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Abstract

In March 2018, representatives of member countries of the African Union signed the African Continental Free Trade Area (AfCFTA) agreement. This agreement provides a framework for trade liberalization in goods and services and is expected to eventually cover all African countries. Using a multi-country, multi-sector general equilibrium model based on Costinot and Rodriguez-Clare (2014), we estimate the welfare effects of the AfCFTA for 45 countries in Africa. Three different model specifications—comprising both perfect competition and monopolistic competition—are used. Simulations include full elimination of import tariffs and partial but substantial reduction in non-tariff barriers (NTBs). Results reveal significant potential welfare gains from trade liberalization in Africa. As intra-regional import tariffs in the continent are already low, the bulk of these gains come from lowering NTBs. Overall gains for the continent are broadly similar under the three model specifications used, with considerable variation of potential welfare gains across countries in all model structures.

JEL Classification Numbers: F11, F12, F13, F15, F17

Keywords: AfCFTA, welfare, general equilibrium, trade barriers

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1. INTRODUCTION

On March 21, 2018 representatives of over 40 (out of 55) member countries of the African Union (AU) signed the African Continental Free Trade Area (AfCFTA) agreement.[1] Once fully implemented, the AfCFTA is expected to cover all 55 African countries, with an estimated combined current GDP of US$2.5 trillion, and a population of over one billion, 60 percent of whom are below the age of 25 years. Even without this free trade agreement, the African continent has in recent times been recognized as a land of vast unexploited opportunities (McKinsey, 2018). The AfCFTA can support the realization of the continent's economic promise. It has the potential to raise Africa's low productivity and promote higher investment, thereby helping to increase income levels and reducing poverty.

The push for the AfCFTA is taking place against the backdrop of increased skepticism about multilateral trade agreements and a global backlash against free trade. Yet, trade integration has long been seen by African policy makers as a mechanism for raising potential growth and reducing poverty in the continent (Yongzheng and Gupta, 2005). Several trade and regional economic integration groups have been formed over the years.[2] The AfCFTA is the most ambitious initiative in this vein.

This paper provides estimates of the potential welfare impact of the AfCFTA. Such estimates are useful for various reasons. First, they allow an assessment of the size of changes in welfare and income, and their main sources to better anchor expectations regarding the potential implications of the agreement for economic development. Second, they provide an understanding of the international distribution of the potential gains from the agreement, and what countries can do to fully reap them.

This paper studies the impact of the AfCFTA on African economies using a global, multi-sector general equilibrium model developed by Costinot and Rodriguez-Clare (2014), under two main market structures: perfect competition and monopolistic competition. The model is flexible enough to include the features of some of the main micro-theoretical trade models proposed in the last decades, such as Krugman (1980), Eaton and Kortum (2002), and Melitz (2003). We mainly calibrate the model with data from 2014-16, and start with a perfect competition set up; we then extend the model to include monopolistic competition, as in Krugman (1980), and as in Melitz (2003). While there have been some recent studies on the potential impact of the AfCFTA (e.g., Chauvin, 2016; Jensen, 2015; Mevel and Karingi, 2012), none have considered imperfectly competitive market structures.

We estimate income and welfare changes for 45 African countries and other world regions. The model simulations use a comprehensive database comprising output, trade flows, and import tariff and non-tariff barriers (NTBs) for 26 sectors in all countries considered. Simulations

[1] Since then, twelve additional countries have signed onto the AfCFTA. See Appendix 1 for the full list of signatory countries.

[2] The first two such integration arrangements, established early in the last century, were the South African Customs Union (SACU) in 1910 and the East African Community (EAC) in 1919.

include full elimination of import tariffs and a 35 percent reduction in NTBs. We find that the welfare gains from combined tariff elimination and NTB reduction is about 2 to 4 percent, depending on the model structure used and the extent of NTB reduction considered. Because existing intra-African tariffs are already generally low, overall gains from tariff elimination in the continent are quite modest, with the bulk of gains stemming from the reduction in NTBs.

The paper proceeds as follows. Section 2 presents the basic elements of the AfCFTA. Section 3 describes the current state of trade and factors likely to impact any potential benefits from the AfCFTA. Sections 4 and 5 discuss the model and present the data used. The estimates of the effects of the AfCFTA are presented in Section 6. Section 7 discusses results from related studies and compares them to our own. Finally, Section 8 concludes and presents some policy implications.

2. KEY ELEMENTS OF THE AFCFTA

The AfCFTA builds on negotiations of the Tripartite Free Trade Area (TFTA), composed of the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA), and the East African Community (EAC). [3] It aims to achieve the following general objectives:[4] (1) deepening economic integration in Africa in accordance with Agenda 2063;(2) creating a continental customs union; (3) liberalizing intra-African trade; (4) resolving the challenges of overlapping memberships in regional economic communities (RECs); (5) enhancing competitiveness; (6) contributing to the movement of capital and natural persons and facilitating investment; (7)promoting sustainable and inclusive socio-economic development, gender equality and structural transformation; and (8) promoting industrialization. The AfCFTA also seeks to build on the level of integration attained by existing RECs, which are expected to contribute to its institutional structure. In the long-run, the RECs' trade functions are expected to be consolidated at the continental level.

The agreement has seven specific objectives.[5] These are to: (i) eliminate tariffs and non-tariff barriers to trade in goods progressively; (ii) liberalize trade in services progressively; (iii) cooperate on investment, intellectual property rights and competition policy; (iv) cooperate on all trade-related areas; (v) cooperate on customs matters and the implementation of trade facilitation measures; (vi) establish a mechanism for the settlement of disputes concerning members' rights and obligations; and (vii) establish and maintain an institutional framework for the implementation and administration of the AfCFTA.

The AfCFTA is being implemented in two phases. Phase I provides a framework for the liberalization of trade in goods and services, and a mechanism for dispute settlement. For trade in goods, the agreement sets the path for eliminating tariffs on 90 percent of product categories.

[3] The AfCFTA is an overall framework agreement of which the various protocols, annexes, and appendices form an integral part. Most of the details still need to be negotiated. Thus far, agreement has been reached on the objectives, principles, institutions, and a workplan for completing the negotiations.

[4] See Article 3 of the Agreement, p. 4.

[5] See Article 4 of the Agreement, p. 5.

(continued…)

Countries can implement tariff reductions over a longer period in the case of sensitive goods, or maintain existing tariffs—where the products are excluded—for the remaining 10 percent of product categories (tariff lines). The protocol on trade in goods includes annexes on tariff concessions, rules of origin, customs cooperation, trade facilitation, non-tariff barriers, technical barriers to trade, sanitary and phytosanitary measures, and transit and trade remedies.[6]

Annex 4 to the Agreement provides institutional structures for the progressive elimination of NTBs; a general categorization of NTBs; reporting and monitoring tools; and facilitation of resolution of identified NTBs. On the liberalization of trade in services, member countries have also agreed to a request-and-offer approach, based on seven identified priority sectors: logistics and transport, financial services, tourism, professional services, energy services, construction, and communications. Phase II of the AfCFTA will cover competition policy, investment, and intellectual property rights. Negotiations for Phase II are scheduled to begin soon, with an expected conclusion date of 2020. Phase I of the AfCFTA came into force on May 30, 2019, 30 days after the 22nd ratification instrument was deposited with the Chairman of the African Union Commission.[7]

3. THE CURRENT STATE OF TRADE IN AFRICA

Africa is a vast and diverse continent where discussions of trade integration, as a driver of sustained growth and poverty reduction, have been long standing. Perhaps unlike other regions that have pursued deeper trade integration, Africa stands out in at least four areas: heterogeneity in country size, income levels/development, and trade openness; diversity of trade regimes and trade policies; patterns of intra-regional trade; and the lack of a major continent-wide trading hub.

3.1 Some broad trade features

The continent contains an assortment of countries in terms of size, income, and openness. In terms of size, seven countries have populations of less than 1.5 million, and one has over 100 million. Between these two extremes, there is a wide distribution of countries (see Table 1). Although Africa contains 16 percent of the world's population, it has only 5 percent of its income. Half of African countries (27), with 44.6 percent of Africa's total population, are categorized as low income. The remainder is distributed between lower-middle-income (18 countries, with 45.9 percent of the population), upper-middle-income (8 countries with 9.5 percent of the population), and high-income (1 country with 0.01 percent of the population).

Countries' openness to trade varies, with gross exports and imports ranging from 38 percent to 140 percent of GDP. Finally, 15 African countries, with about 17 of the total population and 7 percent of GDP are landlocked.

[6] Under Phase I, negotiations focus on tariff concessions and the rules of origin for trade in goods, and specific commitments regarding trade in services.
[7] See Appendix 1 for details.

Table 1. Selected Indicators of African Countries, 2016[1]

(In billions of US dollars, unless otherwise stated)

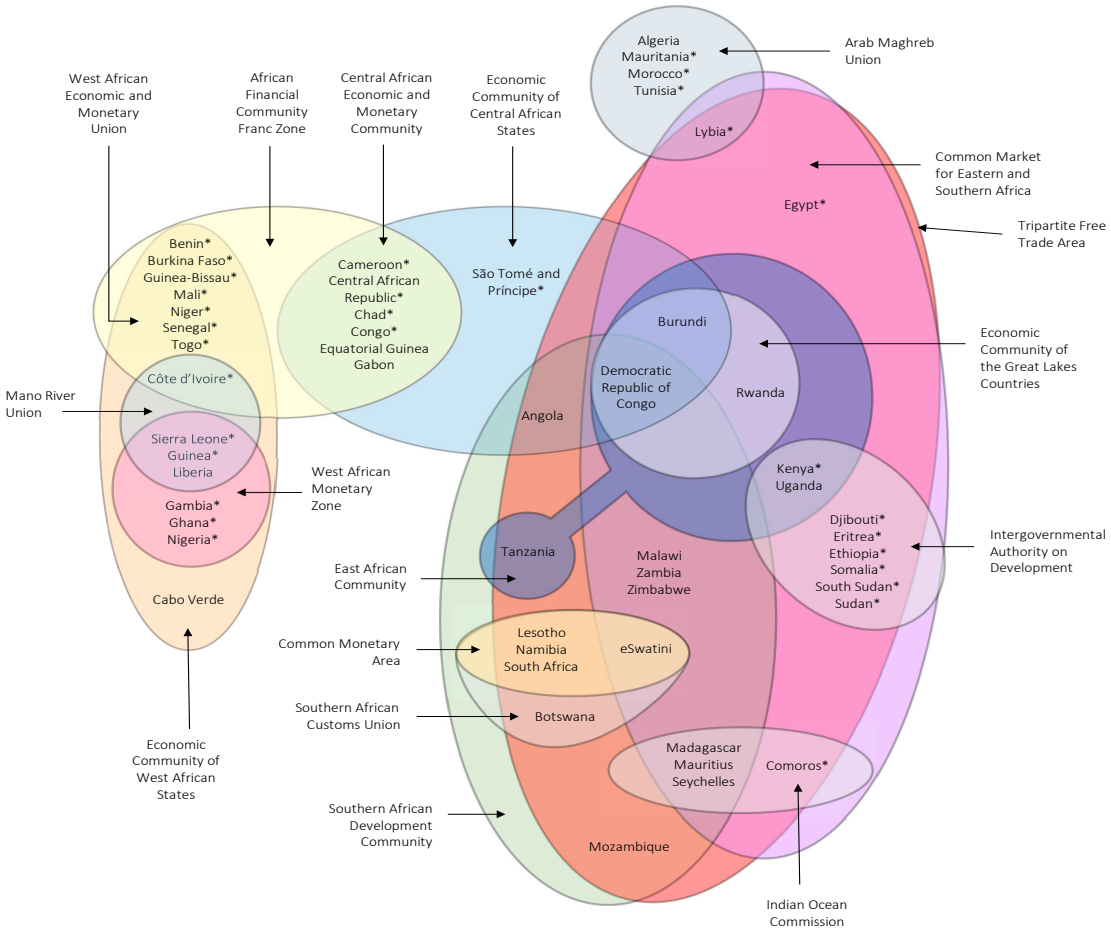
Country	GDP PPP (US$bns)	Exports of goods	Imports of goods	Openness (Percent of GDP, goods/services)	Population (Millions of persons)	Access to the sea	Income level	Percent		NTM Coverage Ratio		NTMs Frequency Ratio		Trade within Africa as a ratio of total trade
								Average Applied Import Tariffs	Effective Non-Trade Measures (NTM)	Imports	Exports	Imports	Exports	
Egypt	1,132.1	18.7	57.4	31	90.2	yes	LM	6.6	14.6	...	...	...	...	...
Nigeria	1,090.1	34.7	35.2	21	183.6	yes	LM	11.3	15.0	94.3[b]	1.0	85.9	24.4	8.9
South Africa	742.2	76.4	74.1	61	55.6	yes	UM	4.5	2.7	...	...	...	...	19.0
Algeria	609.6	29.1	49.4	58	40.8	yes	UM	8.9	14.6	52.9	0.0	53.2	1.5	2.8
Morocco	281.4	18.9	36.6	77	34.5	yes	LM	3.8	...	57.3	32.1	44.6	24.1	4.8
Angola	185.6	27.6	13.5	55	27.4	yes	LM	10.2[a]	9.5	...	...	...	...	6.5
Sudan	178.0	3.1	7.5	24	39.6	no	LM	12.1[d]	16.0	...	...	...	...	4.0
Ethiopia	177.4	2.9	16.7	36	91.2	yes	L	12.1[a]	2.5	97.8[a]	91.9	90.0	37.3	7.2
Kenya	152.9	5.7	13.4	37	45.5	yes	LM	10.6[b]	3.9	...	...	...	...	15.3
Tanzania	150.3	5.4	8.2	41	48.7	yes	L	8.6	21.1	...	...	...	...	20.5
Tunisia	130.5	13.6	18.4	92	11.4	yes	LM	3.9[a]	...	70.6	56.7	58.2	42.8	6.6
Ghana	121.2	11.1	12.9	89	27.6	yes	LM	10.8	3.8	51.3[b]	93.3	41.3	24.1	11.8
Côte d'Ivoire	88.3	10.9	7.8	62	24.3	yes	LM	10.6[a]	14.3	21.9[d]	38.4	18.7	3.4	25.1
Cameroon	84.6	4.6	4.8	41	23.7	yes	LM	15.8[b]	3.6	46.8[a]	76.6	18.7	15.0	16.8
Uganda	83.4	2.9	4.4	46	36.6	no	L	7.9[a]	2.4	...	...	...	...	25.7
Zambia	65.3	6.5	6.5	73	16.7	no	LM	4.0[a]	2.5	...	...	...	...	41.4
Democratic Republic of the Congo	65.0	9.9	10.1	56	84.1	yes	L	10.2[b]	9.5	...	...	...	...	32.3
Senegal	39.6	2.9	4.8	54	15.4	yes	L	9.0	18.2	48.3[d]	32.9	28.8	10.5	26.0
Mali	38.2	2.8	3.4	64	18.3	no	L	7.6	4.6	...	...	...	...	50.4
Madagascar	37.5	2.2	2.4	69	24.9	yes	L	9.4[a]	9.5	...	...	...	...	8.8
Botswana	37.4	7.4	5.9	95	2.2	no	UM	0.6	9.5	...	...	...	...	49.7
Libya	37.0	...	...	...	6.4	yes	UM	...	...	...	...	...	...	...
Gabon	35.8	4.5	2.7	71	1.9	yes	UM	14.4[c]	1.8	...	...	...	...	6.4
Mozambique	35.1	3.3	4.7	107	28.8	no	L	4.2[b]	9.5	...	...	...	...	29.7
Burkina Faso	33.0	2.6	2.8	63	18.4	no	L	9.6[a]	4.3	61.8[d]	65.4	26.5	15.5	20.6
Zimbabwe	32.4	3.7	5.2	65	14.5	no	L	5.7[a]	...	...	...	...	...	83.5
Equatorial Guinea	31.2	4.2	2.3	76	0.8	yes	UM	15.6[e]	...	...	...	...	...	9.3
Republic of Congo	29.7	4.0	5.7	177	4.2	yes	LM	16.4	9.5	...	...	...	...	28.1
Chad	29.0	2.2	2.0	64	11.9	no	L	14.2[c]	9.5	...	...	...	...	7.4
Namibia	26.3	3.4	5.6	92	2.3	yes	UM	1.0	9.5	...	...	...	...	57.2
Mauritius	26.0	2.4	4.4	96	1.3	yes	UM	0.8	6.8	...	...	...	...	15.0
Guinea	24.4	2.4	4.4	88	12.7	yes	L	11.9[d]	9.5	...	...	...	...	14.1
Benin	23.6	1.1	1.8	46	10.8	yes	L	11.6	9.5	64.1[b]	46.7	32.7	30.2	18.1
Rwanda	22.8	0.7	2.0	55	11.6	no	L	7.3	4.8	...	...	...	...	32.4
Malawi	21.1	1.5	2.1	75	18.6	no	L	4.2[a]	5.0	...	...	...	...	37.7
South Sudan	20.7	1.7	1.2	119	12.2	no	L	...	9.5	...	...	...	...	...
Niger	20.4	1.0	1.7	50	18.2	no	L	9.6	9.5	28.5[b]	1.5	18.8	1.0	18.3
Somalia	18.0	0.6	2.9	77	0.0	yes	L	...	9.5	...	...	...	...	...
Mauritania	16.4	1.4	1.9	89	3.8	yes	LM	11.4[b]	9.5	36.6[a]	32.0	17.9	12.8	9.5
Togo	12.2	1.0	2.0	87	7.6	yes	L	10.3	9.5	...	...	...	...	31.6
Eswatini	11.1	1.7	1.3	89	1.1	no	LM	0.6[b]	9.5	...	...	...	...	85.5
Sierra Leone	10.9	0.7	1.0	62	7.2	yes	L	10.3[d]	9.5	...	...	...	...	20.2
Eritrea	8.8	0.2	0.7	26	5.8	yes	L	5.4[f]	9.5	...	...	...	...	5.5
Burundi	7.8	0.1	0.6	30	10.5	no	L	6.1[a]	9.5	...	...	...	...	32.5
Lesotho	6.6	0.9	1.6	119	1.9	no	LM	2.4[b]	9.5	...	...	...	...	68.4
Liberia	5.8	0.4	1.2	91	4.4	yes	L	12.2[b]	9.5	19.2[b]	36.3	46.5	38.9	2.0
Cabo Verde	3.5	0.2	0.7	104	0.5	yes	LM	10.9[a]	9.5	...	...	...	...	2.2
The Gambia	3.4	0.1	0.3	44	2.0	yes	L	12.7[c]	9.5	61.3[c]	3.5	14.8	8.2	34.4
Djibouti	3.3	0.1	0.7	77	1.0	yes	LM	17.6[b]	...	...	...	...	...	15.9
Central African Republic	3.2	0.1	0.4	54	4.9	no	L	13.9[a]	9.5	...	...	...	...	14.0
Guinea-Bissau	2.9	0.3	0.2	63	1.7	yes	L	9.9[b]	...	...	...	...	...	13.2
Seychelles	2.6	0.5	1.0	200	0.1	yes	H	4.3	9.5	...	...	...	...	8.0
Comoros	1.3	0.0	0.2	62	0.8	yes	L	7.4[b]	...	...	...	...	...	15.4
São Tomé and Príncipe	0.6	0.0	0.1	80	0.2	yes	LM	10.4	9.5	...	...	...	...	18.2
Total Africa	6057.8	344.5	459.0		1,170									
Proportion of world (Percent)	4.8	2.4	3.1		16.1									
Median	30.5	2.6	2.9	63.8	11.7			9.6	9.5	52.9	36.3	32.7	15.5	17.5

Notes: a-2015; b-2014;c-2013; d-2012;e-2007;f-2006.

[1] No data is available for the Republic of Saharawi, a full member of the African Union, which also signed the AfCFTA agreement.

Sources: World Integrated Trade Solutions, and International Monetary Fund World Economic Outlook, April 2018.

Figure 1. Regional Trade Arrangements in Africa, 2019



Source: Partly adopted from Economic Integration in Africa, Figure 3.1, www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/2019AEO/AEO_2019-EN-CHAP3.pdf

The continent is also characterized by a plethora of trade regimes and trade policies. It is carved up by arrangements that are related to its colonial past. Three broad elements characterize the trade regimes on the continent. First, there are preferential trade agreements between individual African countries and countries outside the continent. These include agreements under the general system of preferences (GSP) and duty-free treatment for least-developed countries (LDCs), and preferential access to the US market under the African Growth and Opportunity Act (AGOA). Second, there are regional trade agreements between African countries and countries outside Africa. This grouping includes the various economic partnership agreements (EPAs) that the EU has negotiated with different countries and regional groupings on the continent, which also call for the partial and gradual opening of African markets to EU imports. Third, there is a web of intra-African trade agreements, including eight RECs, and four sub-regional groupings (Figure 1).

Table 2. Simple Average of Applied Effective Tariffs, 2016 (In percent)[1]

	Intra-regional	Effectively Applied (AHS)	Most Favoured Nation (MFN)
Africa	**5.0**	**11.8**	**12.5**
AU-recognised regional economic communities			
Arab Maghreb Union (AMU)	5.0	8.9	14.0
Common Market for Eastern and Southern Africa (COMESA)	5.0	8.9	11.0
Community of Sahel-Saharan States (CEN-SAD)	12.0	12.1	13.1
East African Community (EAC)	0.0	11.6	12.8
Economic Community of Central African States (ECCAS)	9.0	14.4	14.6
Economic Community of West African States (ECOWAS)	11.0	12.4	12.2
Southern African Development Community (SADC)	4.0	7.7	9.2
Intergovernmental Authority on Development (IGAD)	9.0	13.5	16.1
Other preferential trade agreements			
Central African Economic and Monetary Community (CEMAC)	0.0	18.5	17.8
West Afrcian Economic and Monetary Union (WAEMU)	9.0	12.4	12.2
Southern African Customs Union (SACU)	0.0	6.0	7.7
Indian Ocean Commission (IOC)	0.0	5.0	5.1
Comparators			
Latin America and the Caribbean (LAC)	…	9.9	10.5
Association of Southeast Asian Nations (ASEAN)	1.0	5.0	6.3
Southern Common Market (Mercosur)	0.0	11.1	12.1

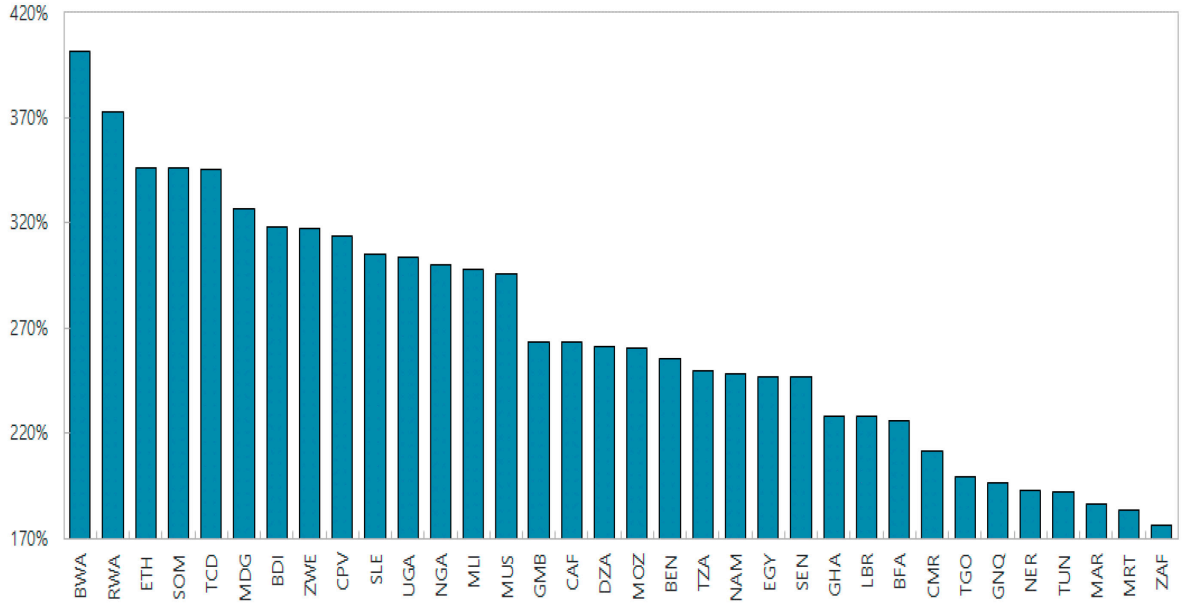
[1]AHS-effectively applied tariff (simple average), MFN -most favored nation – tariff (simple average). For IGAD the entries for AHS and MFN are 2016 for Kenya and Uganda, 2015 for Ethiopia, and 2013 for Sudan.
Source: Economic Integration Africa, table 3.1, www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/2019AEO/AEO_2019-EN-CHAP3.pdf, World Integrated trade Solution and IMF staff estimates.

3.2 Tariff and non-tariff barriers to trade

The intra-African trade agreements have facilitated, to a very large extent, a gradual lowering of tariffs on goods. Effectively applied tariffs have come down in the last two decades, from over 20 percent in 1997 to 11.8 percent in 2016. It should be noted, however, that the applied effective tariffs vary considerably between countries. Those countries that are already part of a regional trade agreement (RTA) generally have significantly reduced effective tariffs, which are low on average (Table 2).

In contrast, non-tariff barriers in Africa are high and prevalent, and represent a critical obstacle to trade (Figure 2).[8] NTBs can be classified in three broad categories: (i) non-tariff trade measures (NTMs); (ii) infrastructure gaps; and (iii) other trade-related transactions costs. The extent of NTMs in selected African countries is shown in Table 3. It reveals that technical, and sanitary/phytosanitary barriers are the two most prevalent NTMs in Africa. Large infrastructure gaps and significant trade-related transaction costs also serve as barriers to trade in Africa, as shown in Table 4. The Table shows that several indicators related to the quality of ports, air transportation, and other measures of infrastructure efficiency, are low in Africa compared to other regions. The reduction in ground transportation costs is especially critical to encouraging intra-regional trade, given the geographic configuration of the continent (World Bank, 2009). Some continental initiatives have been launched in recent years to address infrastructure gaps, but they will take time to narrow the gaps.[9] Table 4 also shows low scores for the region in terms of customs efficiency and other administrative procedures required for effective international trade.

Figure 2. Intra-Africa Non-Tariff Barriers for Selected Countries (Ad valorem equivalent, 2016)



Source: Authors' calculations based on Economic and Social Commission for Asia and the Pacific (ESCAP)-World Bank database.

[8] In this paper, we use the terms NTBs and non-tariff trade costs interchangeably.

[9] The *Presidential Infrastructure Champion Initiative* was launched in 2011 and the *Program for Infrastructure Development in Africa* was adopted in 2012.

Table 3. African Union - Non-Tariff Trade Measures, 2018[1]
(Number of Measures in Place)

	SPS	TBT	ADP	CV	SG	SSG	QR	TRQ	XS
Benin	6	2							
Botswana	3	103							
Burkina Faso	6								
Burundi	8	13							
Cabo Verde	4								
Cameroon		8							
Central African Republic	3	10							
Congo		3							
Côte d'Ivoire	19						15		
Democratic Republic of the Congo	2								
Egypt	87	207	15						
Eswatini	2	1							
Ethiopia					1				
Gabon		2							
The Gambia	2	2							
Ghana	5	9							
Guinea	11	1							
Kenya	92	770							
Liberia	1	3			3				
Madagascar	37								
Malawi	16	18							
Mali	21	2					20		
Mauritius	17	8					9		
Morocco	56	26	13		4			16	
Mozambique	6	14							
Namibia		1							
Nigeria	29	8							
Rwanda	1	215							
Senegal	7	14							
Seychelles	4	4					6		
South Africa	61	278	32		3			53	62
Tanzania	2	292							
Togo	11	2							
Tunisia	2	27			3			13	
Uganda	56	999							
Zambia	4	88			1				
Zimbabwe	6	1							
Africa	587	3068	60		15		50	82	62

[1] SPS: sanitary and phytosanitary; TBT: technical barriers to trade; ADP: anti-dumping; CV: countervailing; SG: safeguards; SSG: special safeguards; QR: quantitative restrictions; TRQ: tariff-rate quotas; XS: export subsidies.
Source: World Trade Organization.

Table 4. Infrastructure Gaps and Trade-Related Transaction Costs in Africa, 2012-16

Variable	Africa	Sub-Saharan Africa	Advanced Economies	Middle East and North Africa	South America	Central America	South Asia
Level of infrastructures:							
Container port traffic per capita (WDI)	0.09	0.07	0.75	0.31	0.12	0.38	0.09
Air transport passengers, per capita (WDI)	0.23	0.25	2.6	1.36	1.43	0.93	0.1
Quality of port infrastructure,(1=low to 7=high) (WDI)	3.64	3.64	5.35	4.34	3.65	4.15	3.51
Liner shipping connectivity index (max=100) (WDI)	14.38	12.72	50.64	24.68	24.16	16.36	27.27
Infrastructure efficiency score, (1=low to 5=high) (LPI)	2.32	2.34	3.75	2.59	2.56	2.43	2.45
Customs efficiency score, (1=low to 5=high) (LPI)	2.35	2.39	3.58	2.44	2.52	2.5	2.42
International shipments efficiency score, (1=low to 5=high) (LPI)	2.52	2.52	3.56	2.81	2.76	2.81	2.68
Timeliness efficiency score, (1=low to 5=high) (LPI)	2.87	2.86	4.09	3.12	3.21	3.1	3.03
Overall logistics efficiency score, (1=low to 5=high) (LPI)	2.49	2.51	3.74	2.71	2.77	2.69	2.62
Trading costs:							
Burden of customs (1=inefficient to 7=efficient) (WDI)	3.6	3.6	5.0	4.0	3.5	3.7	3.8
Time to export (days) (DB)	29.3	30.9	10.2	21	19.8	15.4	30
Time to import (days) (DB)	36.4	38.5	9.3	25.6	24.3	15.3	31.5
Cost to export (USD per container) (DB)	2,149	2,302	1,054	1,340	1,809	1,181	1,696
Cost to import (USD per container) (DB)	2,819	3,056	1,102	1,600	2,020	1,329	1,877

Units: Container port traffic per capita: Annual number of flow of containers of twenty-foot equivalent units (TEUs), divided by total population. Air transport passengers, per capita: Annual number of air transport passengers carried, divided by total population. Quality of port Infrastructure: It measures business executives' perception of their country's port facilities and scores ranked from 1 (extremely underdeveloped) to 7. Liner shipping connectivity index: It captures how well countries are connected to global shipping networks and the maximum value is 100 in 2004. Infrastructure efficiency score: Quality of trade and transport related infrastructure ranked from 1 (lowest quality) to 5. International shipments efficiency score: Efficiency of the clearance process ranked from 1 (lowest efficiency) to 5. Timeliness efficiency score: Timeliness of shipments in reaching destination within the scheduled or expected delivery time ranked from 1 (lowest timeliness) to 5. Overall logistics efficiency score: Composite indiex of previous LPI indicators, ranked from 1 to 5. Burden of Customs: It measures business executives' perceptions of their country's efficiency of customs procedures, ranked from 1 (lower efficiency) to 7. LPI variables are from year 2016. DB and WDI variables are averaged for years 2012-15.

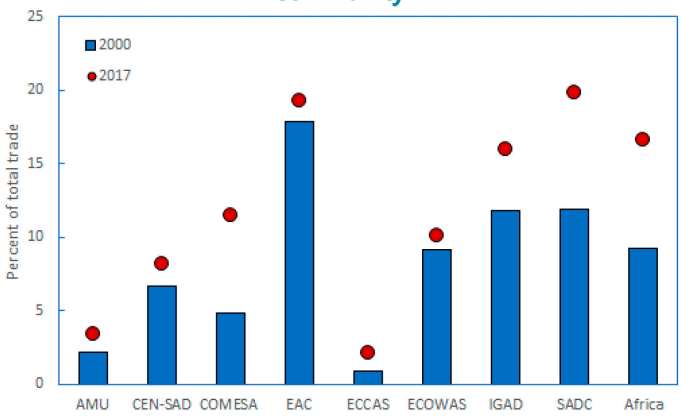
Sources: Doing Business Database (DB), Logistics Performance Database (LPI) and World Development Indicators (WDI). All databases are provided by the World Bank.

Additionally, an enabling business environment is particularly relevant to facilitating intra-regional trade. Various indicators compiled by the World Bank show room for improvement in decreasing the cost and time necessary to create new businesses. Finally, financial depth and inclusion is lower in Africa compared to other regions, so access to trade financing or bank funding to create or expand businesses will be necessary to promote the AfCFTA agenda.

3.3 Intra-regional trade

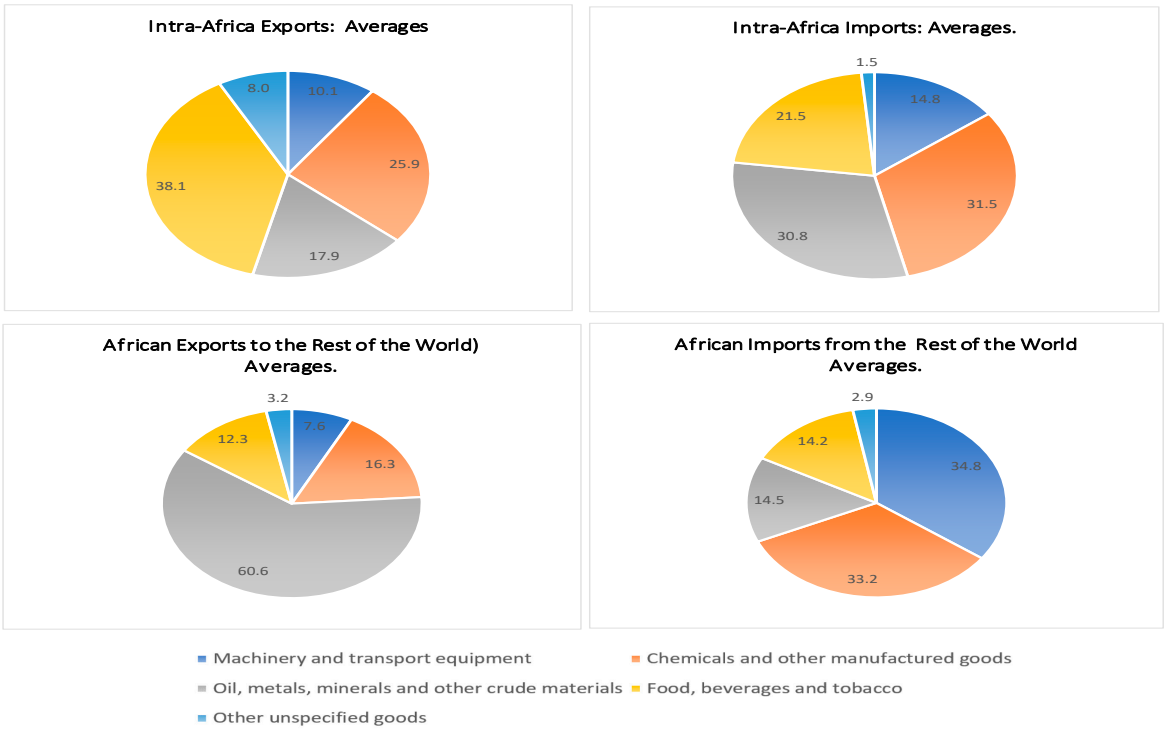
Intra-regional trade in Africa is relatively low but has been rising. In 2017, 17 percent of Africa's total trade was conducted within the continent, rising from 9 percent in 2000 (Figure 3).[10] In other regions, such as Europe and Asia, intra-regional trade was over 50 percent. The expansion of intra-regional trade in Africa has been supported by an increase in commodity exports and stronger macroeconomic conditions and institutions, along with the establishment of RTAs (Arizala et al, 2018). Much of it was driven by the SADC and the EAC, which had the highest levels of intra-union trade (over 20 percent of total trade), compared to other groupings.

Figure 3. Africa: Intra-Regional Trade by Regional Economic Community



Source: United Nations Conference on Trade and Development (UNCTAD).

Figure 4. Composition of Africa's Exports and Imports, 2000-2017 (In percent)

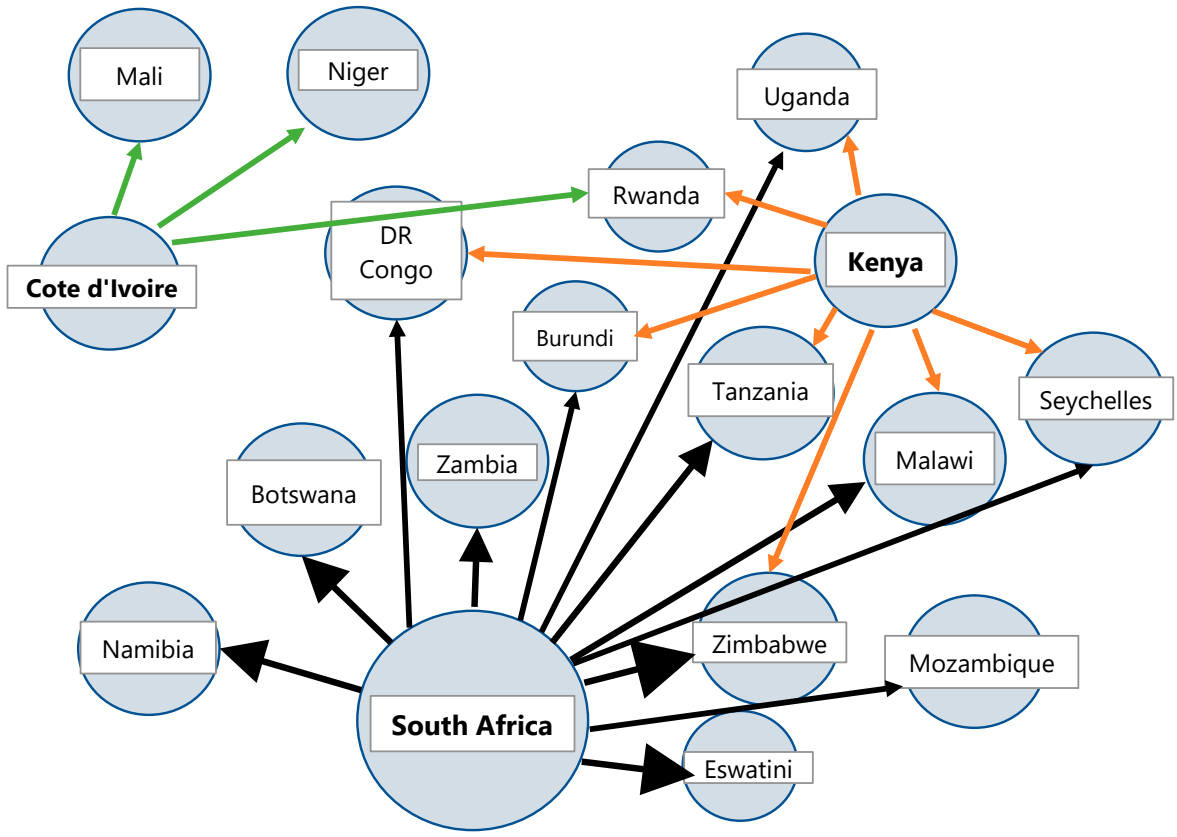


Source: United Nations Comtrade database.

[10]Africa conducts most of its trade with countries outside the continent. Since 2000, Africa's direction of trade has shifted from the USA and Europe, to China and Asia more generally.

The composition of intra-regional trade differs from that for trade outside the continent. During 2000-17, intra-African trade was dominated by manufactured goods and food (Figure 4). In contrast, exports to the rest of the world were dominated by primary products. These accounted for about 60 percent of total exports. At the same time, chemicals, other manufactured goods, machinery, and transport equipment represented close to 70 percent of total imports.

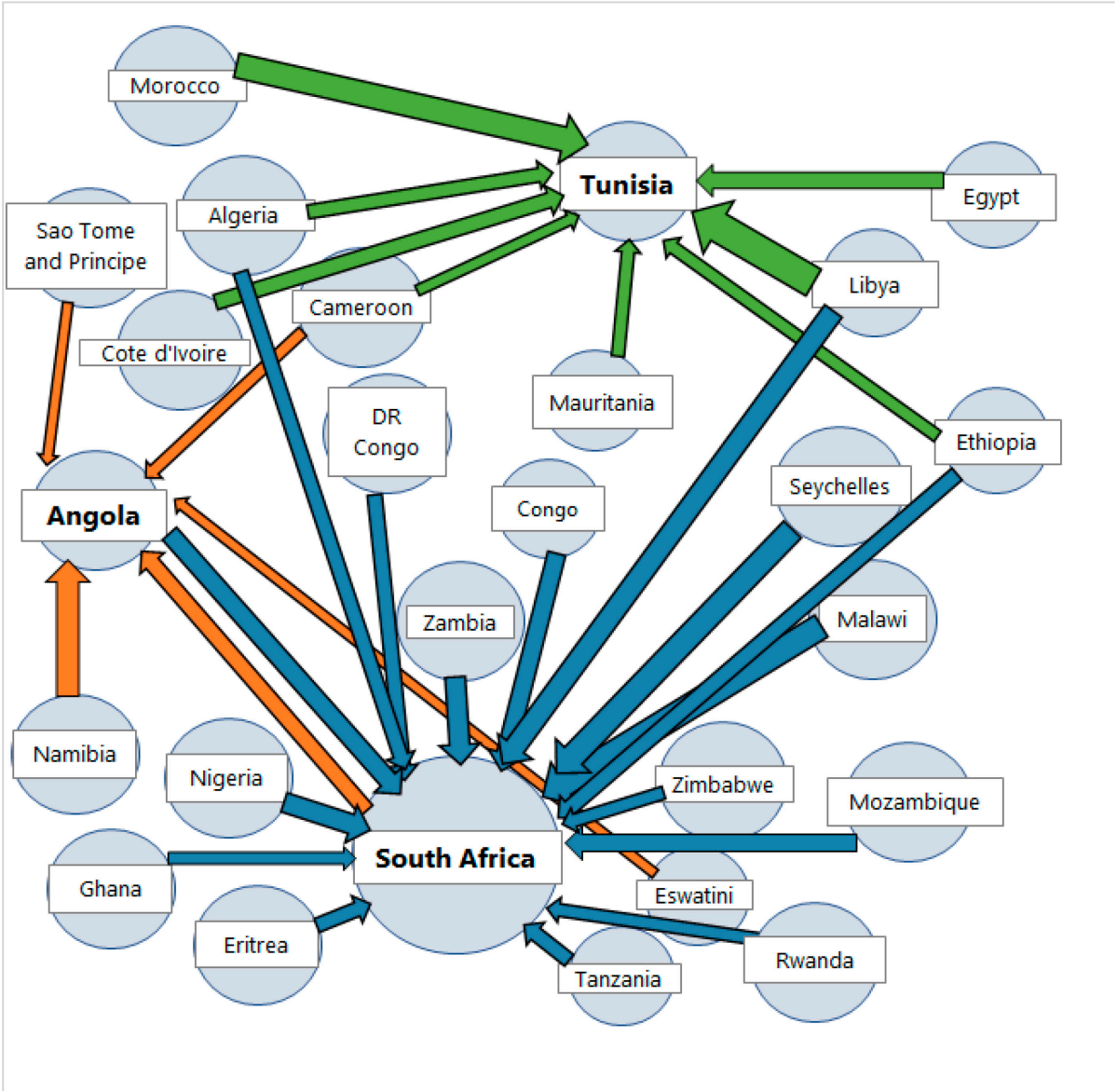
Figure 5. A Network Map of Value Added Exported (Exporter's Perspective), 2015 *



*Trade flows represent at least an average of 4 percent of total imported value-added by each country in the region.
Source: IMF staff imputations using data from the United Nations Conference on Trade and Development, and the Eora multi-region input-output database.

Africa lacks a continent-wide trading hub. Unlike in Asia, Europe, and North America, Africa does not have an economy playing the role of a hub. Apart from South Africa, which operates somewhat as a trading hub for Southern Africa, Africa lacks a systemic global exporter that imports value added from within Africa. As shown in Figure 5, South Africa is a key supplier of value added to economies in Southern Africa. Meanwhile, Figure 6 shows that South Africa also absorbs a large portion of value added from economies in Sub-Saharan Africa (SSA).

Figure 6. A Network Map of Value Added Imported (Importer's Perspective), 2015*



*Flows represent at least an average of 15 percent of the total exported value added.
Source: IMF staff imputations using data from the United Nations Conference on Trade and Development, and the Eora multi-region input-output database.

4. A MODEL FOR EVALUATING THE EFFECTS OF THE AFCFTA

In this section, we summarize the key features of the general equilibrium trade model from Costinot and Rodriguez-Clare (2014) used to estimate the potential impact of the AfCFTA. For a full description of the model, the reader is referred to Costinot and Rodriguez-Clare (2014), and their Online Appendix.[11]

The basic model is a static, multi-sector, multi-country model with perfect competition. The model is flexible enough to include effects related to some of the most relevant micro-theoretical trade models that have been proposed in the last decades, such as Krugman (1980), Eaton and Kortum (2002), and Melitz (2003). The model is based on the well-known Armington model (Armington, 1969), but adds various extensions borrowed from other trade models.

In the model, there is a representative consumer and production, but no explicit government sector. The only taxes are import tariffs, revenue from which is returned to consumers. Welfare changes are measured as the change in real consumption.

Preferences and production

The model assumes a representative consumer in each country j, and S sectors in the economy. In each sector, there is a continuum of different goods or varieties $\omega \in \Omega$. To facilitate the analysis, the model assumes a two-tier utility function. In the first tier the consumer maximizes a utility function with respect to the continuum of goods, within each sector s, and subject to a budget constraint. The model assumes a constant elasticity of substitution (CES) utility function in the first tier. The total consumption of the composite good s in country j, $C_{j,s}$, is given by

$$C_{j,s} = \left(\int_{\Omega_j} c_{j,s}(\omega)^{\frac{\sigma_s - 1}{\sigma_s}} d\omega \right)^{\frac{\sigma_s}{\sigma_s - 1}}, \qquad (1)$$

where $c_{j,s}(\omega)$ is the quantity of variety ω demanded in country j for final consumption, and σ_s is the constant elasticity of substitution within different varieties for a given sector.

In the second tier, the consumer maximizes a Cobb-Douglas utility function with respect to the consumption of the composite good in the first tier ($C_{j,s}$),

$$C_j = \prod_{s=1}^{S} C_{j,s}^{\beta_{j,s}}, \qquad (2)$$

[11] See also Cerdeiro (2016).

where $\beta_{j,s}$ are exogenous non-negative preference parameters that add up to one for each country j.

The associated price index for the final goods consumed in country j is given by

$$P_j = \prod_{s=1}^{S} P_{j,s}^{\beta_{j,s}}, \qquad (3)$$

where $P_{j,s} = \left(\sum_i P_{ij,s}^{1-\sigma}\right)^{\frac{1}{1-\sigma_s}}$, and $P_{ij,s}$ is the composite price of goods that country j buys from country i in sector s. $P_{ij,s}$ is given by

$$P_{ij,s} = \left(\int_{\Omega_{ij,s}} p_{j,s}(\omega)^{(1-\sigma_s)} d\omega\right)^{\frac{1}{1-\sigma_s}}, \qquad (4)$$

where $p_{j,s}(\omega)$ is the price of good ω, in sector s and country j, and $\Omega_{ij,s}$ is the set of goods that country j buys from country i in sector s.

The model also includes a simple production sector, with a single factor of production (labor). There is firm heterogeneity in the cost (productivity) of producing a good ω in sector s in country j.

The model assumes that trade is balanced in all countries,[12] so that aggregate consumption equals aggregate output, and changes in welfare (measured by real consumption) equal changes in real income.

Trade costs

Trade is costly in the model, as it is subject to trade costs, $\phi_{ij,s}$. In order to sell one unit of a good in country j, firms from country i must ship $\phi_{ij,s} \geq 1$ units, with $\phi_{ii,s} = 1$. These trade costs are composed of shipping costs, ad valorem tariffs ($t_{ij,s}$), and other non-tariff costs, $\tau_{ij,s}$:

$$\phi_{ij,s} = \tau_{ij,s}(1 + t_{ij,s}). \qquad (5)$$

Market Structures

This section lays out the impact of different market structures on the price index and on welfare. Costinot and Rodriguez-Clare (2014) extend the simple Armington model to consider various market structures that include imperfect competition, variety selection, and scale effects. In their set up, firms from country i may decide to stop producing and selling goods in country j if it is

[12] An alternative would consist of having constant unbalanced trade. Costinot and Rodriguez-Clare (2014) discuss the implications for counterfactual experiments of this alternative assumption. They also conduct simulations under the two alternative assumptions, and find a relatively high correlation (0.57) between welfare changes with balanced and unbalance trade. See also the Online Appendix to their work.

not profitable for them to do so. Hence, changes in prices may reflect (i) changes at the intensive margin, i.e., changes in the price of goods imported in country j; and (ii) changes at the extensive margin, i.e., changes in the set of goods imported due either to the selection of a set of heterogenous firms (Melitz, 2003), or the entry of a different set of firms (Krugman, 1980).

When considering that firm heterogeneity (productivity) is generated from a Pareto distribution, it is possible to write the price of goods produced in country i, and sold in country j in sector s, from Eq. (4), in a more convenient closed-form solution:

$$P_{ij,s} = \underbrace{\phi_{ij,s} c_{i,s}^{p}}_{Intensive\ margin} \times \underbrace{\left(\left(\frac{E_{j,s}}{c_{i,s}^{x}} \right)^{\frac{\delta_s}{1-\sigma_s}} \frac{\phi_{ij,s} c_{i,s}^{p}}{P_{j,s}} \right)^{\eta_s}}_{Extensive\ margin:Selection} \times \underbrace{\left(\frac{R_{i,s}}{c_{i,s}^{e}} \right)^{\frac{\delta_s}{1-\delta_s}}}_{Extensive\ margin:Entry} \times \xi_{ij,s}, \qquad (6)$$

where $E_{j,s}$ is the total expenditure in sector s in country j, and $R_{i,s}$ are total sales for producers of country i in sector s. To sell in country j, firms must pay exporting costs, $c_{ij,s}^{x}$. Also, there are fixed entry costs to enter in the market, $c_{i,s}^{e}$; costs of producing goods, $c_{i,s}^{p}$; and other structural parameters, $\xi_{ij,s}$.

In the set up shown in Eq. (6), the price index is determined by the market structure, which is given by the value of the following parameters:

- $\delta_s = 0 \longrightarrow$ Perfect competition (PC), i.e., intensive margin case;
- $\delta_s = 1 \longrightarrow$ Monopolistic Competition, i.e., extensive margin entry case (Krugman, 1980); and
- $\eta_s > 0 \longrightarrow$ Firm heterogeneity, i.e., extensive margin selection case (Melitz, 2003).

Model Equilibria

The model is formulated in changes following Dekle, Eaton and Kortum (2007), or the "hat algebra" methodology. More precisely, the equilibrium is formulated in changes between the initial equilibrium (with trade costs) and the counterfactual equilibrium (with lower trade cost). This equilibrium is given by solving a system of six equations (Equations 13-18 in the Online Appendix of Costinot and Rodriguez-Clare, 2014). The hat-variables that are the solution to this system of equations are solved for each country and sector. These variables are consumption $\{\hat{c}_{i,s}\}$, prices $\{\hat{P}_{i,s}\}$, share of expenditure of domestic goods on total expenditure $\{\hat{\lambda}_{ij,s}\}$, expenditure $\{\hat{E}_{i,s}\}$, income $\{\hat{Y}_i\}$, and revenues $\{\hat{R}_{i,s}\}$.[13]

As shown by the authors, the change in consumption, $\{\hat{c}_{i,s}\}$, can be expressed as a function of a few key parameters. For the perfect competition case, these are the share of domestic goods in

[13] For more details, the reader can refer to the Online Appendix of Costinot and Rodriguez-Clare (2014).

total consumption (or the degree of openness of the economy), the trade elasticity, and the preference parameters. Interestingly, all else being equal, changes in consumption move positively with the degree openness of the economy, the trade elasticity, and the elasticity of substitution in consumption. For the imperfect competition cases, in addition to these parameters, changes in consumption are also a function of scale effects (Krugman case), and extensive margin selection effects (Melitz case).

5. DATA AND CALIBRATION

The model is mainly calibrated with data for 2014-16. The calibration requires three key data inputs: trade flows of goods at the sectoral level for each country pair; data on applied tariffs and non-tariff barriers by each importer-exporter pair within the African Union at the sector level; and trade elasticities and preference parameters. For the model version with imperfect competition, information on the extensive margin selection effect is also required. These data inputs are discussed below.

Trade flows

Data on trade flows are taken from the Eora multi-region input-output database, which contains 189 countries and 26 sectors for the year 2015.[14] We aggregate all countries from the importer perspective to a common 26 sector classification. This yields an aggregate trade flow matrix of final goods. These data are also used to compute the initial values for total income, the share of each country's expenditure on goods from every sector s, total domestic expenditure, total income from each sector and country, and preference parameters.

Import tariffs

Data on applied effective tariffs come from the Global Trade Analysis Project (GTAP) Africa 2 database (2014). Bilateral tariff revenues are obtained for each pair of countries within Africa. These are then divided by actual reported imports of goods from GTAP to get the effective tariffs. The 57 sectors from GTAP are then converted into the 26 Eora sector classification. Sectors 14 to 26 from Eora are service sectors, which are considered non-tradable, and are therefore not subject to tariff or NTB reductions due to the AfCFTA.

Non-tariffs barriers

Ad valorem equivalents of NTBs are obtained from the Economic and Social Commission for Asia and the Pacific (ESCAP) and World Bank database for 2016.[15] These estimates represent

[14] The Eora database does not include Comoros, Djibouti, Equatorial Guinea, Guinea Bissau, Morocco, Libya, Tunisia, and Western Sahara. These countries are therefore not included in the model. South Sudan and Zimbabwe were also excluded from the simulations, as the Eora data for these countries appear to have some significant problems.

[15] See https://www.unescap.org/resources/escap-world-bank-trade-cost-database. We use the non-tariff version of the trade costs database. The non-tariff trade costs version of the database measures all (excluding tariff) bi-

(continued…)

bilateral trade costs of importing and are more akin to iceberg costs of trading. In our simulations, we used the ad valorem equivalent of these NTBs (or trade costs). The various NTBs are treated uniformly for simulation purposes and are equivalent to import tariffs in the model, although they feature separately in it.

The database shows large differences in NTBs across countries. We consider a scenario with an overall tariff-equivalent reduction in NTBs of 35 percent in all countries.[16] These NTB reductions are expected to be realized gradually over time. For example, in spite of the ongoing continental initiatives to improve infrastructure in Africa, sharply reducing existing gaps will take time. This would also be the case for the reduction of other NTBs.

Other parameters

As previously discussed, trade elasticities are crucial parameters to determine the welfare gains in these types of models. Table 5 provides the trade elasticity values used in each sector, which are taken from Caliendo and Parro (2015). Trade and domestic consumption are derived from the Eora database. The extensive margin selection effect parameter is taken from Costinot and Rodriguez-Clare (2014).

Table 5. Trade Elasticities

Sector	Elasticity
Agriculture	8.1
Fishing	8.1
Mining & Quarrying	15.72
Food & Beverage	2.55
Textiles & Wearing Apparel	5.56
Twood & Paper	10.83
Petroleum Chemicals & Non-metallic Mineral Products	19.53
Metal Products	4.5
Electricity & Machinery	10.6
Transport Equipment	0.69
Other	5.0

Source: Caliendo and Parro (2015).

Model solution

The system of equations is solved by using an interior point algorithm. Given assumptions on counterfactual changes in tariffs and iceberg trade costs, the model is solved numerically to evaluate changes in welfare (proxied by real consumption) associated with a particular trade liberalization scenario.

6. SIMULATION RESULTS

6.1. Welfare effects under perfect competition

Our estimates of welfare gains are based on full import-tariff elimination and a tariff-equivalent reduction in NTBs by 35 percent for the 45 AfCFTA countries included in the simulations. Given the high level of existing NTBs, the assumed reduction implies a large lowering of trade costs. We also conduct sensitivity analysis on the extent of NTB reduction, as discussed below. The baseline analysis is done using the model with a perfectly competitive market structure. The discussion of results focuses on welfare changes for the continent as a whole, but there is a large dispersion in welfare gains across countries. Other measures of welfare changes (median, simple

directional trade costs of a country. Among its elements, inter alia, are, transportation costs, NTMs, and any other transaction costs associated with trade facilitation and logistics.

[16] This would bring intra-Africa trade costs to a level broadly similar to that in South America.

(continued…)

average), and individual country details, are presented in Appendix 2. The estimates of welfare changes are for the long-run, once all the relevant adjustments have occurred.[17]

Table 6. Baseline Estimates and Sensitivity Analysis (In Percent)

	Baseline		
	A. Tariff elimination only	B. NTB reduction 35%	C. Tariff elimination and NTB reduction
Percent increase welfare SSA, weighted	0.07	2.10	2.60
Percent increase welfare Africa, weighted	0.05	1.70	2.11
Percent increase welfare Rest of the World, weighted	0.00	0.00	0.00
Percent increase welfare World, weighted	0.00	0.03	0.04

	Sensitivity analysis		
	Baseline: Tariff elimination and NTB reduction	Sensitivity 1: Tariff elimination and NTB reduction of 25%	Sensitivity 2: Tariff elimination and NTB reduction of 45%
Percent increase welfare SSA, weighted	2.60	1.22	4.65
Percent increase welfare Africa, weighted	2.11	0.97	3.83
Percent increase welfare Rest of the World, weighted	0.00	0.00	0.00
Percent increase welfare World, weighted	0.04	0.02	0.08

Source: Authors' model simulations.

The welfare effects from tariff elimination alone are very small, with an increase in welfare of 0.05 percent for the continent (0.07 percent for SSA). This is consistent with the low levels of effectively applied tariffs on intra-Africa trade, and with the fact that intra-regional trade accounts for a relatively small fraction of overall trade in the continent. In this scenario, all countries enjoy an increase in welfare, with 11 countries getting gains of 0.1 percent or more.

Reducing NTBs has much stronger effects, with an increase in welfare of 1.7 percent for the continent (2.1 percent for SSA). All countries enjoy welfare increases from the reduction in NTBs, with 8 countries getting gains of over 5 percent. The increase in welfare from combined tariff elimination and NTB reduction is 2.1 percent for the continent (2.6 percent for SSA). Again, all countries benefit in terms of welfare increases, with 9 countries getting gains of 5 percent or more.

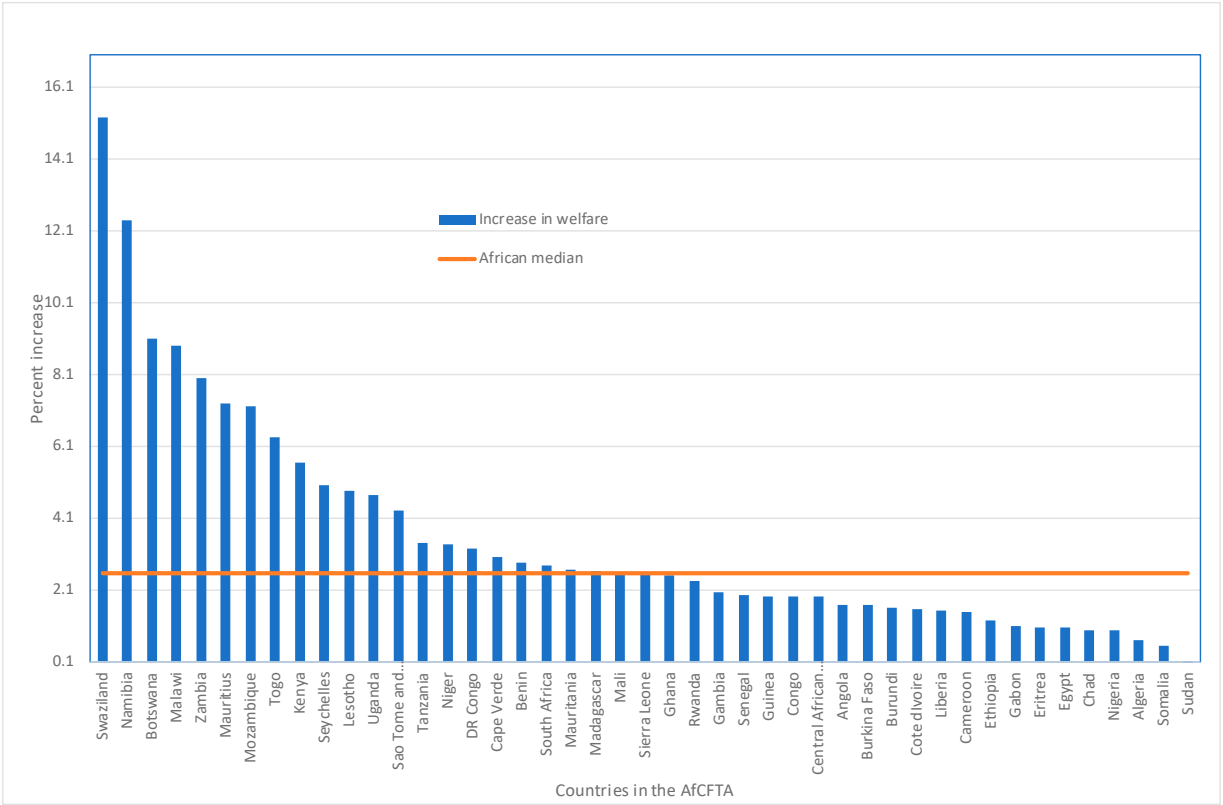
While the AfCFTA proposes to also lower NTBs, it does not target a specific level of NTB reduction. Against this backdrop, we have conducted sensitivity analysis around the NTB reduction assumed in the baseline, considering also reductions of 25 percent and 45 percent (Table 6). Results show strong non-linearity from lowering trade barriers, with welfare gains for the continent increasing to almost 4 percent (4.6 percent for SSA) from reducing NTBs by 45

[17] These are one-off effects on the level of welfare. Given the static nature of the model, transitional dynamics are not reflected in the simulations.

percent, and declining to 1 percent (1.2 percent for SSA) for an NTB reduction of 25 percent. These variations in welfare gains reflect mainly the non-linear nature of the effect of trade costs in the model (which uses highly non-linear functional forms) and, to a lesser extent, the relatively high trade elasticities used in the simulations—borrowed from the literature (Table 5).

As it is standard in general equilibrium trade models, the reduction in tariffs and NTBs impact welfare both through consumption and output by reducing distortions, and thereby improving efficiency. A feature of the model is that international prices are endogenous, allowing for changes in the terms of trade. Therefore, in addition to changes in efficiency, terms of trade movements can affect welfare, and this has a material impact on the distribution of welfare gains across countries, as discussed below.

Figure 7. Country Distribution of Welfare Gains from Tariff Elimination and NTB Reduction (In Percent)

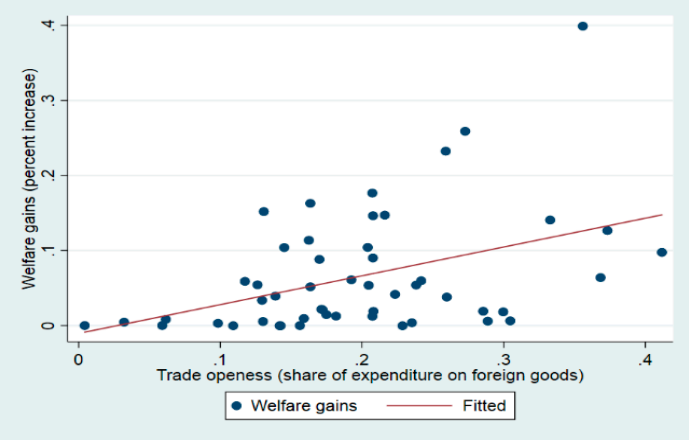


Source: Authors' model simulations.

Not all African countries would benefit equally from a reduction in trade barriers, and there is in fact considerable dispersion in welfare gains across countries (Figure 7). The largest proportional gains tend to accrue to the countries with the most open economies (Figure 8). Moreover, countries that become more open after a reduction in trade barriers, tend to have larger welfare gains. The initial level of trade restrictions plays a key role, with countries facing higher trade barriers also tending to gain more.

The strength of the initial trade ties with other African countries also matters. An economy that trades considerably with other African countries would be able to expand its market opportunities more easily than one that does not have extensive intra-African trade ties. In addition, as trade theory predicts, the smaller countries tend to benefit more from positive terms-of-trade changes resulting from lower trade barriers, which compounds welfare gains derived from increased efficiency. In contrast, larger economies generally see their terms of trade weaken in a relatively strong manner, offsetting welfare gains from improved resources allocation. Even so, by virtue of their openness or strength of trade ties with the rest of the continent, some of these economies (e.g., Kenya, Tanzania, South Africa) experience important welfare gains.

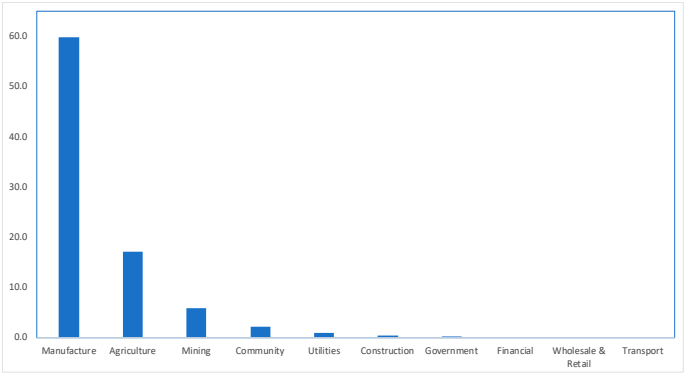
Figure 8. Trade openness and Welfare Changes (Baseline)



Source: Authors' model simulations.

From a sectoral perspective, our model simulations reveal that tradeable sectors, particularly manufacturing and agriculture, are the key drivers of estimated income changes for the vast majority countries. This is to be expected since these are sectors that have a reduction in trade barriers in our simulations, with no trade liberalization taking place for services. Over 60 percent of the increase in overall income comes from higher manufacturing output, while the agricultural sector contributes about 16 percent to the overall increase in income (Figure 9). The other sectors, which are primarily non-traded, make a much smaller contribution to potential welfare changes, but they all expand.

Figure 9. Sectoral Contributions to Income Changes—Combined Scenario (Baseline) (In Percent)



Source: Authors' model simulations.

6.2 Welfare gains under imperfect competition and other model extensions

We consider the same level of reduction in trade barriers as above (full tariff elimination and 35 percent reduction in NTBs) for imperfect competition market structures (Krugman and Melitz cases). Estimated welfare gains under imperfect competition are lower than in the baseline for most countries (Appendix Table 2, and Table 7). This is partly because under imperfect competition, with prices not being equal to marginal costs, from the theory of second best, a reduction in import tariffs does not necessarily raise welfare, regardless of the presence of terms-of-trade effects.[18] The results also suggest that for most African countries, overall scale effects are not very strong. This reflects the fact that countries do not always have a comparative advantage in sectors with strong returns to scale (Costinot and Rodriguez-Clare, 2014).

For the continent as a whole, the size of welfare gains—in the scenario that includes both tariff removal and NTB reduction—are similar to that under perfect competition. In particular, welfare for the continent increases by 1.9 percent, compared to 2.1 percent under perfect competition. As in the perfectly competitive case, welfare increases for all countries from reducing NTBs under imperfect competition. Importantly, due to scale effects, some larger economies (e.g., South Africa, Nigeria) gain more from NTB reduction under the imperfect competition framework—especially under the Krugman model—compared to the baseline.

We have also extended the perfect and monopolistic competition models to incorporate intermediate goods and input-output linkages. Consistent with findings in the literature (Costinot and Rodriguez-Clare, 2014; Caliendo and Parro, 2015), results (not reported) suggest that welfare gains under this specification would be higher under both market structures. This is due to the fact that lower trade barriers allow firms to import more intermediate goods to produce final goods at a lower cost and expand product margins and varieties.

Table 7. Welfare Changes Under Imperfect Competition
(In Percent)

	A. Tariff elimination only		B. NTB reduction 35%		C. Tariff elimination and NTB reduction	
Regions	Increase Welfare (MC), percent	Increase Welfare (MLZ), percent	Increase Welfare (MC), percent	Increase Welfare (MLZ), percent	Increase Welfare (MC), percent	Increase Welfare (MLZ), percent
Weighted SSA	0.06	0.05	2.00	1.50	2.48	2.41
Weighted Africa	0.05	0.04	1.54	1.20	1.92	1.89
Weighted Rest of World	0.00	0.00	0.01	0.01	0.01	0.01
Weighted World	0.00	0.00	0.04	0.03	0.05	0.05

Source: Authors' model simulations.
Note: MC denotes the monopolistic competition (Krugman) case, and MLZ the Melitz case.

6.3. Effects on trade flows and tax revenue

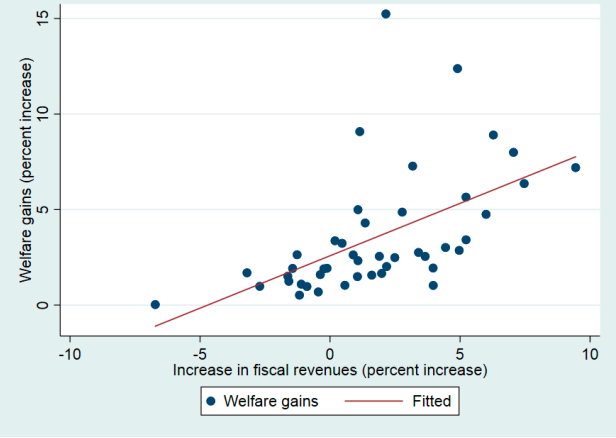
Intraregional trade is expected to expand by about 82 percent in the baseline scenario (perfect competition) and by 78 percent respectively under imperfect competition. But as the initial level of these trade flows is modest, overall trade in the continent would increase only by about 8.4

[18] The theory of the second best (Lipsey and Lancaster, 1956) contends that, when there is more than one distortion in an economy, reducing or eliminating one distortion does not necessarily increase welfare.

percent, and 7.6 percent, respectively under the two scenarios. The results, however, vary considerably across countries, with countries facing initially higher trade barriers generally experiencing larger expansions in trade flows.

Estimated revenue losses for the continent from the elimination of import tariffs in the baseline model amount to 0.03 percent of GDP. This result reflects the low level of effectively applied tariffs in Africa, and the low share of overall imports subject to such tariffs. Once NTB reduction is also taken into account, tax revenue increases for virtually all countries, as the modest revenue losses from import tariff removal are more than offset by increases in overall revenues due to higher consumption and income. In this scenario, revenue increases tend to be proportional to welfare gains, and feature relatively large differences across countries (Figure 10).

Figure 10. Welfare and Fiscal Revenues (Baseline)
(In percent)



Source: Authors' model simulations.

6.4 Effects on non-AfCFTA members

In all cases considered, the world as a whole is better off with the AfCFTA, implying that the AfCFTA increases efficiency at the global level. This positive result is present across all the market structures (Appendix 2).

However, the distribution of the AfCFTA welfare effects across world regions differs. A disaggregation of global welfare effects under the perfectly competitive market structure points to welfare losses in some regions, although these tend to be very small. This is consistent with findings in traditional general equilibrium models (i.e., with perfectly competitive markets) that simulate the effects of preferential trade agreements, which typically find small welfare losses for countries outside the agreements, mainly because of trade diversion effects. These effects would be dampened by terms-of-trade gains by regions outside the agreement, whose trade barriers are assumed to remain unchanged in the model simulations. In the combined tariff and NTB reduction case in the baseline, all regions outside Africa lose, with South Asia, Central Asia, Europe, and the Middle East being the primary losers (Appendix 2).

The models with imperfect competition, however, reveal welfare gains for these regions, but these are only a tiny fraction of those experienced by African countries—which is not surprising, since they are the ones reducing trade barriers. Welfare gains for the other regions seem to be the result of scale effects (activated by increased imports from AfCFTA countries, whose income rises), which would dominate traditional trade diversion effects.

7. RELATION TO OTHER STUDIES

Our research is related to several studies based on traditional computable general equilibrium (CGE) models.[19] These are more detailed models that typically assume perfectly competitive markets; some of these studies (e.g., Chauvin) use dynamic CGE models that identify the transition to the new equilibrium. In these studies, long-run welfare gains from the AfCFTA due to the elimination of intra-Africa tariffs are found to be within the range of 0.1 to 0.5 percent. Once reductions in NTBs are considered, long-run welfare gains increase by 1.3 to 2.2 percent. These estimates are broadly in line with ours, but there are some differences. These might be due to the different model structures used, as well as to differences in the data used to calibrate the models.

The existing literature reports considerably lower growth in intra-regional trade from the reduction in trade barriers in the context of the AfCTA. The expansion of intra-regional trade reported in these studies ranges from 33 to 52 percent (compared to the roughly 80 percent growth we find). Overall trade growth is therefore substantially lower. In this case, the difference in findings appear to be more related to the model structures used. Comparisons for the North American Free Trade Agreement (NAFTA) also show that traditional CGE models generate significantly lower trade growth from reducing trade barriers, with newer models seemingly performing better (Costinot and Rodriguez-Clare, 2014).

On the fiscal revenue impact, existing CGE studies have found that the AfCFTA would generate tax revenue losses in the range of 0.14 to 0.22 percent of GDP for the continent as whole. These estimates are larger than ours, although absolute differences are not substantial.

8. CONCLUSION AND POLICY IMPLICATIONS

Conclusion

The AfCFTA trade liberalization agenda is ambitious and far reaching. Our paper has quantified some of these proposals using a general equilibrium model and provides several insights. First, the estimated welfare gains for Africa from adopting the AfCFTA are significant under the various scenarios of reduction in trade barriers considered, with most gains coming from the reduction in NTBs. These gains could rise substantially with a greater reduction in NTBs. Given the static nature of the model, the reduction of NTBs in the simulations is done on a one-off basis. In practice, however, lowering NTBs will entail a process and will likely take place gradually, especially large reductions in transport costs—which will require substantial investments. Second, the size of the potential gains in allocative efficiency that member countries are likely to gain from the AfCFTA depend critically on openness, the initial level of trade barriers, and the strength of initial intra-African trade ties. Because smaller countries tend to be very open and benefit from terms of trade changes, a good number of them experience

[19] See Mevel and Karingi (2012); Jensen and Sandrey (2015); Chauvin, et al. (2016); Saygili et al. (2018); and Vanzetti et. al., (2018).

large welfare gains. Third, for almost all countries, manufacturing and agriculture are the largest contributors to estimated income gains. Fourth, for most countries, under monopolistic market structures, gains from the introduction of the AfCFTA are lower than in the perfectly competitive market structure, suggesting that overall scale effects are not strong for most African countries. Fifth, our simulations suggest that the AfCFTA would be good for global welfare, although—as expected—some regions outside Africa would experience very small welfare losses.

Policy Implications

There are several policy implications of these results that should be considered to realize the full potential welfare benefits of the provisions contained in the AfCFTA. These include:

AfCFTA members should adopt a well-articulated and phased program for reducing all NTBs to the maximum extent feasible. Our simulations assume partial, albeit significant, elimination of NTBs, and there is much to be gained from further reduction in these barriers. The NTB reduction program should include addressing a broader array of barriers that hinder trade, including infrastructure gaps, and an improvement in the business environment in Africa. The quality of ports, air transportation, and other measures of infrastructure where efficiency is relatively low in Africa compared with other regions, need to be addressed. The reduction in ground transportation costs is especially critical to encouraging intraregional trade, given the geographic configuration of the continent. Other areas, such as customs efficiency and other administrative procedures required for international trade, also need an overhaul to improve efficiency. In addition, creating an enabling business environment would be particularly relevant to facilitate intraregional trade. In this area, the reduction in the cost and time necessary to create new businesses is important. Finally, concerted efforts are required to increase financial depth and inclusion in Africa to bring it on par with other regions, as well as promoting access to trade financing or bank funding to create or expand businesses. It is expected that all these efforts and initiatives will help to promote the AfCFTA agenda.

AfCFTA members should limit the extent and scope of carve outs for tariff reductions. This a very relevant consideration since the AfCFTA proposes to liberalize only 90 percent of the tariff lines. Intra-African trade is concentrated in a few products, and much of it is already tariff-free, being concentrated in the existing free-trade areas. If a substantial portion of the remaining trade is contained in the remaining 10 percent of tariff lines, the potential welfare benefits of the AfCFTA would be reduced, especially if potentially exempted sectors are the most protected. To fully realize welfare benefits from the AfCFTA, member countries need to liberalize 100 percent of the tariff lines, even if this is completed in a phased manner over the medium term.

In the long run, to fully leverage the economic opportunities of the AfCFTA, policy makers would need to adopt supporting policies to encourage structural transformation. In particular, countries will need to lower their dependence on commodities and move up the value chain. Policies to encourage structural transformation could include training programs for workers to ensure a smooth reallocation of labor and capital to sectors that are more likely to grow, such as manufacturing. It is only in this way that the continent would be able to use the AfCFTA as a mechanism to claim its place in the global value chain.

Finally, there are at least three areas in which the analysis presented in this paper could be extended in future work. First, the model is static, so it is unable to provide guidance on the potential dynamic supply-side responses to the AfCFTA, such as increased private and public investment. As mentioned above, a significant reduction in infrastructure gaps will require substantial public investment. The effects of this could be modeled more thoroughly in a dynamic setting that allows comparison of costs and benefits from it, including those resulting from lower trade costs. A dynamic model could also take account of higher foreign direct investment flows into the region in response to the increase in unified market size derived from the agreement. These responses would further raise the welfare and income gains from the AfCFTA. Second, while the model considers the distribution of income or welfare changes across countries, it focuses on economy-wide changes at the national level, and does not consider domestic income distribution effects. These effects can be economically and socially important and deserve to be examined, and adequate responses to them provided. Third, work can be extended to capture some specific characteristics of African economies, including a broad coverage of the informal economy and informal trade between countries, as well as imperfect factor mobility across sectors.

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Appendix 1: List of Countries That Are Signatories to AfCFTA

	Signed Treaty	Ratified Treaty[1]
Algeria	√	
Angola	√	
Benin	√	
Botswana	√	
Burkina Faso	√	
Burundi	√	
Cameroon	√	
Cape Verde	√	
Central African Republic	√	
Chad	√	1/7/2018
Comoros	√	
Congo, Republic	√	12/2/2019
Cote d' Ivoire	√	16/12/2018
Democratic Republic of Congo	√	
Djibouti	√	19/2/2019
Egypt	√	8/4/2019
Equatorial Guinea	√	
eSwatini	√	1/7/2018
Ethiopia	√	10/4/2019
Gabon	√	
Ghana	√	10/5/2018
Guinea	√	1/7/2018
Guinea Bissau	√	
Kenya	√	10/5/2018
Lesotho	√	
Liberia	√	
Libya	√	
Madagascar	√	
Malawi	√	
Mali	√	19/2/2019
Mauritania	√	11/2/2019
Mauritius	√	
Morocco	√	
Mozambique	√	
Namibia	√	19/2/2019
Niger	√	8/6/2018
Republic of Saharawi	√	29/4/2019
Rwanda	√	26/5/2018
São Tomé and Principe	√	
Senegal	√	April, 2019
Seychelles	√	
Sierra Leone	√	29/4/2019
Somalia	√	
South Africa	√	12/2/2019
South Sudan	√	
Sudan	√	
The Gambia	√	16/4/2019
Togo	√	April, 2019
Tunisia	√	
Uganda	√	28/11/2018
Zambia	√	
Zimbabwe	√	Approved
Totals	52	23

[1] Date on which the AFCFTA instrument of ratification was deposited with the African Union Commission (AUC) Chairperson. Approved in this column indicates that ratification has been approved by Parliament/Cabinet/National Assembly, but not yet deposited with the AU.

Sources: African Union webpage, https://au.int/.../list-african-countries-signed-establisment-african-continental-free-trade-agreement; Tralac webpage, https://www.tralac.org/resources/infographics/13795-status-of-afcfta-ratification.html.

Appendix 2. Welfare Gains for Individual Countries

	A. Tariff elimination only			B. NTB reduction 35%			C. Tariff elimination and NTB reduction		
Country	Increase Welfare (PC), percent	Increase Welfare (MC), percent	Increase Welfare (MLZ), percent	Increase Welfare (PC), percent	Increase Welfare (MC), percent	Increase Welfare (MLZ), percent	Increase Welfare (PC), percent	Increase Welfare (MC), percent	Increase Welfare (MLZ), percent
Algeria	0.006	0.004	0.003	0.489	0.547	0.546	0.692	0.880	0.765
Angola	0.060	0.007	-0.010	1.337	1.534	0.719	1.693	2.010	2.058
Benin	0.152	0.074	0.064	2.351	2.278	1.329	2.865	2.909	2.238
Botswana	0.054	0.029	0.030	7.762	8.086	5.549	9.082	9.143	8.844
Burkina Faso	0.054	0.032	0.019	1.290	1.670	1.041	1.661	2.257	1.939
Burundi	0.009	0.036	0.021	1.218	1.284	1.172	1.597	1.765	1.540
Cameroon	0.021	0.040	0.034	1.149	1.123	1.318	1.495	1.671	1.599
Cape Verde	0.177	0.254	0.243	2.431	0.912	0.803	3.017	2.463	1.167
Central African Republic	0.022	0.034	0.023	1.456	1.294	1.598	1.901	1.560	1.689
Chad	0.003	0.029	0.026	0.676	1.112	1.137	0.983	1.683	1.764
Congo	0.019	0.019	0.004	1.466	1.561	1.050	1.922	2.120	2.042
Cote dIvoire	0.019	0.064	0.056	1.218	0.937	0.985	1.570	1.279	1.278
DR Congo	0.088	0.013	-0.021	2.638	2.658	2.085	3.235	3.370	3.971
Egypt	0.015	0.003	0.002	0.836	0.261	0.446	1.031	0.186	0.431
Eritrea	0.005	0.028	0.023	0.741	0.983	0.843	1.038	1.210	0.686
Ethiopia	0.008	0.023	0.020	0.889	1.253	1.410	1.249	1.587	1.475
Gabon	0.013	0.014	0.007	0.790	0.675	0.661	1.096	0.684	0.765
Gambia	0.039	0.060	0.056	1.563	1.134	1.303	2.021	2.145	1.444
Ghana	0.054	0.055	0.055	1.952	1.956	1.622	2.487	2.443	2.373
Guinea	0.018	0.030	0.018	1.488	1.589	1.173	1.928	2.111	1.840
Kenya	0.146	0.116	0.076	4.673	2.075	2.318	5.653	2.619	2.985
Lesotho	0.061	0.026	0.024	4.024	1.609	3.245	4.868	1.883	1.962
Liberia	0.006	0.107	0.117	1.162	0.957	1.185	1.513	1.100	1.110
Madagascar	0.004	-0.148	-0.117	2.024	2.424	1.398	2.630	2.478	2.400
Malawi	0.232	0.116	0.014	7.364	5.006	4.345	8.906	5.899	5.507
Mali	0.059	0.033	0.018	1.981	2.339	1.726	2.554	2.714	2.612
Mauritania	0.038	0.173	0.147	1.991	0.161	0.306	2.638	2.688	0.663
Mauritius	0.127	0.141	0.128	6.001	4.918	3.243	7.276	5.751	5.699
Mozambique	0.163	0.053	0.005	6.176	4.187	2.425	7.198	5.204	5.154
Namibia	0.399	0.203	0.204	10.943	9.187	6.611	12.382	9.097	9.589
Niger	0.090	0.068	0.042	2.681	2.320	2.496	3.368	2.562	2.583
Nigeria	0.012	0.006	0.004	0.742	0.881	0.720	0.974	1.206	1.138
Rwanda	0.034	0.031	0.006	1.866	2.198	2.145	2.326	2.796	2.602
Sao Tome and Principe	0.064	0.088	0.089	3.393	2.068	1.987	4.300	2.613	2.341
Senegal	0.114	0.061	0.066	1.587	0.668	0.646	1.942	1.250	0.756
Seychelles	0.141	0.273	0.232	4.037	3.780	2.042	4.995	4.856	5.235
Sierra Leone	0.042	0.046	0.034	2.076	1.368	1.617	2.551	2.152	1.836
Somalia	0.005	0.004	0.003	0.374	0.347	0.295	0.523	0.490	0.451
South Africa	0.104	0.135	0.122	2.210	2.384	1.743	2.757	2.941	2.733
Sudan	0.000	0.001	0.001	0.016	0.042	0.041	0.029	0.068	0.067
Swaziland	0.098	-0.262	-0.277	13.394	10.161	8.010	15.242	11.486	11.095
Togo	0.147	0.273	0.241	5.492	3.674	2.946	6.362	3.960	3.925
Uganda	0.104	0.089	0.081	3.783	2.204	2.402	4.751	2.993	2.937
Tanzania	0.052	0.041	0.037	2.851	2.911	1.292	3.420	3.184	3.441
Zambia	0.259	0.247	0.094	6.802	4.876	2.926	7.995	5.581	5.314
Average SSA	0.082	0.065	0.048	3.192	2.606	2.082	3.870	3.168	3.042
Median SSA	0.057	0.044	0.032	2.050	2.012	1.607	2.592	2.471	2.289
Average Weighted SSA	0.070	0.063	0.049	2.102	1.997	1.496	2.599	2.477	2.408
Average Africa	0.074	0.062	0.046	2.920	2.346	1.887	3.549	2.912	2.756
Median Africa	0.054	0.040	0.026	1.981	1.609	1.398	2.551	2.443	2.042
Average Weighted Africa	0.053	0.047	0.037	1.697	1.541	1.204	2.107	1.918	1.886
East Asia and Pacific	0.0000	0.0002	0.0002	-0.001	0.006	0.004	-0.002	0.006	0.007
Europe and Central Asia	-0.0002	0.0011	0.0014	-0.006	0.013	0.011	-0.007	0.013	0.017
LATAM and Caribbean	-0.0003	0.0008	0.0007	-0.002	0.005	0.003	-0.002	0.004	0.006
Middle East	-0.0003	0.0009	0.0009	-0.005	0.017	0.010	-0.006	0.018	0.018
North America	-0.0001	0.0001	0.0003	-0.002	0.005	0.005	-0.002	0.006	0.007
South Asia	-0.0003	-0.0009	-0.0009	-0.005	0.005	0.008	-0.006	0.005	0.007
Average Rest of World	0.000	0.000	0.000	-0.004	0.008	0.007	-0.004	0.009	0.010
Median Rest of World	0.000	0.000	0.001	-0.004	0.006	0.007	-0.004	0.006	0.007
Average Weighted RoW	0.000	0.000	0.001	-0.003	0.008	0.007	-0.004	0.008	0.010
Average World	0.065	0.054	0.041	2.576	2.071	1.665	3.131	2.571	2.433
Median World	0.039	0.033	0.023	1.587	1.534	1.303	2.021	2.145	1.840
Average Weighted World	0.001	0.002	0.001	0.034	0.042	0.033	0.043	0.051	0.052

Note: PC denotes the perfect competitive case. MC denotes the monopolistic competition case (Krugman). MLZ denotes the Melitz case.
Source: Authors' model simulations.