	67.9	40.6
	GIN	2.8	4.8	85.8
	MOZ	4.9	10.1	102.0
	TUN	19.9	24.2	102.0
	UGA	4.5	7.1	38.3

Source: Authors' calculations based on World Bank WDI, February 2021.

sizable growth in exports of goods and services, the growth in imports was also large in these countries. Tunisia experienced more moderate growth in its exports and imports, but its average trade deficit has also expanded from US$ 0.8 billion to US$ 4.3 billion. Côte d'Ivoire is the only country among the six selected OIC countries that has a trade surplus. Even if its imports have grown at a higher rate than its exports, the average trade surplus remained close to the same levels of US$ 1.4 billion.

The average value of exports of goods and services grew by 167% in Uganda, 166% in Guinea, 141% in Mozambique, 63% in Côte d'Ivoire, 56% in Egypt and 36% in Tunisia. On the other hand, the average value of imports of goods and services grew by 216% in Mozambique, 194% in Guinea, 151% in Uganda, 101% in Egypt, 79% in Côte d'Ivoire and 57% in Tunisia. As a measure of openness of the economies, the share of total trade in total GDP of the concerned countries followed different patterns. It fell in the cases of Côte d'Ivoire (from 86% to 61%), Egypt (from 56% to 41%) and Uganda (from 44% to 38%). However, overall openness increased considerably in Guinea (from 63% to 86%), Mozambique (63%–102%) and Tunisia (from 94% to 102%). Specifically, Mozambique and Guinea become increasingly more integrated into global economic activities as the shares of exports and imports in their total GDP increase over time (Table 1). Overall, Guinea, Mozambique and Tunisia appear to be more open economies as compared to Côte d'Ivoire, Egypt and Uganda.

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[2] We also collected information on the status of AfCFTA preparedness as perceived by the countries. We contacted representatives of AfCFTA national committees (or office of Chief negotiators when national committees' representatives was not identified) and shared a list of 34 indicators clustered in 9 areas of preparation. The list was provided by the African Union AfCFTA office (before the AfCFTA Secretariat was operational). We sent the list to Cote d'Ivoire Nigeria, Cote d'Ivoire, Uganda, Mozambique, Djibouti, Tunisia, Guinea, Egypt, Algeria. We obtained a response from all countries except for Mozambique and Algeria.

Table 2. Average Applied Tariff Rates, Weighted Mean (2010 vs 2018).

		All products (%)	Manufactured products (%)	Primary products (%)
CIV	2010	7.14	8.74	5.12
	2018	10.17	8.80	12.71
EGY	2010	9.71	10.90	7.98
	2018	8.19	6.59	10.99
GIN	2010	11.91	10.18	13.87
	2018	11.29	9.08	15.04
MOZ	2010	4.77	4.42	5.15
	2018	4.18	4.42	3.67
TUN	2010	13.77	15.63	8.90
	2016	9.35	9.46	9.07
UGA	2010	9.18	7.69	11.91
	2018	8.01	6.22	14.31

Source: World Bank WDI, October 2020.

The trade relations of the six OIC countries with other African countries are also relatively weak when compared to other major economies. After its operationalization, the AfCFTA may contribute to enhanced cooperation and trade relations among the African countries. This would be in terms of both trade diversion as well as trade creation. It would be more beneficial if intra-regional trade volumes increase due to trade creation in new products and markets. This would require greater production capacities, productive sources and foreign investment. Along these lines, the subsequent sections will also provide estimations on the changes in sectoral outputs and demand for factors of productions.

Before proceeding with the estimation of potential impact of tariff liberalization, the latest rates of applied import tariffs are presented in Table 2 to demonstrate ex-ante trade barriers between individual countries and the Africa region as a whole. It provides the weighted average of applied tariff rates to all trade partners. During 2010−2018, average applied tariff rates in primary products increased in all countries except Mozambique. On the other hand, the average rates in manufacturing products fell considerably or remained around the same levels in the selected countries. The fall is particularly strong in the cases of Egypt and Tunisia.

In order to have a better grasp of the estimation results in the following sections, Table 3 reports the aggregated ad valorem import tariffs applied by individual OIC countries on products imported from Africa. The model in this study estimates the impacts upon the elimination of these tariffs (and all other tariffs applied among African countries). Most protected sectors appear to be wearing apparel, leather products, meat products, vegetable, fruit and nuts, and beverages and tobacco products. Uganda applies the lowest levels of tariffs, but the rates are significantly high in the cases of Côte d'Ivoire and Guinea. Accordingly, one would expect greater impacts of tariff elimination on these two countries.

Table 3. Pre-AfCFTA Tariff Rates and Import Shares from Africa (GTAP Data).

	Average Tariff Rates Applied for Imports from Africa (%)						Share of Sectors in Total Imports from Africa (%)					
	CIV	EGY	GIN	MOZ	TUN	UGA	CIV	EGY	GIN	MOZ	TUN	UGA
Vegetables, fruit, nuts	10.2	4.5	19.6	10.2	1.4	5.4	0.7	0.8	0.5	1.5	0.3	1.7
Other agro-food products	3	0.1	6.8	2	0.8	1.4	0.2	1.9	0.2	1.2	1.1	1.2
Other agriculture	7.7	0	5.3	0.1	5.8	0.8	0.0	25.8	0.0	0.2	1.3	0.4
Livestock, fish & other animal prd	8.8	0.8	9.7	4.8	1.4	1.1	0.0	4.8	0.1	0.9	0.1	0.6
Meat products	18.7	1.2	14.9	11.7	7	1.4	0.1	0.3	0.0	1.1	0.0	0.3
Hydrocarbons and minerals	0	0.2	4.6	0.9	0	0	64.8	1.6	0.4	2.9	69.8	3.9
Beverages and tobacco products	12.7	0.9	20	4.5	13	1.6	1.6	4.8	13.0	3.9	0.4	4.2
Agroindustry	7.6	1	19.1	2.4	1.6	7.7	9.9	3.3	33.7	17.4	5.0	13.4
Textiles	14.9	2.1	15	2.5	0.1	1.9	1.5	0.6	5.4	1.2	1.6	2.2
Wearing apparel	19.1	12.8	18.8	0.4	16.4	6.9	0.2	0.2	0.3	0.7	0.1	0.6
Leather products	19.6	8.5	19.9	0.1	12.7	1.4	0.2	0.1	1.1	0.3	0.2	1.3
Paper and wood products	14.3	2.5	18.1	0.1	7.9	2.8	1.5	1.2	2.4	4.0	0.9	6.3
Refining and petrochemicals	6.2	0.3	8.9	1.7	0.4	1.7	7.1	21.8	17.1	13.6	13.3	22.5
Pharmaceuticals	0	0.5	0.2	0	0.2	0	0.4	0.1	0.5	0.2	0.2	3.0
Nonmetallic mineral products	16.6	2.5	18.4	1.4	0.1	0.2	0.6	0.3	2.2	1.8	1.0	7.2
Metal products	6.8	0.7	15.2	0.9	0	0.7	5.9	20.8	8.4	16.7	1.9	13.2
Computer, electronic and optic	9.5	2.4	7.4	0.4	0.2	1.8	0.4	0.9	0.6	3.8	0.3	5.4
Machinery and equipment	8.7	1.6	8.4	0.1	0.4	2.7	2.5	2.5	11.1	16.7	0.6	5.5
Motor vehicles and parts	10.3	0.3	10.2	3.5	6.1	4.9	2.1	7.9	1.2	10.3	1.8	5.0
Other manufacturing	13.3	7.3	14.7	5	1.1	2.3	0.3	0.2	1.8	1.3	0.1	2.0

Source: GTAP 10 database. Rates and shares that are higher than 10% are shaded in grey.

`Sectoral distribution is also important in understanding the potential impacts of AfCFTA. Even if Côte d'Ivoire applies high tariff rates in various sectors, their share in total imports from Africa usually does not exceed the 2% level. The country primarily imports hydrocarbons and minerals and the tariff rate in this sector is zero. This is also the case in Tunisia. The case of Guinea is slightly different from the case of Côte d'Ivoire, since Guinean imports are less concentrated and some products with a higher share of imports also face high tariff rates, such as agroindustry, beverages and tobacco products, and machinery and equipment. Therefore, the elimination of tariffs in Guinea is likely to have more transformative impacts on the economic structure. In Egypt, products with the highest share of imports have tariff rates below 1%. In Mozambique, this rate reaches up to 3.5%, but Uganda applies the highest duties on agroindustry products that have a relatively higher share of imports.

3. Model and estimation

The AfCFTA foresees tariffs reduction in 90% of goods traded between AfCFTA signatory countries within 5 years for non-LDCs and 10 years for the least developed countries (LDCs). For an additional 7% of 'sensitive' goods, tariffs will fall within 10 years for non-LDCs and 13 years for LDCs. A final 3% of 'excluded' products are to retain their tariffs to allow flexibilities for countries with particular sensitivities but will be subject to a review process every five years (UNECA & AU, 2020). The excluded products cannot account for more than 10% of intra-Africa imports (World Bank, 2020). The agreement is expected to be completed with the reduction of NTBs and implementation of a trade facilitation agreement (TFA).

This study particularly focuses on six OIC countries in Africa: Côte d'Ivoire, Egypt, Guinea, Mozambique, Tunisia and Uganda. These countries are selected based on a multidimensional model ranking of all OIC African countries with respect to their level of readiness to access the AfCFTA (Annex Table A3). In order to assess the potential long-term effects of the agreement on these countries, the computable general equilibrium model developed by the Global Trade Analysis Project (GTAP) is used. As a widely used approach in the literature, it is a multi-region, multi-sector, computable general equilibrium model, with perfect competition and constant returns to scale. The model is estimated by using the GTAP 10 database, which originally covers 141 regions, of which 121 are individual countries, and 65 sectors. The database provides a snapshot of the global economy in 2014, and describes domestic inter-industry flows, global bilateral trade patterns, international transport margins and protection matrices that link individual countries/regions (Aguiar, et al., 2019).

There are certain limitations related with the GTAP database that make it difficult to get a realistic assessment of the impact of trade liberalization on African countries. The first is that, due to data limitations in African countries, some of them are classified into composite groups; this level of aggregation does not recognize the heterogeneity among these countries and does not permit researchers to measure the impact of trade liberalization at the national level. This high heterogeneity implies that we should be cautious in making general statements about the impact of trade liberalization on African countries since aggregate results can be quite misleading. The data for the six selected OIC countries are already available at the national level; therefore, such a concern is not expected in our study. The second problem is the fact that many commodities exported by African countries are not provided as separate sectors in the GTAP database. They are aggregated and lumped into much larger sectors, so commodities with very different production structures and price dynamics are included together in a composite sector. The objective of this paper is not to evaluate the impacts at the commodity level, but at the broader sectoral level. Even if the sectoral level results may be affected by insufficient disaggregation of GTAP data at the commodity level, they will remain indicative to put the things into a perspective.

For the purpose of this article, the partner countries are aggregated into 5 regions (totalling 11 regions/countries) with data disaggregated into 24 sectors (see the annex for sectoral and geographical classification of the GTAP database). The model is estimated with five factor endowments with fixed supply, including land, natural resources, unskilled labour, skilled labour and capital. As per the GTAP model, land and natural resources are assumed to be perfectly immobile between sectors but labour and capital are perfectly mobile. The solution algorithm used is the Gragg method with automatic accuracy to get a high level of precision in the results.

Two different scenarios are used to analyse the potential impacts of the AfCFTA. The first scenario assumes full tariff elimination on imported goods within Africa. The second scenario considers a partial elimination of tariffs where one product category (out of 20 agricultural and manufacturing sectors) is excluded to retain the tariffs to take into account the "sensitive and excluded" products. A

sector is considered as sensitive and excluded from tariff reductions if it enjoys high levels of protection and its share in total imports from Africa does not substantially exceed the 10% level. No further separation was made on the classification of sensitive and excluded products. Considering the high level of concentration in intra-African trade, the exclusion of a sector may significantly alter the estimated impacts if the 10%-share constraint in total imports is ignored. This is also a common approach used in the literature (see World Bank, 2020; Saygili et al., 2018; Mevel et al., 2015). In both scenarios, the tariff rates of African countries with the rest of the world are kept constant. The simulations in this study are based on the GTAP standard closure.

World Bank (2020) ranks tariff lines in descending order by tariff revenues generated by African imports and considers products with highest tariff revenues as sensitive products No further separation was made on the classification of sensitive and excluded products. Similar approaches are followed by some other studies including Saygili et al. (2018) and Mevel et al. (2015). However, in the case of African countries, tariff revenue should not be considered as the only criteria in selecting sensitive products. Tariff are applied to protect domestic producers and develop the capacities of affected industries to make them more competitive in international markets. This would be also a more logical policy option when countries are allowed to retain tariffs in very few products. Therefore, in this study, products are considered as sensitive if they enjoy the highest average tariff rates, taking into consideration that their share in total imports does not exceed the 10% threshold level.

Moreover, AfCFTA is expected to reduce the trade costs associated with NTBs by putting a common set of rules for participating countries in various areas including competition, sanitary and phytosanitary standards, and other technical barriers to trade. The reduction in trade costs associated with NTBs would affect the imports from non-African countries as well as exports from participating countries to the rest of the world. However, these effects will be ignored in this study. Similarly, possible gains associated with the implementation of TFA are disregarded.

4. Findings

4.1. Output and welfare effects

Economic liberalization has been widely considered as a critical policy instrument to support productivity and growth. Empirical evidence suggests that countries with liberalized trade regimes experienced higher annual growth rates (Wacziarg & Welch, 2008). An open economy has enabled many developing countries to gain competitive advantages in the manufacture of various products. The literature provides evidence on the potential gains from eliminating trade barriers under different contexts. However, trade liberalization policies may also entail costs and unequal distribution of benefits within and across countries. Greater openness to trade may have diverse effect on industrial production, government revenues, employment and wages for different skill levels. Therefore, economic policies aiming to open up an economy should be accompanied by accommodative policies to address the harmful effects on negatively affected sectors and workers.

Exports of African economies are characterized by high dependence on raw and primary products. Industrial capacities are yet to be developed to become more competitive in global markets. Trade liberalization and regional integration among countries with similar development levels and economic structures may encourage firms' participation to international trade and raise their productivity before entering more competitive markets. In the African context, trade barriers may have been preventing some firms to enter foreign markets, but firms will be more confident when policy makers express their willingness to create a single market at continental level. Moreover, some firms may find it more profitable to export within Africa instead of exporting outside of the region, leading to trade diversion and trade creation effects. This may have further implications on production and employment in the long run. Such impacts are expected to be particularly high in countries with high initial barriers.

Fig. 1 shows the estimated impacts on sectoral outputs in six OIC countries. The results are shown for best and worst performing sectors after full trade liberalization. Outputs in leather and metal products in Côte d'Ivoire are estimated to increase around 18−20%, but machinery and equipment sector may see a contraction over 10%. In Egypt, the estimated impacts are more moderate, where production would increase more than 3% in machinery and equipment and around 1% in motor vehicles. Probably the most sizable impacts are expected to be seen in the case of Guinea. While production in certain sectors is expected to boost up to 34%, it is expected to contract up to 18% in some others. This reflects that a considerable restructuring in economic activities could be witnessed in the economy of Guinea.
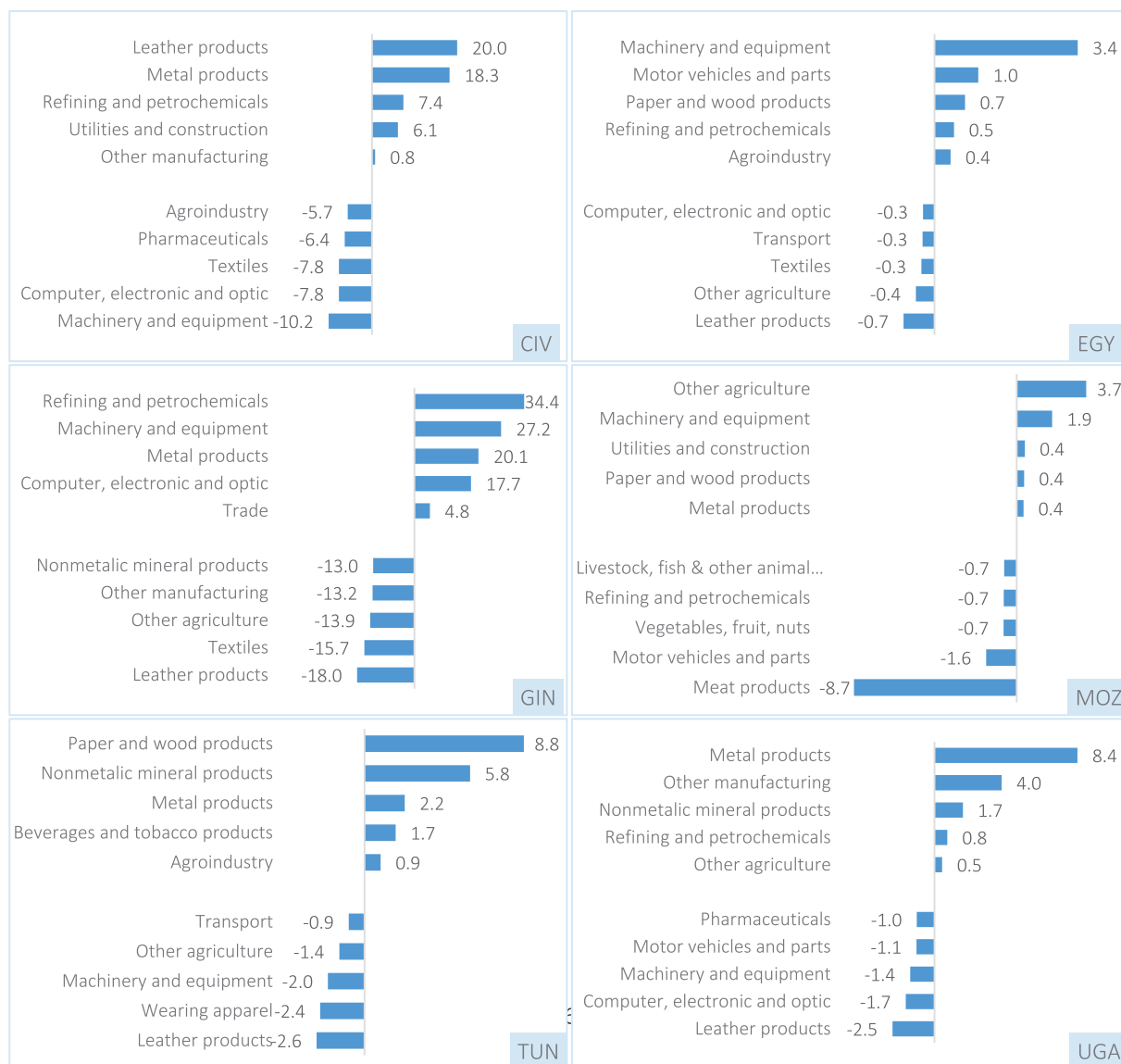
Fig. 1. Estimated Impacts on Sectoral Output (%). Source: Authors' estimation based on GTAP 10 database.

In Mozambique, other agricultural production is expected to rise by 3.7%, but meat production is expected to fall by 8.7%. Other than this shift in the agricultural sector, no major impact is expected in the manufacturing and services sectors. The impacts on production in Tunisia and Uganda appear to be of similar magnitude. Paper and wood products (8.8%) and non-metal mineral products (5.8%) are expected to grow in Tunisia, but leather products, wearing apparel, and machinery and equipment are expected to shrink between 2% and 3%. In Uganda, metal products (8.4%) and other manufacturing activities (4.0%) are estimated to expand, but the production of leather products is expected to fall by 2.5%.

In the case of partial liberalization, similar results are obtained in terms of sectoral impacts. As demonstrated in Annex Table A1, the simulated impacts do not change significantly in Egypt and Tunisia. In Côte d'Ivoire, the expected growth in leather products would fall but the expected growth in metal products would improve further. In

Table 4. Estimated impacts on GDP (%) and welfare (US$ million).

	GDP		Welfare	
	Partial	Full	Partial	Full
CIV	5.0	5.3	610.0	641.4
EGY	0.4	0.4	224.8	242.6
GIN	6.6	6.5	227.5	228.1
MOZ	−0.3	−0.4	−22.1	−28.0
TUN	0.7	0.7	108.3	113.7
UGA	0.6	0.4	18.0	14.9

Source: Authors' estimation based on GTAP 10 database.

Guinea, the expected contraction in the production of beverages and tobacco products would moderate. On the other hand, meat production in Mozambique would significantly benefit from partial liberalization. Finally, other manufacturing products would see lower growth in Uganda.

Considering these economic transformations, GDPs of the six OIC countries are expected to be affected at different rates after full trade liberalization in Africa (Table 4). Due to major shifts in economic activities, GDP of Guinea is estimated to increase by 6.5%. A strong impact is also expected in the case of Côte d'Ivoire with an increase of 5.3% in GDP. Tunisia (0.7%), Uganda (0.4%) and Egypt (0.4%) are expected to see small increases in their GDP, whereas Mozambique may witness a small contraction in total economic activities by 0.4%. In terms of welfare impacts, Côte d'Ivoire is estimated to see the largest benefits from trade liberalization, followed by Egypt and Guinea. Mozambique may again experience a negative welfare effect (Table 4).

Estimated impacts on the total change in GDP and welfare barely change in the case of partial liberalization, which are mostly lower than the magnitude estimated in the case of full liberalization. Partial liberalization reduces the gains most in Côte d'Ivoire both in terms of GDP growth and welfare gains. Welfare gains would reduce to US$ 497 million from the initially estimated US$ 643 million. On the other hand, the negative effect of trade liberalization on Mozambique slightly shrinks when only partial liberalization takes place (Table 4).

It is also possible in the GTAP model to decompose the welfare gains into its sources. Since our model does not consider any change in endowments or technology, the welfare results are due only to changes in allocative efficiency (gains associated with the allocation of resources changes relative to pre-existing distortions), terms of trade (gains associated with the change in the relative price of exports to imports), and investment returns on the capital account (the returns on the difference between domestic savings and investment). As shown in Table 5, gains are mostly due to relative change in

prices, or terms of trade effect. In Côte d'Ivoire and Guinea. Trade liberalization is also expected to improve allocative efficiency and create important welfare gains for these economies.

It is hard to predict which segments of a society would benefit more from welfare gains, which is largely associated with interventionist policies of governments. The findings in the literature support this argument. The microsimulations applied by Chauvin et al. (2016) point to the heterogeneity of the impacts on welfare for different income groups. They found that in some countries, such as Burkina Faso and Côte d'Ivoire, the benefits will help the poor more, whereas in Cameroon and Nigeria, the rich will gain more. It is not possible to trace why this heterogeneity takes place, but a possible explanation would be the consumption and production patterns of households. In some cases, poor households may be net producers of some exported goods, who will be harmed by a price fall after trade liberalization. In some others, they may be net consumers of imported goods, and benefit from a price fall due to lower trade barriers.

There are also concerns by the smaller economies about the competition from larger economies, affecting the integration process. It is argued that countries with a more diversified export structure and large productive capacities in manufacturing are likely to benefit more from growing regional economic integration and experience significant economic growth and welfare gains. However, the above results indicate that this argument is not necessarily true. Smaller and currently highly protected economies would benefit the most from this economic integration process. For example, Guinea, as a small and highly protected economy, is expected to experience the largest benefit among the six OIC countries. Elimination of trade barriers will have a significant impact on economic activities by allowing for scale economies after creating immediate winners and losers in different sectors and products. Therefore, the adoption of appropriate policies can further stimulate trade and investment

Table 5. Decomposition of welfare gains (US$ million).

	Allocative Efficiency		Terms of Trade		Investment-Savings		Total	
	Full L.	Partial L.	Full L.	Partial L.	Full L.	Partial L.	Full L.	Partial L.
Côte d'Ivoire	238.8	228.5	383.8	364.1	20.0	18.6	642.6	611.2
Egypt	23.1	22.0	123.5	114.2	97.6	90.0	244.2	226.3
Guinea	82.6	81.5	114.9	115.2	31.3	31.5	228.9	228.3
Mozambique	−8.7	−8.0	−12.7	−8.7	−6.4	−5.2	−27.9	−21.9
Tunisia	11.9	11.2	84.8	80.7	17.5	16.7	114.2	108.6
Uganda	1.3	2.0	16.9	19.7	−3.2	−3.5	15.1	18.2

Source: Authors' estimation based on GTAP 10 database.

in targeted sectors in small economies following the trade liberalization.

4.2. Trade effects

There are eight various regional economic communities (RECs) that are considered as building blocks for the AfCFTA, but the degree of integration significantly differs within the individual RECs. There are also overlaps between the various RECs. Some RECs are relatively more integrated than others, with already very low trade barriers. Therefore, the expected impacts of trade liberalization likely to differ between countries and different regions or RECs. Adding to this, non-tariff measures in many parts of the continent, such as quotas, sanitary and phytosanitary measures, technical standards, and bureaucratic procedures, constitute a major barrier to trade. Moreover, most African states belong to multiple free trade areas, which may have different tariffs, rules of origin and standards.

Keeping these considerations in mind, trade liberalization at the continental level is expected to change the trade patterns among the African countries significantly. As provided above in Table 3, some sectors are protected with relatively higher tariff rates, distorting the trade flows across the continent, and their elimination may cause a major change in demand for imported products within Africa. In this section, the simulation results from full tariff elimination (scenario 1) as well as partial elimination (scenario 2) are presented with respect to their impacts on total and bilateral trade.

In the case of full liberalization, import demand is expected to increase in almost all sectors in the six concerned African OIC countries. In aggregate terms, total imports are expected to rise most in Côte d'Ivoire (10.9%) and Guinea (7.3%). Imports are estimated to increase by less than 2% in other countries and regions in Africa investigated in this study. Exports are expected to increase at lower rates than imports, except in Egypt and

Mozambique (Table 6). Particularly in Côte d'Ivoire and Guinea, the rise in exports is expected to be significantly below the increase in imports, with potential implications on trade balances. In the case of partial liberalization, estimated impacts either decline slightly or remain unchanged (Table 6).

At the sectoral level, Côte d'Ivoire and Guinea are expected to experience significant rises in import flows. Demand for foreign products will rise over 20% in other manufacturing products, leather products and metal products in Côte d'Ivoire (Table 7). The sectors with at least a 20% rise in Guinea are meat products, other agriculture, hydrocarbons and minerals, and trade services. Increase in imports is not expected to exceed the 1% level in any sector in the case of Egypt. Imports of meat products and vegetables, fruits and nuts are estimated to increase by at least 15% in Mozambique. Livestock and other animal products may also increase by over 5%. Imports in the majority of sectors are expected to change narrowly in Mozambique. There are a few sectors in Tunisia where demand for African goods and services is to increase over 3%, including paper and wood products, meat products and other agriculture. Uganda demonstrates a strong rise in import demand for agroindustry, vegetables, fruit and nuts, but the impacts on the remaining sectors are below 5%.

Simulation results reveal much stronger effects in terms of changes in total exports. Unlike the case of imports, there are also sectors in which exports shrink at considerably high rates. The most significant transformation is expected in Guinea and Côte d'Ivoire (Table 8). In Guinea, while some sectors are estimated to enjoy an increase in exports over 40% such as refining and petrochemicals, textiles and meat products, exports in some others are expected to fall over 30% such as other agriculture and other agro-food products. Overall, there are six sectors where exports are expected to increase over 10%, but there are 14 sectors with expected to fall in exports over 10%. Nevertheless, the expected growth in total exports is 6.1% in Guinea. Côte d'Ivoire is also estimated to see a total increase of 6.5% in its exports. The largest increases are expected in exports of leather products (157%) and metal products (62%). However, exports of pharmaceuticals (−26%), and hydrocarbons and minerals (−20%) are expected to fall significantly.

Total exports from Egypt, Mozambique and Tunisia are expected to rise less than 1%, while it will slightly exceed 1% in Uganda. Sectors that are found to export more after full trade liberalization are motor vehicles and parts (24%) in Egypt; machinery and equipment (13%) in Mozambique,

Table 6. Estimated impacts on total exports and imports (%).

	Partial Liberalization		Full Liberalization	
	Change in Exports	Change in Imports	Change in Exports	Change in Imports
CIV	6.3	10.5	6.5	10.9
EGY	0.6	0.6	0.6	0.6
GIN	6.0	7.3	6.1	7.3
MOZ	0.5	0.5	0.7	0.6
TUN	0.8	0.9	0.8	1.0
UGA	0.9	1.4	1.2	1.8

Source: Authors' estimation based on GTAP 10 database.

Table 7. Change in Aggregate Imports (%, Market Price Weights).

	CIV	EGY	GIN	MOZ	TUN	UGA	African OIC	Other Africa
TOTAL	10.9	0.6	7.3	0.6	1.0	1.8	1.4	2.0
Vegetables, fruit, nuts	5.6	0.9	15.4	15.3	1.9	8.7	3.8	5.5
Other agro-food products	3.6	1.0	8.6	0.0	1.8	1.0	1.3	2.0
Other agriculture	12.5	0.3	26.1	0.2	3.3	0.6	25.4	2.5
Livestock, fish & other animal products	6.1	1.0	2.6	5.8	1.6	1.2	1.7	2.7
Meat products	15.1	0.9	32.0	16.9	3.6	4.5	2.5	2.0
Hydrocarbons and minerals	9.5	0.8	21.1	3.1	1.1	1.3	4.3	0.8
Beverages and tobacco products	6.6	0.1	8.0	2.5	1.3	1.4	2.2	5.1
Agroindustry	7.4	0.7	13.7	0.7	2.0	13.1	1.6	3.7
Textiles	10.6	1.0	7.2	0.0	-0.3	1.4	1.1	2.1
Wearing apparel	18.4	0.9	13.7	-0.2	1.3	4.5	1.2	1.5
Leather products	21.5	0.6	6.3	-0.3	0.1	0.7	3.0	2.3
Paper and wood products	18.8	0.6	18.0	-0.3	4.0	3.3	2.1	3.4
Refining and petrochemicals	9.4	0.3	-1.6	0.2	1.0	0.6	0.7	1.6
Pharmaceuticals	8.8	0.3	1.6	-0.2	0.9	0.5	0.5	0.6
Non-metallic mineral products	15.5	0.9	1.9	0.4	2.0	1.2	2.1	2.6
Metal products	20.0	0.7	8.6	0.3	1.0	3.8	0.9	3.2
Computer, electronic and optic	9.7	0.6	3.3	0.2	0.5	1.3	1.4	1.4
Machinery and equipment	12.0	0.7	-0.3	0.1	0.4	1.6	1.0	1.6
Motor vehicles and parts	6.5	0.2	5.7	0.8	1.0	1.0	1.5	1.5
Other manufacturing	24.0	0.5	13.7	0.7	1.4	2.1	1.4	2.3
Utilities and construction	15.7	0.7	14.7	-0.2	2.2	1.3	1.0	1.6
Trade	11.0	0.7	22.6	0.1	1.1	0.8	0.9	1.1
Transport	7.3	0.3	8.1	-0.4	0.6	0.5	0.4	0.5
Other Services	12.1	0.6	12.1	-0.2	1.4	0.9	0.7	0.9

Source: Authors' estimation based on GTAP 10 database. Shaded in grey colour if the estimated change is greater than 10%.

paper and wood products (40%) in Tunisia and other manufacturing (56%) in Uganda. The size of contraction in exports is relatively small in affected sectors in these countries, not exceeding 3%.

The results showing the sectoral changes in aggregate exports and imports in the case of partial liberalization are presented in Annex Table A2. There is no substantial change from the case of full liberalization except for a few sectors in some countries. These include leather products in Côte d'Ivoire, meat products in Mozambique and agro-industry products in Uganda, which are mainly the sectors that are excluded from the tariff elimination.

While some countries are expected to experience significant shifts in their trade structure, another shift is expected in trade partners. With the elimi-nation of tariffs, intra-African trade is expected to rise at the expense of European and other trading partners outside of the region, implying a trade diversion. Fig. 2a shows the simulated changes in total exports from the six OIC countries to major trading partners. However, since aggregate exports

are expected to rise in value, trade liberalization has also a trade creation. The results do not change substantially in the case of partial liberalization (Fig. 2b).

The largest impact is expected in the trade pat-terns of Côte d'Ivoire. It is to export an additional US$ 1.7 billion worth of goods and services to Af-rican countries (both OIC and non-OIC), mainly at the expense of a decline of over US$ 1 billion in exports to the EU, USA, and other developed countries. Exports from Egypt and Tunisia to both OIC and non-OIC African countries are expected to rise, but exports from Guinea, Mozambique and Uganda are not expected to increase towards nine OIC African countries (see the annex for country classification). Trade diversion and creation effects are estimated to be low in the cases of Mozambique and Uganda.

Regardless of the percentage changes in bilateral trade at the sectoral level, the total volume of ex-ports among the six OIC countries is not expected to change considerably. Exports from Côte d'Ivoire to

Table 8. Change in Aggregate Exports (%, FOB Prices).

	CIV	EGY	GIN	MOZ	TUN	UGA	African OIC	Other Africa
TOTAL	6.5	0.6	6.1	0.7	0.8	1.2	1.1	1.6
Vegetables, fruit, nuts	-9.9	-0.8	-18.7	0.1	-1.9	0.4	-0.2	2.2
Other agro-food products	-13.6	-0.1	-30.5	4.5	-2.0	-1.3	-1.4	0.4
Other agriculture	-7.8	-2.9	-35.1	9.5	-1.7	0.5	-0.7	-1.4
Livestock, fish & other animal products	-3.1	-0.8	-16.7	3.9	-0.6	-0.8	0.3	0.3
Meat products	7.6	-2.6	40.0	1.2	-0.2	11.8	0.2	7.4
Hydrocarbons and minerals	-19.7	-1.0	-15.1	0.2	-1.9	-0.7	-0.3	-0.4
Beverages and tobacco products	-7.2	6.8	6.7	0.7	8.5	2.8	36.4	5.4
Agroindustry	-6.0	6.1	-20.7	2.2	8.9	2.4	13.1	10.3
Textiles	1.4	-1.3	42.2	7.0	4.8	15.0	62.0	11.9
Wearing apparel	23.4	-1.2	-27.7	1.1	-2.6	0.9	-0.6	0.9
Leather products	156.6	-2.0	-21.9	2.3	-2.7	-2.9	28.5	1.8
Paper and wood products	5.6	8.1	-2.4	1.9	40.1	0.2	15.1	4.3
Refining and petrochemicals	22.9	2.4	45.3	-0.6	2.3	11.3	2.2	8.8
Pharmaceuticals	-25.9	-0.2	-9.5	0.2	-1.0	-1.7	2.2	-0.2
Non-metallic mineral products	-3.3	1.2	-15.3	2.0	26.4	6.4	24.8	14.5
Metal products	62.1	1.2	23.5	0.4	7.0	38.9	2.8	-0.8
Computer, electronic and optic	14.3	-0.8	19.7	1.6	0.4	0.3	0.1	16.6
Machinery and equipment	-10.1	4.8	28.8	12.5	-2.1	-0.2	8.3	8.7
Motor vehicles and parts	29.7	23.7	-2.5	7.7	0.0	10.0	6.0	9.6
Other manufacturing	10.7	2.7	-17.3	0.4	0.1	56.4	27.8	3.9
Utilities and construction	-0.4	-1.2	-20.3	1.1	-1.8	-2.5	-1.2	1.7
Trade	-18.5	-1.4	-25.8	0.0	-2.7	-2.3	-1.7	-2.0
Transport	-11.9	-0.9	-13.7	0.7	-1.6	-1.2	-0.7	-0.8
Other Services	-19.6	-1.4	-22.8	0.3	-2.6	-2.1	-1.5	-1.9

Source: Authors' estimation based on GTAP 10 database. Shaded in grey colour if the estimated change is greater than 10%.

Guinea, exports from Egypt to Côte d'Ivoire, Uganda and Guinea, and exports from Tunisia to Côte d'Ivoire and Guinea are expected to increase by at least US$ 10 million. More significant increases are expected towards African OIC and other African countries, as presented in Table 9.

Finally, Fig. 3 shows the estimated percentage changes in intra-African trade in comparison with extra-African trade following full trade liberalization. Intra-African trade (exports plus imports) is expected to grow most in Guinea (137%), followed by Côte d'Ivoire (68%) and Tunisia (30%). The lowest impact is expected on Uganda's trade. In almost all cases, trade with the rest of the world will fall. On aggregate, the total trade of the six OIC countries is expected to grow by 30% with other African countries, but decline by 3.1% with the rest of the world. On the other hand, intra-African trade is expected to grow by 19.9% at the continental level when implemented by all African countries, while trade with the rest of the world is to fall by 1.2%. This is somewhat higher than the African Development Bank, 2019 findings, where intra-regional trade was estimated to rise by 14.6% following trade liberalization, but lower than the rate (24%) found by Fofack et al. (2021).

Overall, significant impacts on trade structure and trade partners are expected following the implementation of the AfCFTA. Stronger impacts are expected in the case of Guinea and Côte d'Ivoire. However, the transformative impact of the free trade agreement may require significant movement of factors of production across the affected sectors. In this connection, the next section will briefly review the potential impacts on factor demand changes in the selected OIC countries.

4.3. Factor demand effects

Change in output and trade structures will require changes in demand for factors of production. Productive resources in the affected countries will have to be reallocated across sectors to align with new domestic and foreign demand patterns and to utilize the potential benefits of trade liberalization. This structural change in economic activities may entail some adjustment costs that need to be taken into consideration by policy makers. Demand for certain
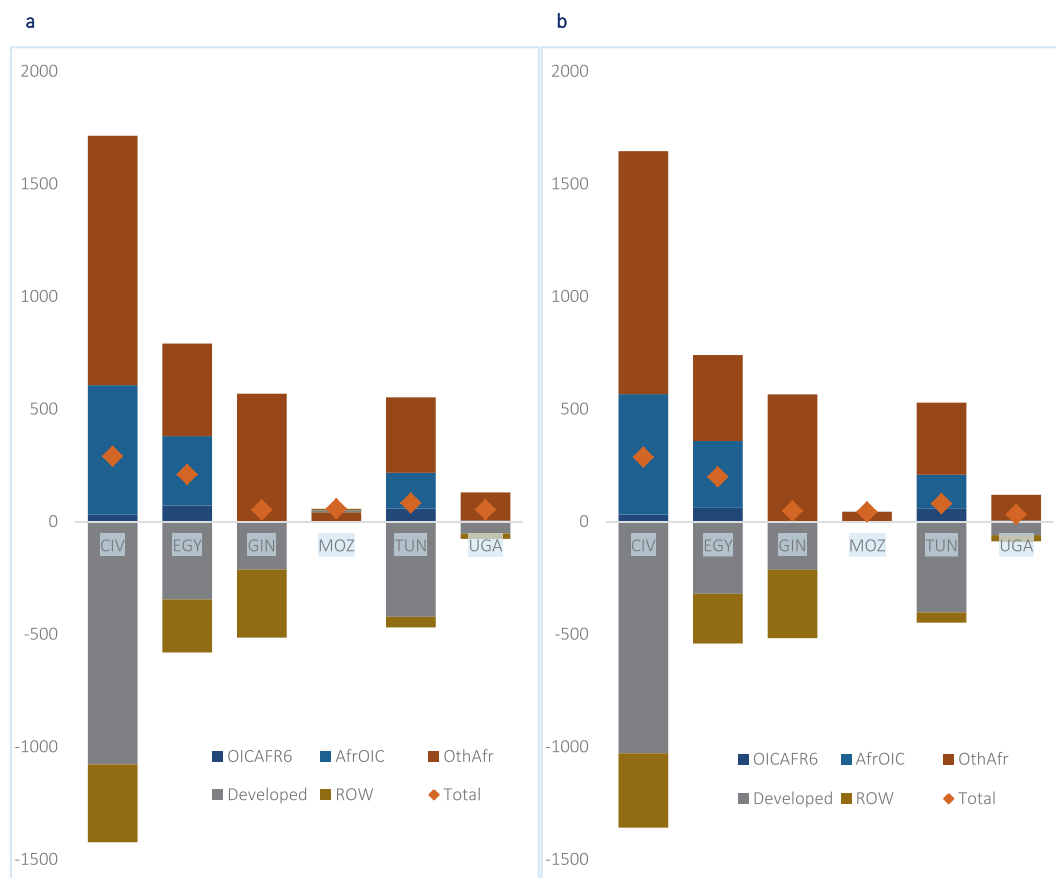
Fig. 2. a: Estimated Impacts on Bilateral Exports (US$ Million), Full Liberalization. b: Estimated Impacts on Bilateral Exports (US$ Million), Partial Liberalization. Source: Author's estimation based on GTAP 10 database.

skills may fall or rise and affect the wages accordingly. Even though temporary unemployment may be observed as a result of changing demand for labour, the model assumes full employment in the long run. Moreover, the long-term benefits of trade liberalization are expected to surpass the short-term costs, as demonstrated in total welfare gains in section 4. Demand for capital may also change as a result of new investment requirements.

As shown in Table 10, demand for both skilled and unskilled labour in different sectors is expected

to change in a similar direction after trade liberalization. Labour is expected to move towards the production of leather and metal products in Côte d'Ivoire, largely shifting from machinery and equipment, and textiles sectors. In Egypt, more labour will be needed in machinery and equipment but less in leather products and other agriculture. Driven by the change in production and trade structure, demand for labour is expected to shift significantly across major economic sectors in Guinea. Refining and petrochemicals, and

Table 9. Change in bilateral exports (US$ million).

Partner Reporter	CIV	EGY	GIN	MOZ	TUN	UGA	African OIC	Other Africa
CIV	0.0	−0.4	21.9	0.6	6.7	2.3	575	1108
EGY	38.9	0.0	10.6	5.4	−0.2	17.0	308	411
GIN	0.8	0.0	0.0	0.0	0.4	0.1	−1.5	567
MOZ	0.4	0.2	0.0	0.0	0.0	0.1	0.1	40.9
TUN	44.6	−1.6	14.3	0.5	0.0	0.1	159	335
UGA	1.1	0.0	0.0	0.1	3.5	0.0	−2.0	125
African OIC	351	1.4	159	27.1	28.7	5.9	1423	2008
Other Africa	251	38.1	31.2	147	67	76.3	2147	4786

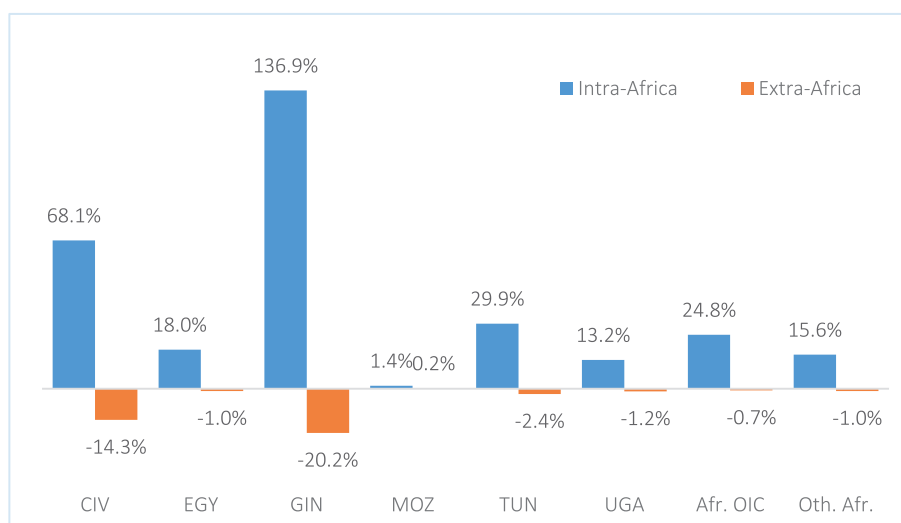Source: Authors' estimation based on GTAP 10 database.

Fig. 3. Estimated Impacts on Intra-African Trade (%), Full Liberalization. Source: Authors' estimation based on GTAP 10 database.

machinery and equipment will require considerably more labour, but the opposite is expected in leather products and textiles. Labour in Mozambique is expected to move mainly from meat products to other agriculture sector. Non-metallic mineral products in Tunisia will require more labour to absorb the falling demand for labour in wearing apparel and leather products sectors. The metal products sector in Uganda is expected to experience the highest increase in labour demand.

Table 10. Change in Labour Demand (%), Full Liberalization.

	Skilled Labour						Unskilled Labour					
	CIV	EGY	GIN	MOZ	TUN	UGA	CIV	EGY	GIN	MOZ	TUN	UGA
Vegetables, fruit, nuts	-2.0	0.0	-5.3	-0.7	0.2	0.0	-1.2	0.0	-5.4	-0.7	0.2	0.0
Other agro-food products	-1.8	0.0	2.1	0.3	-0.2	-0.7	-1.0	0.0	2.1	0.3	-0.2	-0.7
Other agriculture	-5.0	-0.5	-14.1	3.8	-1.4	0.5	-4.2	-0.5	-14.1	3.8	-1.4	0.5
Livestock, fish & other animal pr.	-0.8	0.1	2.9	-0.8	0.4	-0.2	0.0	0.1	2.8	-0.9	0.4	-0.2
Meat products	-1.8	-0.2	1.2	-8.6	0.2	0.4	2.1	-0.2	0.9	-8.6	0.1	0.4
Hydrocarbons and minerals	-4.2	-0.2	-10.9	0.1	-0.6	-0.5	-3.5	-0.2	-11.0	0.1	-0.6	-0.5
Beverages and tobacco products	-1.6	0.1	-0.9	-0.1	1.7	0.4	2.3	0.1	-1.2	-0.1	1.7	0.4
Agroindustry	-6.4	0.4	-8.6	-0.2	0.9	-0.5	-2.8	0.4	-8.9	-0.2	0.9	-0.5
Textiles	-8.6	-0.3	-15.0	0.4	-0.7	0.0	-4.6	-0.3	-15.3	0.3	-0.7	0.0
Wearing apparel	-2.4	-0.1	-8.2	0.1	-2.4	-0.3	1.9	-0.1	-8.5	0.0	-2.5	-0.3
Leather products	19.0	-0.7	-17.2	0.4	-2.6	-2.3	24.2	-0.7	-17.5	0.3	-2.7	-2.3
Paper and wood products	-0.5	0.7	-6.1	0.5	8.8	-0.5	3.9	0.7	-6.4	0.4	8.7	-0.6
Refining and petrochemicals	6.5	0.5	35.9	-0.5	0.7	1.0	11.2	0.5	35.4	-0.6	0.7	0.9
Pharmaceuticals	-7.2	-0.2	-6.7	0.1	-0.8	-0.8	-3.2	-0.2	-7.1	0.1	-0.8	-0.8
Non-metallic mineral products	-2.6	0.1	-12.0	0.5	5.8	1.9	1.7	0.2	-12.3	0.5	5.8	1.9
Metal products	17.2	0.0	21.5	0.5	2.2	8.7	22.4	0.0	21.1	0.5	2.2	8.6
Computer, electronic and optic	-8.6	-0.3	18.9	0.5	-0.1	-1.5	-4.6	-0.3	18.5	0.4	-0.1	-1.5
Machinery and equipment	-11.0	3.4	28.0	2.0	-2.0	-1.2	-7.1	3.4	27.5	2.0	-2.0	-1.3
Motor vehicles and parts	-5.0	1.0	-9.3	-1.5	-0.4	-0.9	-0.8	1.0	-9.6	-1.5	-0.4	-0.9
Other manufacturing	-0.1	0.3	-12.4	0.4	-0.2	4.2	4.3	0.3	-12.7	0.3	-0.2	4.1
Utilities and construction	4.7	0.1	1.4	0.6	0.8	0.5	9.7	0.1	1.0	0.5	0.7	0.4
Trade	-1.8	0.0	7.2	0.1	-0.2	0.4	4.1	0.1	6.7	0.0	-0.2	0.3
Transport	-2.2	-0.3	2.2	0.2	-0.8	-0.1	3.6	-0.3	1.7	0.2	-0.9	-0.1
Other Services	-0.7	0.0	1.2	-0.1	0.0	0.0	3.7	0.0	0.8	-0.2	0.0	-0.1

Source: Authors' estimation based on GTAP 10 database. Shaded in grey colour if the estimated change is greater than 10%.

Economic transformation may also require additional capital to be invested. Sudden falls in tariff revenues may cause deterioration in government budgets to finance some critical expenditures in infrastructure investment and social protection. Table 11 shows the change in capital demand following full trade liberalization in Africa. In Côte d'Ivoire, the demand for capital is estimated to increase in leather products (20%) and metal products (18.3%), but to decrease in machinery and equipment (−10.2%) and textiles (−7.9%). Demand for capital in Egypt is expected to increase by 3.4% in machinery and equipment, but the change in demand in other sectors is not expected to exceed 1%. A major shift in demand for capital is expected in Guinea to achieve economic transformation. Refining and petrochemicals (33.3%) and machinery and equipment (25.5%) are expected to see the highest increase in demand for capital, but the opposite is expected in leather products (−18.8%) and textiles (−16.6%). More capital will be needed in other agriculture (3.8%) sector in Mozambique but less capital in meat products (−8.7%). In Tunisia, more capital will move to the production of paper and wood products (8.8%) and non-metallic mineral

products (5.8%) but less to leather products (−2.6%) and wearing apparel (−2.4%). Finally, a significant reallocation of capital towards metal products (8.4%) is expected in Uganda.

5. Extensions

Previous section shed lights on the potential impacts of tariff liberalization following the AfCFTA but ignored that of trade facilitation. Labour and capital are also assumed to be immobile. This section extends the previous assumptions by four ways. First, it accounts for trade facilitation in Africa, whose impacts are limited to the continental trade. Second, the rest of the world also benefits from trade facilitation measures introduced in the continent, but at a lesser extent. Third, capital can move across borders. Fourth, total employment of unskilled workers can change. Tables 12−14 provide the results in the presence of trade facilitation as well as relaxations of some assumptions related to labour and capital.

Trade facilitation has emerged as an important issue for the world trading system over the last decade. In 2017, the Trade Facilitation Agreement (TFA) by the member states of the World Trade

Table 11. Change in Capital Demand (%), Full Liberalization.

	CIV	EGY	GIN	MOZ	TUN	UGA
Vegetables, fruit, nuts	-1.8	0.0	-5.7	-0.8	0.2	-0.1
Other agro-food products	-1.6	0.0	1.7	0.3	-0.2	-0.8
Other agriculture	-4.9	-0.5	-14.4	3.8	-1.4	0.4
Livestock, fish & other animal products	-0.6	0.1	2.5	-0.9	0.4	-0.2
Meat products	-1.0	-0.2	-0.5	-8.7	0.1	0.2
Hydrocarbons and minerals	-4.1	-0.2	-11.2	0.1	-0.6	-0.6
Beverages and tobacco products	-0.8	0.1	-2.6	-0.2	1.7	0.2
Agroindustry	-5.7	0.4	-10.2	-0.3	0.9	-0.7
Textiles	-7.8	-0.3	-16.6	0.2	-0.7	-0.3
Wearing apparel	-1.6	-0.1	-9.9	-0.1	-2.4	-0.6
Leather products	20.0	-0.7	-18.8	0.2	-2.6	-2.5
Paper and wood products	0.4	0.7	-7.9	0.3	8.8	-0.8
Refining and petrochemicals	7.4	0.5	33.3	-0.7	0.7	0.7
Pharmaceuticals	-6.4	-0.3	-8.5	-0.1	-0.8	-1.1
Non-metallic mineral products	-1.7	0.1	-13.6	0.3	5.8	1.6
Metal products	18.3	0.0	19.2	0.3	2.2	8.4
Computer, electronic and optic	-7.8	-0.3	16.7	0.3	-0.1	-1.7
Machinery and equipment	-10.2	3.4	25.5	1.8	-2.0	-1.5
Motor vehicles and parts	-4.2	1.0	-11.0	-1.7	-0.4	-1.1
Other manufacturing	0.7	0.3	-14.0	0.2	-0.2	3.9
Utilities and construction	5.7	0.1	-0.7	0.4	0.7	0.2
Trade	-0.6	0.0	4.5	-0.2	-0.2	0.0
Transport	-1.1	-0.3	-0.4	0.0	-0.9	-0.4
Other Services	0.2	0.0	-0.8	-0.3	0.0	-0.3

Source: Authors' estimation based on GTAP 10 database. Shaded in grey colour if the estimated change is greater than 10%.

Table 12. Change in welfare and GDP.

	I. Welfare (Million USD)						II. GDP (%)					
	(a)	(b)	(c)	(d)	(e)	(f)	(a)	(b)	(c)	(d)	(e)	(f)
CIV	610.0	641.4	1549.0	1695.9	2077.2	2989.7	5.0	5.3	11.6	11.1	11.5	14.4
EGY	224.8	242.6	1269.5	2916.8	6128.6	8905.6	0.4	0.4	1.9	2.4	3.1	3.9
GIN	227.5	228.1	420.3	498.5	1793.1	2513.8	6.6	6.5	11.3	11.4	37.6	46.6
MOZ	−22.1	−28.0	412.3	541.2	1017.1	2212.7	−0.3	−0.4	3.4	3.6	7.0	14.2
TUN	108.3	113.7	613.4	1019.6	3024.9	4940.5	0.7	0.7	3.1	3.7	7.5	11.4
UGA	18.0	14.9	179.7	266.9	982.9	1854.3	0.6	0.4	2.6	2.5	4.3	7.2

Source: Authors' estimation based on GTAP 10 database. *Note:* Column (a) presents the results for partial liberalization, (b) for full liberalization, (c) for full liberalization and trade facilitation only in Africa, (d) for full liberalization and trade facilitation in Africa with implications for the ROW, (e) for capital mobility (in addition to trade facilitation), and (f) change in employment (in addition to capital mobility and trade facilitation).

Table 13. Change in value of merchandise exports and imports (%).

	I. Exports						II. Imports					
	(a)	(b)	(c)	(d)	(e)	(f)	(a)	(b)	(c)	(d)	(e)	(f)
CIV	6.3	6.5	13.4	12.2	20.7	23.9	10.4	10.9	23.1	22.3	20.9	24.2
EGY	0.6	0.6	2.6	2.8	4.6	5.3	0.6	0.6	2.6	3.2	4.1	4.8
GIN	6.0	6.1	10.0	9.9	32.1	41.2	7.3	7.3	12.1	12.1	34.2	43.7
MOZ	0.5	0.7	3.1	2.7	8.0	15.1	0.5	0.6	4.9	4.8	8.7	15.4
TUN	0.8	0.8	3.2	3.2	9.2	13.1	0.9	1.0	4.2	4.8	9.1	13.0
UGA	0.9	1.2	4.3	3.9	7.2	10.0	1.4	1.8	6.5	6.4	7.6	10.2

Source: Authors' estimation based on GTAP 10 database. *Note:* Column (a) presents the results for partial liberalization, (b) for full liberalization, (c) for full liberalization and trade facilitation only in Africa, (d) for full liberalization and trade facilitation in Africa with implications for the ROW, (e) for capital mobility (in addition to trade facilitation), and (f) change in employment (in addition to capital mobility and trade facilitation).

Table 14. Change in trade balance (million USD).

	(a)	(b)	(c)	(d)	(e)	(f)
CIV	−513.6	−541.4	−1188.8	−1230.8	−123.2	−142.0
EGY	−166.3	−179.6	−888.9	−1298.8	−1164.9	−1450.2
GIN	−126.5	−125.1	−210.5	−212.0	−485.8	−614.4
MOZ	−16.4	−12.6	−320.3	−340.4	−372.9	−587.0
TUN	−83.8	−87.6	−459.2	−618.4	−546.4	−790.7
UGA	−20.8	−22.1	−90.9	−104.7	27.3	63.2

Source: Authors' estimation based on GTAP 10 database. *Note:* Column (a) presents the results for partial liberalization, (b) for full liberalization, (c) for full liberalization and trade facilitation only in Africa, (d) for full liberalization and trade facilitation in Africa with implications for the ROW, (e) for capital mobility (in addition to trade facilitation), and (f) change in employment (in addition to capital mobility and trade facilitation).

Organization (WTO) entered into force, which contains commitments to expedite the movement, release and clearance of goods, including goods in transit. Considering the growing importance of trade facilitation, the first extension was on the assumption related to trade facilitation. Accordingly, attempts to facilitate trade through simplification, modernization and harmonization of export and import processes among African countries are assumed to reduce bilateral trade costs by 10%. Going further, it is also assumed that improved customs services would also generate indirect benefits for the rest of the world, which is presumed to at 2%. In view of that, column (c) in each Table from 12 to 14 presents the findings in the presence of full liberalization and trade facilitation in Africa corresponding to 10% fall in trade costs. Similarly, column (d) shows the results when trade facilitation in Africa reduces trade costs with non-African countries by 2%.

In the presence of trade facilitation, estimated welfare impacts would increase significantly. Welfare losses in declining sectors may offset welfare gains in the other parts of the economy in the short-run, but long-term gains are significant. The absolute rise in welfare would be particularly high in Côte d'Ivoire and Egypt (Table 12/I-c). The welfare gains would further increase in Egypt and Tunisia if non-African countries would also benefit from trade facilitation (Table 12/I-d). This is mainly due to the fact that their existing trade relations with the rest of the world is stronger than their relations with Africa. Overall,

trade facilitation would have significant multiplier effect in terms of welfare gains, particularly in Egypt, Mozambique, Tunisia and Uganda. Significant improvements in GDP would be observed due to trade facilitation (Table 12/II-c), particularly in Côte d'Ivoire and Guinea, but this affect is not expected to amplify as a result of trade facilitation with non-African countries (Table 12/II-d).

Total value of exports and imports would also increase substantially as a result of reductions in trade costs following trade facilitation (Table 13/I-c & II-c). No significant impact would be observed when non-African trade partners also benefit from trade facilitation (Table 13/I-d & II-d). Despite the growth in exports, imports are expected to grow faster, with implications on trade balance. In all concerned countries, trade facilitation measures are expected to deteriorate trade balance, especially in Côte d'Ivoire and Egypt (Table 14/c & d).

In the default GTAP closure, labour and capital are assumed to be mobile across all uses within a country, but immobile internationally. This assumption is relaxed by allowing capital to move internationally without altering the global stock of capital. Cross-border mobility of physical capital, or foreign investment, would bring additional benefits for the African countries, because trade agreements can create idle and obsolete capital in declining sectors, but new investments may be needed in rising sectors. Column (e) in each Table from 12 to 14 presents the findings in the presence of full liberalization, trade facilitation in both Africa and rest of the world, and capital mobility across borders in Africa.

In terms of welfare gains, continental capital mobility would generate additional welfare gains in all concerned countries. Access to foreign capital would allow countries to finance the investment requirements in emerging sectors during the transition period at a quicker pace and benefit from additional welfare gains.[3] The proportionally the largest increase would be observed in Guinea and Uganda, where welfare gains would increase by 3–4 times (Table 12/I-e). Overall GDP would increase in all countries, but a huge increase would be observed in the case of Guinea, where GDP would rise by 37.6% in the presence of capital mobility (Table 12/II-e). Capital mobility would surge the value of exports significantly. Combined impact of trade

facilitation and capital mobility on exports would be as high as 32.1% in Guinea and 20.7% in Côte d'Ivoire (Table 13/I-e), but their impact on imports would be lower in Côte d'Ivoire as compared to the case without capital mobility (Table 13/II-e). Accordingly, trade deficit in Côte d'Ivoire would fall significantly following capital mobility. Trade deficit would also fall in Egypt and Tunisia. In Uganda, it would turn to a surplus (Table 14/e).

Final extension was made on employment for unskilled labour.[4] While some workers benefit from excess demand in their sectors, others may suffer from unemployment and underemployment. Allowing for a change in total employment would enable countries to meet an increase in demand for unskilled labour through a rise in quantity of labour (e.g., unemployed workers finding jobs). These extensions are in line with the long-term vision of structural transformation under the Agenda 2063 and the abundance of labour on the continent (Saygili et al., 2018). Column (f) in each Table from 12 to 14 presents the findings in the presence of full liberalization, trade facilitation in both Africa and rest of the world, capital mobility across borders in Africa, and change in total employment.

Trade liberalization can have a negative impact on unskilled labour in the short- and medium term, especially if low-skill sectors were originally protected. This may require substantial investment in skills, creating significant adjustment costs. Allowing for labour market participation decisions to change in response to shocks related to free trade area would bring additional welfare gains as compared to the situation under trade facilitation and capital mobility (Table 12/I-f). A significant impact would also be observed in terms of GDP growth (Table 12/II-f). A relatively significant improvement would also be realized in the growth of merchandise exports and imports (Table 13/I-f & II-f). Yet, overproportional increase in imports would deteriorate trade deficits in all countries, except Uganda (Table 14/f).

Various assumptions on the modelling may yield different results, but it is evident that there are significant gains that vary across countries. The extended evaluation on the impacts of AfCFTA reveals that the benefits can augment tremendously if it is supported by additional policy measures.

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[3] Trade agreements generally create idle and obsolete capital in declining sectors, and specialized machinery and equipment used in these sectors are not useful in other sectors. Capital mobility would allow the specialized machinery to move across border where demand is high. Capital demand for leather products is expected to rise in Côte d'Ivoire, but fall in Guinea, as shown in Table 11. Capital mobility would enable a quick match in meeting demands.
[4] The standard CGE model assumes full employment, where a shock to an economy causes wages to adjust until the fixed supply of labour is again fully employed. On the other hand, in the modified model with an unemployment closure, the wage is set to be fixed, where economic shocks can lead to a change in the labour supply. Accordingly, the size of the labour force will adjust until labour supply and demand are again equal at the initial wage rate (see Burfisher, 2016).

However, these policies will entail additional costs other than the adjustment costs associated with trade liberalization. Considering the significant benefits that could emerge as a result of trade facilitation, countries with limited institutional, human and financial capacity should be supported for them to effectively allocate their resources in the transitionary period and to take necessary measures towards facilitating trade.

Further analyses have been made to check the sensitivity of the results to change in import elasticity of substitution, but no significant change was observed in the results.

6. Conclusion

This study investigates the potential impacts of the AfCFTA on production and trade in six selected countries in Africa, namely Côte d'Ivoire, Egypt, Guinea, Mozambique, Tunisia and Uganda. In order to estimate the potential long-term effects of the agreement on these countries, the study uses the computable general equilibrium model developed by the GTAP considering two alternative scenarios. The first scenario assumes full tariff elimination on imported goods within Africa. The second scenario assumes partial liberalization, where one product category is excluded to retain the tariffs to take into account the "sensitive and excluded" products.

Following a full trade liberalization in Africa, the total gross domestic product (GDP) of the six OIC countries are expected to be affected at different rates. Due to major shifts in economic activities, GDPs of Guinea and Côte d'Ivoire are estimated to increase significantly. Tunisia, Uganda and Egypt are expected to see relatively small increases in their GDP, but Mozambique may witness a small contraction in its total economic activities. In terms of welfare impacts, Côte d'Ivoire is estimated to see the largest benefits from trade liberalization, followed by Egypt and Guinea. Mozambique may again experience a negative welfare effect. Estimated impacts on total change in GDP and welfare barely change in the case of partial liberalization, which are yet lower than the magnitudes estimated under full liberalization.

Following a full trade liberalization, intra-African trade would grow most in Guinea (137%), followed by Côte d'Ivoire (68%) and Tunisia (30%). The lowest impact is expected on Uganda's trade. In almost all cases, trade with the rest of the world will fall. On aggregate, total trade of the six OIC countries is expected to grow by 30% with other African countries but decline by 3.1% with the rest of the world. On the other hand, intra-African trade is expected to grow by

19.9% at the continental level, while trade with the rest of the world to fall by 1.2%. At the sectoral level, the most significant transformation is expected in Guinea and Côte d'Ivoire after full trade liberalization. In Guinea, some sectors are estimated to enjoy an increase in exports over 40%, but there are also sectors where exports are expected to fall over 30%, such as other agriculture and other agro-food products. In Côte d'Ivoire, the largest increases are expected in exports of leather products and metal products. However, exports of pharmaceuticals and hydrocarbons and minerals are expected to fall significantly. As for the other countries, the sectors whose exports increase most are motor vehicles and parts in Egypt, machinery and equipment in Mozambique, paper and wood products in Tunisia, and other manufacturing in Uganda. The size of contraction in exports is relatively small in the affected sectors in these four countries, not exceeding 3%.

Overall, countries with a higher initial level of protection tend to see a higher benefit from being part of a regional trade agreement due to the elimination of high barriers. Countries with more liberal trade regimes and greater openness tend to experience relatively weaker welfare benefits resulting from the further liberalization of trade. Gains would be higher if supplemented with additional trade reforms. However, structural adjustment costs and associated social tensions may be higher in countries with greater ex-ante protectionism.

Evidently, trade liberalization following the AfCFTA will boost trade among the African countries and create important welfare gains. However, even if there is a total welfare gain from trade liberalization, certain sectors, firms and workers will be negatively affected, requiring government interventions to alleviate the short- and medium-term negative impacts. The cost of adjustment may be particularly high for unskilled labour and SMEs with limited competitiveness, particularly in countries where significant restructuring is expected. The inadequate reaction by the governments may fuel the dissatisfaction by these groups and create social tensions.

The COVID-19 pandemic is likely to cause some delay in the effective implementation of the AfCFTA and hamper economic integration. Yet, intra-African trade offers great potential to establish regional value chains and boost economic growth and integration during the post-pandemic period. In fact, African countries trade more manufacturing goods within the region than in their trade with non-African countries. Therefore, reducing reliance on external markets, creating supply chains in critical manufacturing industries and promoting trade in differentiated products would support regional

integration and boost intra-continental trade. Free movement of goods will definitely expose domestic producers to greater competition from other countries in the continent that produce similar products. This would require more investment in productive capacities to differentiate products, more emphasis on creating regional value chains and smart infrastructure investment projects for better connectivity and smoother movement of goods and people. There is also need for measures to protect negatively affected segments of the societies to achieve more balanced growth. Exposure to greater competition and incentives to differentiate products may be a driver of productivity and growth within the continent, with further implications on poverty, inequality and development.

Finally, there is a need for tailored policies for individual OIC countries to adapt to the new economic conditions. The countries that are expected to gain more from the AfCFTA are likely to undergo a significant economic transformation and this process should be managed smoothly to prevent any harmful impacts on certain economic actors. Similarly, the countries that are expected to experience limited should be supported with other policy interventions to benefit more from this great initiative. In parallel to policy advancement and technical assistance, it is important to provide access to financing and to fund AfCFTA related transactions, infrastructure, and capital investment needs. In addition to traditional financing methods, innovative solutions should be tested to attract non-traditional investors in the African continent, including investing in niche asset classes, like trade finance. In this regard, the development of specialized investment vehicles and funds could provide institutional investors with the needed sectorial experience, product expertise and portfolios of transactions.

Authors' contributions

K. Bagci: Made substantial contributions to the design of the work; the acquisition, analysis, and interpretation of data; drafted the work; approved the version to be published.

A. Diallo: Made substantial contributions to the conception of the work; or the acquisition of data; approved the version to be published.

A. Terrai: Made substantial contributions to the conception of the work; or the acquisition of data; approved the version to be published.

Conflicts of interest

The authors have no competing interests to declare that are relevant to the content of this article.

Annexes

Data Aggregations

Sectoral Aggregations

	Aggregate	Comprising Sectors
1	Vegetables, fruit, nuts	Vegetables, fruit, nuts.
2	Other agro-food products	Paddy rice; Wheat; Cereal grains nec; Oil seeds; Sugar cane, sugar beet.
3	Other Agriculture	Plant-based fibers; Crops nec; Wool, silk-worm cocoons.
4	Livestock, Fish & Other Animal Products	Bovine cattle, sheep and goats; Animal products nec; Raw milk; Fishing.
5	Meat products	Bovine meat products; Meat products nec.
6	Hydrocarbons and Minerals	Coal; Oil; Gas; Forestry; Minerals nec.
7	Beverages and tobacco products	Beverages and tobacco products.
8	Agroindustry	Vegetable oils and fats; Dairy products; Processed rice; Sugar; Food products nec.
9	Textiles	Textiles.
10	Wearing apparel	Wearing apparel.
11	Leather products	Leather products.
12	Paper and Wood products	Wood products; Paper products, publishing.

(continued)

	Aggregate	Comprising Sectors
13	Refining and Petrochemicals	Petroleum, coal products; Chemical products; Rubber and plastic products.
14	Pharmaceuticals	Basic pharmaceutical products.
15	Non-metallic mineral products	Mineral products nec.
16	Metal products	Ferrous metals; Metals nec; Metal products.
17	Computer, electronic and optic	Computer, electronic and optic.
18	Machinery and Equipment	Electrical equipment; Machinery and equipment nec.
19	Motor vehicles and parts	Motor vehicles and parts; Transport equipment nec.
20	Other Manufacturing	Manufactures nec.
21	Utilities and Construction	Electricity; Gas manufacture, distribution; Water; Construction.
22	Trade	Trade.
23	Transport and Trade	Transport nec; Water transport; Air transport; Warehousing and support activities
24	Other Services	Accommodation, Food and service activities; Communication; Financial services nec; Insurance; Real estate activities; Business services nec; Recreational and other service; Public Administration and defence; Education; Human health and social work activities; Dwellings.

* *NEC* stands for *not elsewhere classified.*

Regional Aggregations

	Aggregation	Comprising Countries and Regions
1	Côte d'Ivoire	Côte d'Ivoire (CIV)
2	Egypt	Egypt (EGY)
3	Guinea	Guinea (GIN)
4	Mozambique	Mozambique (MOZ)
5	Tunisia	Tunisia (TUN)
6	Uganda	Uganda (UGA)
7	African OIC (7 + 2)	Morocco; Benin; Burkina Faso; Cameroon; Nigeria; Senegal; Togo; Rest of North Africa (Libya and Algeria);
8	Other Africa	Ghana; Rest of Western Africa (Cape Verde, Gambia, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Saint Helena and Sierra Leone); Rest of Central Africa (Central African Rep., Chad, Congo, Equatorial Guinea, Gabon, and Sao Tome and Principe); South Central Africa (Angola and DR of Congo); Ethiopia; Kenya; Madagascar; Malawi; Mauritius; Rwanda; Tanzania; Zambia; Zimbabwe; Rest of Eastern Africa (Burundi, Comoros, Djibouti, Eritrea, Mayotte, Seychelles, Somalia and Sudan); Botswana; Namibia; South Africa; Rest of South African Customs (Eswatini and Lesotho)
9	Other OIC (13 + 13)	Albania, Brunei Darussalam; Indonesia; Malaysia; Bangladesh; Pakistan; Kazakhstan; Kyrgyzstan; Tajikistan; Azerbaijan; Iran; Jordan; Rest of Western Asia (Iraq, Lebanon, Palestine, Syria and Yemen); Rest of Former Soviet Union (Turkmenistan and Uzbekistan), GCC (Bahrain; Kuwait; Oman; Qatar; Saudi Arabia; United Arab Emirates), Turkey
10	Developed	European Union (Austria; Belgium; Bulgaria; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Romania; Slovakia; Slovenia; Spain; Sweden), United States of America, United Kingdom, Australia; New Zealand; Hong Kong; Japan; Korea; Taiwan; Singapore; Canada; Switzerland; Norway; Israel

(continued)

	Aggregation	Comprising Countries and Regions
11	Rest of World	China, India, Russian Federation, Rest of Oceania; Mongolia; Rest of East Asia; Cambodia; Lao PDR; Philippines; Thailand; Viet Nam; Rest of Southeast Asia; Nepal; Sri Lanka; Rest of South Asia; Mexico; Rest of North America; Argentina; Bolivia; Brazil; Chile; Colombia; Ecuador; Paraguay; Peru; Uruguay; Venezuela; Rest of South America; Costa Rica; Guatemala; Honduras; Nicaragua; Panama; El Salvador; Rest of Central America; Dominican Republic; Jamaica; Puerto Rico; Trinidad and Tobago; Caribbean; Rest of EFTA; Belarus; Ukraine; Rest of Eastern Europe; Rest of Europe; Rest of Former Soviet Union; Armenia; Georgia; Rest of the World (Antarctica, Bouvet Island, British Indian Ocean Territory and French Southern Territories)

Notes: The data are available for 32 individual OIC countries and 9 OIC countries at the aggregated level. The data for other OIC countries are available in aggregated regions that also contain non-OIC countries, such as "Rest of Western Africa" and "Rest of South Asia". Therefore, the complete categorization for all OIC countries was not possible.

Annex Tables

Table A1. Change in Sectoral Output (%).

	Côte d'Ivoire		Egypt		Guinea		Mozambique		Tunisia		Uganda	
	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial	Full	Partial
Vegetables, fruit, nuts	−1.0	−1.0	0.0	0.0	−5.3	−5.4	−0.7	−0.7	0.2	0.1	0.0	0.0
Food and agriculture	−0.8	−1.0	0.0	0.0	1.9	2.0	0.3	0.2	−0.2	−0.4	−0.7	−0.5
Other agriculture	−4.0	−3.7	−0.4	−0.4	−13.9	−13.9	3.7	3.5	−1.4	−1.3	0.5	0.1
Livestock, fish & other animal products	0.0	−0.1	0.0	0.0	2.2	2.2	−0.7	−0.4	0.3	0.3	−0.2	0.1
Meat products	−1.0	−1.1	−0.2	−0.2	−0.2	−0.2	−8.7	0.2	0.1	0.1	0.2	0.2
Hydrocarbons and minerals	−2.5	−2.3	−0.1	−0.1	−9.9	−10.0	0.1	0.0	−0.4	−0.4	−0.4	−0.4
Beverages and tobacco products	−0.8	−0.8	0.1	0.1	−2.2	−0.4	−0.2	−0.2	1.7	1.3	0.3	0.2
Agroindustry	−5.7	−6.7	0.4	0.3	−9.2	−9.2	−0.3	−0.5	0.9	0.6	−0.7	0.1
Textiles	−7.8	−7.4	−0.3	−0.3	−15.7	−15.8	0.3	0.1	−0.7	−0.6	−0.2	−0.3
Wearing apparel	−1.6	−1.5	−0.1	−0.1	−9.0	−9.0	0.0	−0.1	−2.4	−2.3	−0.5	−0.5
Leather products	20.0	13.7	−0.7	−0.7	−18.0	−18.1	0.3	0.0	−2.6	−2.6	−2.5	−2.9
Paper and wood products	0.4	0.5	0.7	0.7	−7.0	−7.0	0.4	0.4	8.8	8.8	−0.7	−0.8
Refining and petrochemicals	7.4	7.7	0.5	0.5	34.4	34.4	−0.7	−0.9	0.7	0.7	0.8	0.6
Pharmaceuticals	−6.4	−6.1	−0.2	−0.2	−8.1	−8.1	−0.1	−0.2	−0.8	−0.7	−1.0	−1.4
Nonmetalic mineral products	−1.7	−1.9	0.1	0.2	−13.0	−13.0	0.4	0.3	5.8	5.8	1.7	1.5
Metal products	18.3	19.4	0.0	0.1	20.1	19.8	0.4	0.0	2.2	2.3	8.4	8.2
Computer, electronic and optic	−7.8	−7.1	−0.3	−0.2	17.7	17.7	0.3	0.1	−0.1	0.0	−1.7	−1.9
Machinery and equipment	−10.2	−9.6	3.4	3.4	27.2	27.2	1.9	1.7	−2.0	−1.9	−1.4	−1.6
Motor vehicles and parts	−4.2	−3.7	1.0	1.0	−9.9	−10.0	−1.6	−1.8	−0.4	−0.3	−1.1	−1.2
Other manufacturing	0.8	0.5	0.3	0.2	−13.2	−13.3	0.2	−0.3	−0.2	−0.3	4.0	2.4
Utilities and construction	6.1	5.4	0.1	0.1	−0.4	−0.4	0.4	0.4	0.7	0.7	0.2	0.2
Trade	0.2	0.2	0.0	0.0	4.8	4.8	0.0	−0.1	−0.2	−0.2	0.1	0.1
Transport	−1.1	−1.0	−0.3	−0.3	0.4	0.4	0.1	0.1	−0.9	−0.8	−0.4	−0.4
Other Services	0.2	0.2	0.0	0.0	−0.3	−0.3	−0.2	−0.2	0.0	0.0	−0.2	−0.2

Source: Authors' estimation based on GTAP 10 database.

Table A2. Sectoral Change in Aggregate Exports and Imports after Partial Liberalization (%).

	A) Change in Aggregate Exports, FOB prices								B) Change in Aggregate Imports, market price weights							
	CIV	EGY	GIN	MOZ	TUN	UGA	Afr. OIC	Oth. Africa	CIV	EGY	GIN	MOZ	TUN	UGA	Afr. OIC	Oth. Africa
TOTAL	6.3	0.6	6.0	0.5	0.8	0.9	1.0	1.4	10.5	0.6	7.3	0.5	0.9	1.4	1.3	1.9
Vegetables, fruit, nuts	−9.4	−0.7	−19.0	0.0	−1.6	−0.2	−0.3	1.6	5.3	0.8	15.5	15.6	1.6	8.9	2.9	4.4
Food and agriculture	−12.9	0.0	−30.6	4.1	−1.8	−1.8	−1.2	0.5	3.3	0.9	8.8	−0.1	1.4	1.7	1.2	1.9
Other agriculture	−6.9	−2.8	−35.3	8.9	−1.4	0.1	−0.5	−1.2	11.7	0.2	26.3	0.4	3.1	0.8	25.5	2.4
Livestock, fish & other animal products	−2.7	−0.7	−16.8	3.2	−0.4	−1.5	0.4	0.4	5.6	0.9	2.6	6.7	1.5	2.1	1.6	2.7
Meat products	9.3	−2.3	38.9	0.2	0.0	10.7	0.5	4.9	14.3	0.8	32.1	−0.7	3.5	5.0	2.3	2.0
Hydrocarbons and minerals	−19.0	−1.0	−15.2	0.1	−1.9	−0.8	−0.2	−0.4	9.8	0.8	20.9	3.2	1.0	1.2	4.3	0.8
Beverages and tobacco products	−6.9	4.8	1.6	0.6	6.6	1.8	25.9	4.1	6.3	0.1	6.2	2.6	1.3	1.6	1.7	4.0
Agroindustry	−7.8	4.4	−21.2	1.6	6.5	0.9	10.2	7.9	7.0	0.6	13.8	0.8	1.9	0.9	1.3	3.0
Textiles	2.8	−1.1	42.0	6.5	5.0	14.4	62.3	12.0	10.2	0.9	7.2	0.1	−0.2	1.6	1.0	2.1
Wearing apparel	25.4	−1.0	−27.9	0.6	−2.4	0.3	−0.4	0.6	17.5	0.8	13.7	−0.1	0.9	4.7	1.1	1.5
Leather products	102.1	−1.9	−28.4	1.2	−2.7	−3.6	17.9	0.8	14.0	0.6	6.3	−0.2	0.1	0.7	2.2	1.8
Paper and wood products	7.0	8.2	−2.5	1.5	40.1	−0.2	15.3	4.4	18.2	0.6	18.1	−0.2	3.9	3.4	2.0	3.4
Refining and petrochemicals	23.7	2.4	45.2	−0.9	2.4	10.8	2.3	8.8	8.9	0.3	−1.6	0.2	1.0	0.6	0.7	1.6
Pharmaceuticals	−24.7	−0.1	−9.5	−0.3	−0.8	−2.5	2.4	−0.1	8.3	0.3	1.7	−0.1	0.8	0.6	0.5	0.6
Nonmetalic mineral products	−2.3	1.3	−15.4	1.8	26.4	6.0	24.9	14.6	14.4	0.8	1.9	0.4	1.9	1.3	2.0	2.5
Metal products	64.6	1.3	23.2	0.1	7.1	38.3	2.9	−0.7	19.7	0.7	8.6	0.2	1.0	3.8	0.9	3.2
Computer, electronic and optic	16.6	−0.7	19.7	1.0	0.6	−0.2	0.4	16.8	9.2	0.5	3.3	0.3	0.5	1.4	1.3	1.3
Machinery and equipment	−8.4	4.9	28.8	11.9	−1.9	−0.7	8.5	8.8	11.4	0.7	−0.3	0.2	0.4	1.7	0.9	1.5
Motor vehicles and parts	31.5	23.8	−2.7	7.3	0.1	9.6	6.2	9.7	6.1	0.2	5.7	0.9	1.0	1.0	1.4	1.5
Other manufacturing	1.1	2.0	−24.2	−0.2	−0.5	40.6	20.3	2.7	22.8	0.5	13.7	0.7	1.4	2.3	1.2	1.9
Utilities and construction	−15.7	−1.1	−20.3	1.3	−1.7	−2.7	−1.1	−1.0	14.7	0.6	14.7	−0.1	2.2	1.4	0.9	1.1
Trade	−17.6	−1.3	−25.9	−0.3	−2.6	−2.5	−1.5	−1.9	10.4	0.7	22.5	0.1	1.0	0.9	0.8	1.0
Transport	−11.3	−0.8	−13.8	0.5	−1.5	−1.4	−0.6	−0.8	6.9	0.3	8.1	−0.3	0.6	0.6	0.4	0.5
Other Services	−18.7	−1.3	−22.9	0.0	−2.5	−2.3	−1.4	−1.8	11.4	0.5	12.2	−0.1	1.3	1.0	0.7	0.9

Source: Authors' estimation based on GTAP 10 database.

Table A3. ITFC Relative Readiness Index for 27 OIC African Countries.

Countries	Development HDI		African Impact Inter-African Trade		Economy Size GDP PPP (US$ Billion)		Resources Total Reserves		Resilience External Debt		Infrastructure LPI		Competitiveness WEF Index		Regional Integration ARI Index		Governance Mo Ibrahim Index		Economic Complexity ECI Index		Total	Final score	Rank	Group
	Value	X Factor	Amount	X Factor	Amount	X Factor	Months	X Factor	%	X Factor	Value	X Factor	Value	X Factor	Value	X Factor	Value	X Factor	Value	X Factor				
Egypt	0.71	94.5	4.7	56.1	1292.5	100.0	5.3	41.8	39.4	62.7	2.8	91.7	54.5	90.8	0.42	98.1	39.0	53.9	-0.1	91.3	780.9	78.1	1	A (Tier 1)
Algeria	0.75	100.0	2.9	35.2	488.3	37.8	12.8	100.0	3.3	100.0	2.4	79.4	56.3	93.8	0.28	65.6	50.4	69.6	-0.9	51.7	733.1	73.3	2	A (Tier 1)
Nigeria	0.54	72.1	8.3	100.0	1044.2	80.8	4.0	31.2	12.7	90.3	2.5	82.2	48.3	80.5	0.30	68.8	44.3	61.2	-1.7	14.5	681.5	68.2	3	B (Tier 2)
Morocco	0.69	91.7	2.8	33.3	273.6	21.2	5.3	41.4	46.8	55.0	2.5	82.4	60.0	100.0	0.43	100.0	60.7	83.8	-0.6	66.7	675.5	67.5	4	B (Tier 2)
Côte d'Ivoire	0.54	71.9	4.6	55.2	144.5	11.2	4.5	35.2	33.7	68.6	3.1	100.0	48.1	80.2	0.36	83.0	58.2	80.4	-1.1	42.5	628.2	62.8	5	B (Tier 2)
Tunisia	0.74	98.9	2.8	33.6	123.6	9.6	3.7	28.7	100.8	-0.8	2.6	83.4	56.4	94.0	0.34	78.6	72.4	100.0	0.1	100.0	625.9	62.6	6	B (Tier 2)
Uganda	0.54	72.7	2.0	23.9	106.6	8.2	4.2	32.7	40.8	61.2	2.6	83.6	48.9	81.5	0.38	87.4	50.6	69.9	-0.4	75.4	596.5	59.7	7	C (Tier 3)
Senegal	0.51	68.4	3.0	36.2	58.1	4.5	3.5	27.2	58.8	42.6	2.3	73.1	49.7	82.8	0.40	94.0	68.2	94.2	-0.5	70.5	593.5	59.3	8	C (Tier 3)
Benin	0.55	72.9	1.2	14.0	41.8	3.2	2.4	18.8	27.4	75.1	2.7	89.2	45.8	76.3	0.35	80.7	66.1	91.3	-0.6	67.1	588.7	58.9	9	C (Tier 3)
Togo	0.52	68.9	2.2	26.3	13.6	1.1	2.6	20.5	40.0	62.0	2.4	79.4	35.1	58.5	0.40	92.8	51.3	70.9	-0.6	66.7	546.9	54.7	10	C (Tier 3)
Libya	0.72	96.8	0.7	8.5	31.5	2.4	10.0	78.4	20.0	82.7	2.1	68.3	35.1	58.5	0.28	65.1	26.9	37.2	-1.0	48.8	546.7	54.7	11	C (Tier 3)
Mali	0.43	58.0	1.6	18.9	47.6	3.7	1.3	10.5	31.0	71.4	2.6	83.4	43.6	72.7	0.35	81.9	45.1	62.3	-0.7	64.3	527.6	52.8	12	C (Tier 3)
Burkina Faso	0.45	60.4	1.5	18.0	46.1	3.6	0.7	5.7	23.9	78.7	2.6	85.1	43.4	72.3	0.37	86.0	57.4	79.3	-1.4	30.0	519.1	51.9	13	C (Tier 3)
Gabon	0.70	94.0	0.8	10.2	33.4	2.6	4.5	35.2	46.4	55.5	2.2	70.1	47.5	79.2	0.34	79.1	43.5	60.1	-1.4	30.4	516.3	51.6	14	C (Tier 3)
Sierra Leone	0.45	60.4	1.9	22.9	13.7	1.1	3.5	27.2	44.4	57.5	2.1	67.4	38.8	64.7	0.22	51.6	56.2	77.6	-0.3	83.1	513.5	51.3	15	C (Tier 3)
Cameroon	0.56	75.3	1.8	21.7	97.0	7.5	4.4	34.7	33.5	68.8	2.6	84.2	46.0	76.7	0.27	62.3	35.7	49.3	-1.3	32.9	513.3	51.3	16	C (Tier 3)
Comoros	0.55	74.1	0.1	1.5	2.7	0.2	6.8	53.4	25.6	77.0	2.6	83.0	35.1	58.5	0.35	81.4	42.3	58.4	-1.5	24.2	511.5	51.2	17	C (Tier 3)
Guinea-Bissau	0.48	64.2	0.1	1.2	4.2	0.3	10.9	85.3	44.2	57.7	2.1	77.4	35.1	58.5	0.30	70.0	48.5	67.0	-1.5	24.2	505.9	50.6	18	C (Tier 3)
Gambia	0.50	66.3	0.1	1.7	5.4	0.4	3.6	28.1	40.0	62.1	2.4	77.9	45.9	76.5	0.35	81.6	58.0	80.1	-1.5	24.2	499.0	49.9	19	D (Tier 4)
Niger	0.39	52.7	0.5	6.2	30.3	2.3	3.9	30.5	26.7	75.7	2.1	67.2	35.1	58.5	0.30	69.5	52.7	72.8	-0.7	61.4	496.8	49.7	20	D (Tier 4)
Mauritania	0.55	73.0	1.0	11.9	24.0	1.9	3.2	25.0	71.6	29.4	2.3	75.6	40.9	68.2	0.39	89.8	40.3	55.7	-0.9	52.7	483.0	48.3	21	D (Tier 4)
Mozambique	0.46	61.0	5.1	61.8	40.9	3.2	4.4	34.1	135.7	-37.0	2.7	87.1	38.1	63.5	0.38	88.4	47.1	65.1	-1.1	41.5	468.6	46.9	22	D (Tier 4)
Guinea	0.48	63.8	0.5	5.9	35.1	2.7	3.3	25.5	23.5	79.1	2.2	71.4	46.1	76.8	0.30	70.5	43.4	59.9	-1.8	11.6	467.3	46.7	23	D (Tier 4)
Djibouti	0.52	70.1	0.3	3.9	5.6	0.4	1.2	9.6	79.0	21.7	2.6	85.5	35.1	58.5	0.39	91.6	41.3	57.0	-1.5	24.2	422.4	42.2	24	D (Tier 4)
Chad	0.40	53.2	0.2	2.2	26.6	2.1	2.0	15.7	32.1	70.3	2.4	78.4	35.1	58.5	0.30	70.5	37.5	51.8	-2.1	-5.3	397.3	39.7	25	E (Tier 5)
Somalia	0.30	40.1	0.6	7.0	13.9	1.1	1.0	7.8	20.0	82.7	2.2	71.7	35.1	58.5	0.30	70.5	13.8	19.1	-1.5	24.2	382.6	38.3	26	E (Tier 5)
Sudan	0.51	68.2	1.3	15.2	166.3	12.9	0.2	1.5	77.1	23.7	2.4	78.8	35.1	58.5	0.23	53.0	27.4	37.8	-1.5	24.2	373.7	37.4	27	E (Tier 5)
27 OIC Afr. C.	0.54		1.9		156.0		4.2		43.6		2.5		43.49		0.34		47.3		-1.0		540.6	54.1		
Sources	UNDP		IMF		IMF		WB		WB		WB		WEF		ARI		Mo Ibr.		OEC					
Update	2021		2021		2021		2021		2021		2021		2021		2021									

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