



COMMON MARKET FOR EASTERN AND SOUTHERN  
AFRICA

Modelling COMESA's Exports into the  
AfCFTA by Product Sectors: A partial  
equilibrium analysis

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## i. Acronyms

AfCFTA: The African Continental Free Trade Area

COMESA: The Common Market for Eastern and Southern Africa

COMTRADE: pseudonym for United Nations International Trade Statistics  
Database

SADC: Southern African Development Community

SITC: Standard International Trade Classification

TRAINS: Trade Analysis Information System

WITS: World Integrated Trade Solution

## ii. Abstract

This paper uses the partial equilibrium analysis model to analyse the trade effects arising from liberalization of trade in the African Continental Free Trade Area (AfCFTA) on exports from the Common Market for Eastern and Southern Africa (COMESA) classified by technology sectors. The paper also discusses provisions aimed at supporting lesser-developed economies in the AfCFTA to develop technology intense sectors. Liberalization of trade in the AfCFTA will be beneficial for COMESA. Exports from COMESA into Africa will increase due to removal of barriers in intra-Africa trade. The removed barriers will also divert considerable trade from world exports destined to Africa to the benefit of COMESA. Exports from COMESA will shift the proportions away from the dominance of primary products to products with higher technology intensity. Loss of revenue and predominance of low-income economies in COMESA and in Africa at large necessitates the need for special and differential treatment as a crucial part of the AfCFTA. COMESA should take the lead to propose amendment of article 6 of the Protocol on Goods in the AfCFTA on special and differential treatment (SDT) to include a focal point within the AfCFTA framework mandated with oversight over implementation of the SDT provisions. Adoption of special and differential treatment provisions should avoid the pitfall of relying on the precondition based on the graduation of economies but rather focus towards sectors of specific interest to lesser-developed members.

# 1. Introduction

A core benefit of regional trade agreements is the reduction of trade barriers. This acts as a catalyst for increased trade and subsequent growth as member states have easier access to the expanded local market and foreign markets. The export share of intra-African exports over Africa's global exports in 2018 was at 15%. In comparison, other continental areas in Europe, Asia and the America's achieved 69%, 55% and 54% respectively (ITC Trademap database, author's calculations). Africa's level of integration is certainly minimal. Africa has responded to this challenge by seeking to liberalize trade and to deepen integration to create more trade opportunities under the African Continental Free Trade Area Agreement (AfCFTA). The agreement incorporates 8 regional trade blocs in Africa including COMESA as building blocks.

In 2018, the Common Market for Eastern and Southern Africa (COMESA) globally exported goods worth 17 billion US dollars out of which a proportion of 14% was intra-Africa trade. This was below the likes of East African Community (EAC), Intergovernmental Authority on Development (IGAD), Southern African Development Community (SADC) and Economic Community of West African States (ECOWAS) at 41%, 24%, 21% and 15% respectively (ITC Trademap database, author's calculations). The export share index denotes how poorly COMESA has integrated so far into the African community. COMESA's major trading partner in African exports was South Africa accounting for 15% of African exports.

Economic development is mostly homogeneous across Africa with 23 countries on Low-income level, 23 on Lower middle income, 6 on Upper middle income while 2 are High income countries (World Bank, 2020). COMESA countries also share

homogenous levels economic development as depicted in the latest classification of economies by the World Bank with the majority of countries in the lower and middle-income category. Out of the 21 member states for COMESA, 10 countries are Low income, 8 are Lower middle income, one is Upper middle income and 2 are High income (ibid).

This paper rallies the theme from COMESA's Annual Report for 2015 (COMESA, 2016) calling for Inclusive and Sustainable Industrialisation that requires promotion of investments that will upgrade COMESA's technological and industrial base as a foundation for innovative economies for the region to leap frog and skip some stages of development

## 1.1. Background

The African Continental Free Trade Area (AfCFTA) is one of the flagship projects of the First Ten Year Implementation Plan under the African Union Agenda 2063 – The Africa We Want. Phase 1 of the AfCFTA negotiations has covered areas of Trade in Goods and Trade in Services. Phase 2 will cover areas of Investment, Intellectual Property Rights and Competition Policy. The agreement was signed at the 10th Extraordinary Summit of the AU Assembly on 21 March 2018 in Kigali, Rwanda and the signatories comprise 53 countries out of the 54 member states of the African Union excluding Eritrea (African Union, 2018) (Tralac, 2019).

In the negotiations leading to the formation of the AfCFTA, the third Meeting of the African Union Ministers for Trade (AMOT) which was held in Niamey, Niger, decided on the modalities for the liberalization of trade in goods and for trade in services. The AMOT agreed on an ambitious target of 90% for tariff liberalization, which takes into

account the overall goal of an integrated continent. At the same time, the adopted modalities provide sufficient flexibilities and length of time for some countries to adjust and implement their significant commitments termed special and differential treatment. Subsequently, during the signing of the AfCFTA agreement in the 10th Extraordinary Session of the African Union Heads of State and Government, held on 21st March 2018 in Kigali, Rwanda the Protocol on Trade in Goods was one of the four adopted protocols into the AfCFTA (African Union, 2018).

The Protocol on Trade in Goods of the AfCFTA consists of a framework of general obligations and nine Annexes as well as provision for national schedules of tariff concessions yet to be negotiated further. Article 7 of the AfCFTA on elimination of tariffs is preconditioned on goods expressed in article 7.1 that state parties shall progressively eliminate tariffs on goods from other member states. Members express their commitments in schedules of tariff concessions. These provisions are aimed at stimulating investment and market access by ensuring tariff-only protection and tariff reduction commitments, products are specified by the members in their schedule of commitments. Unlike the market access provisions, article 6 on special and differential treatment provisions under the AfCFTA takes a different approach and is preconditioned on the contrast existing between developed and lesser developed member states i.e. graduation of economies. The article does not specify a focal committee with oversight over this clause.

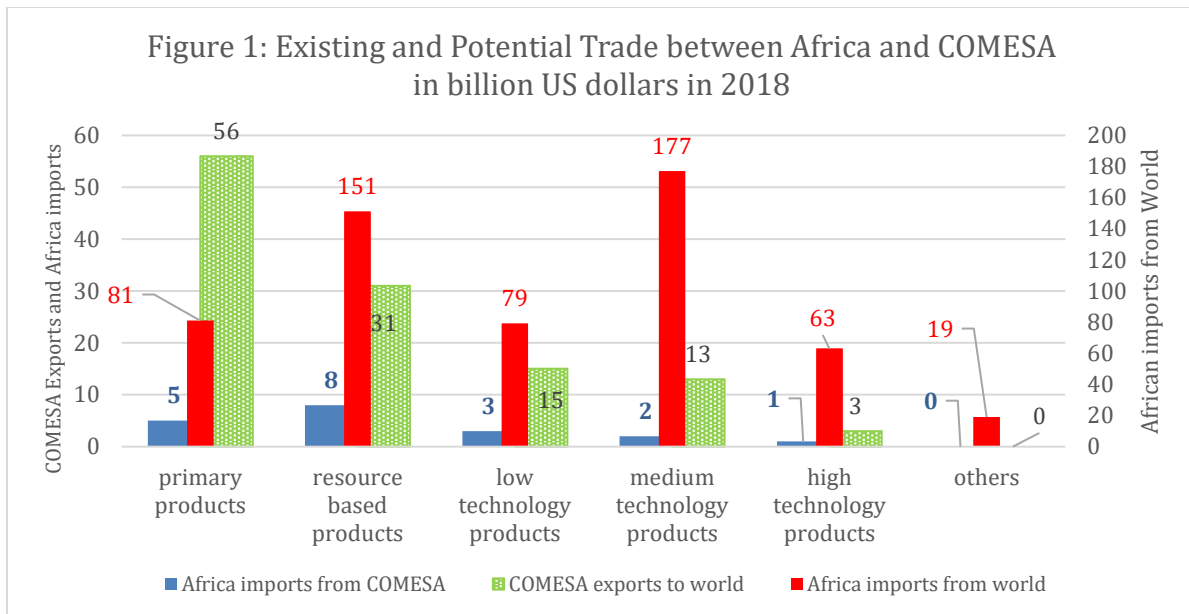
At the multilateral level, the General Agreement on Tariffs and Trade of 1994 (GATT 1994) has inspired the AfCFTA agreement and takes precedence in several of the AfCFTA provisions. Article II on schedules of concessions is preconditioned on trade in goods and article XXVIII *bis* of the GATT 1994 allows members to re-negotiate reduction of tariffs also preconditioned on trade in goods. Flexibilities in the GATT

1994 take a robust approach incorporating up to 25 SDT clauses contained in Articles XVIII, XXXVI, XXXVII and XXXVIII of the GATT 1994. A handful of these agreements are preconditioned on specific goods of interest to developing countries i.e. The Agreement on Agriculture, the Anti-Dumping Agreement, Agreement on Subsidies and Countervailing Measures, Agreement on Safeguards, the TBT Agreement and the SPS Agreement. The Doha ministerial declaration of 2001 mandates the Committee on Trade and Development (CTD) of the World Trade Organisation (WTO) with oversight over the SDT provisions (WTO, 2020).

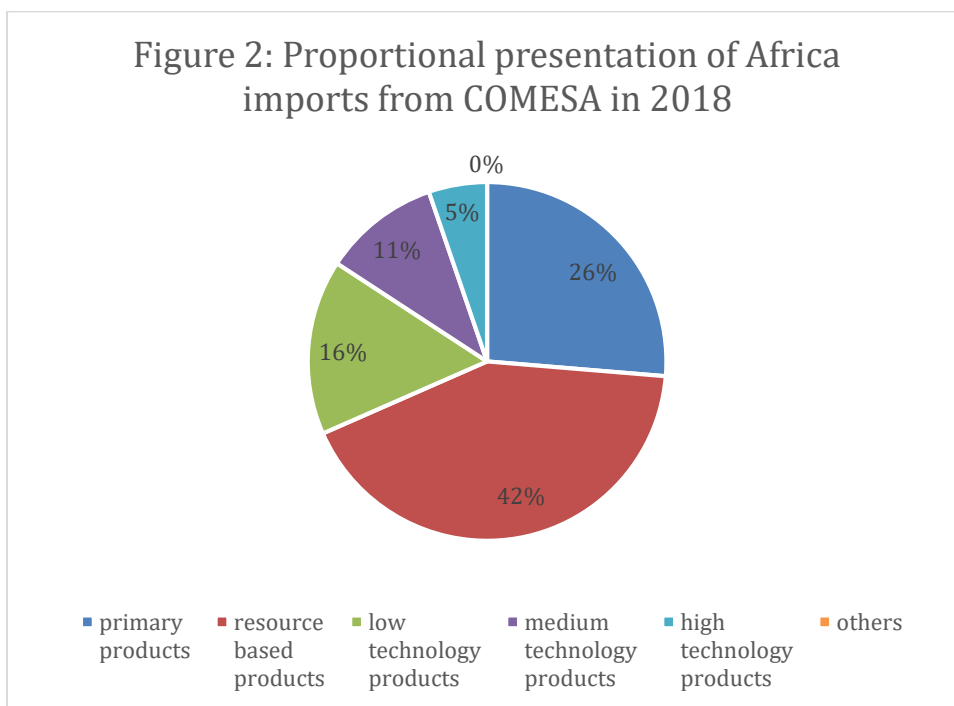
The COMESA treaty (COMESA, 2020) does not provide for market access and schedule of concessions. However, in chapter 22 of the COMESA treaty on Least Developed Countries and Economically Depressed Areas, the provision for ailing sectors in the liberalization process is directed towards products and takes a robust approach. Article 144 is aimed at export oriented sectors, article 145 aims at infrastructure, article 146 aims at the industrial and energy sector, article 147 aims at agriculture and agro-industry sector and article 148 aims at services. The provisions are under the oversight of the COMESA Fund Ministers committee.

Africa presents a potential market for all of COMESA's exports across all sectors as depicted in table figure 1 showing import values for Africa and export values for COMESA for 2018. Removing existing barriers would facilitate growth in products with increasing technology content.





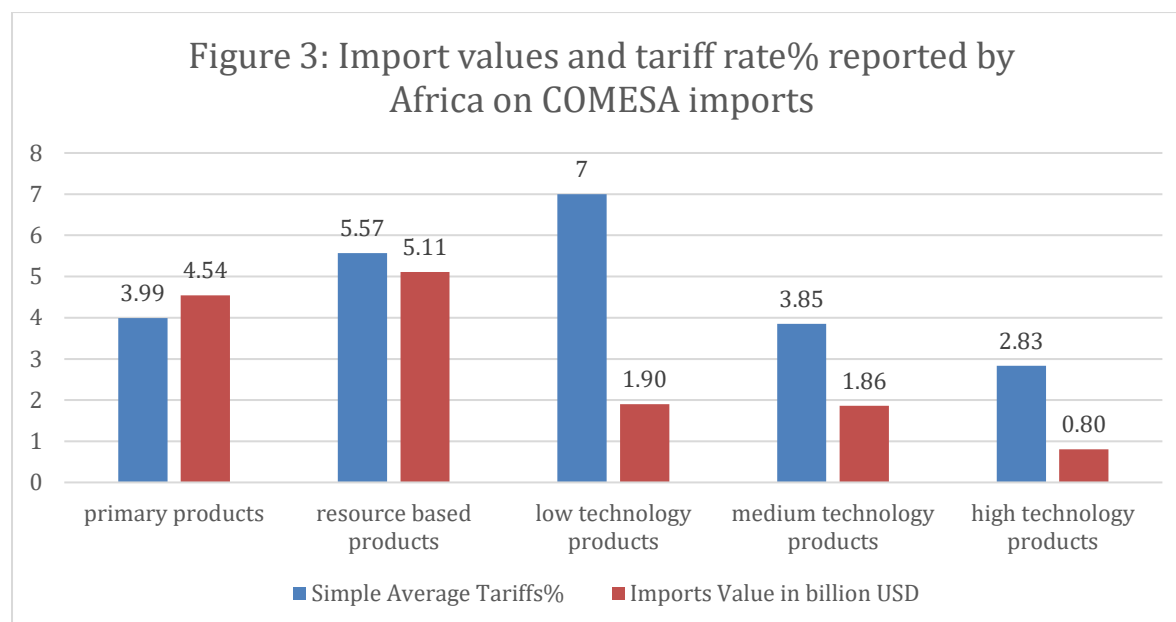
Data sourced from Trademap database, author's calculations



Data sourced from Trademap database, author's calculations

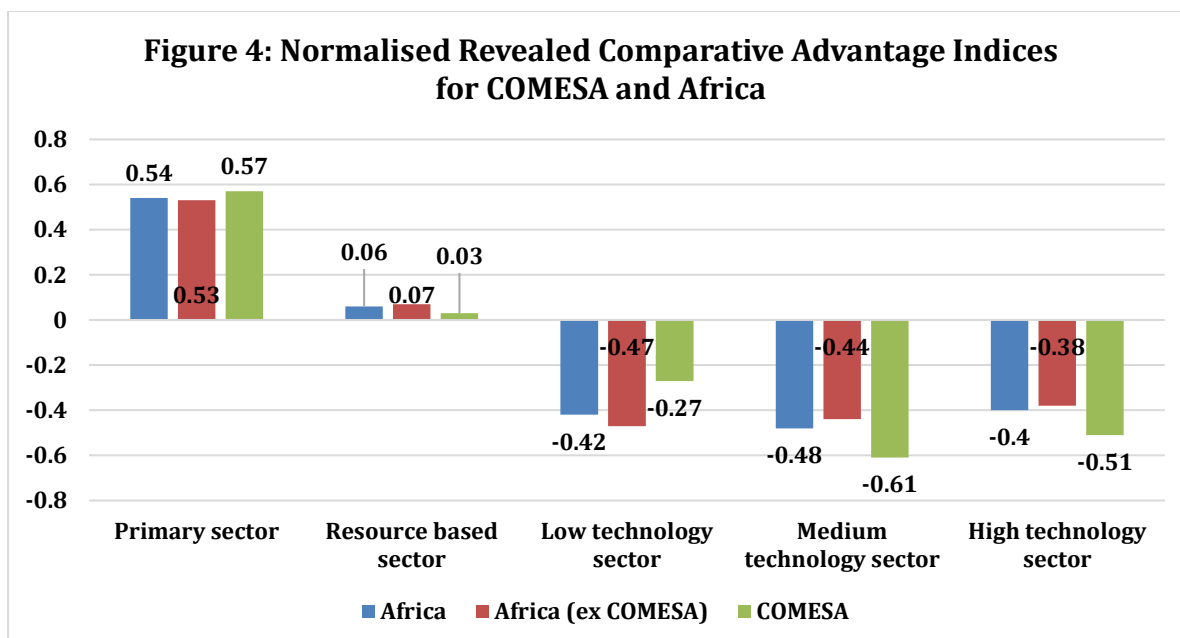
The sectoral proportions of COMESA exports in 2018 profiled according to technological concentration i.e. primary, resource based, low technology, medium

technology and high technology products was 26%, 42%, 16%, 11% and 5% respectively (Trademap database). As the technology concentration in products increases the simple average tariff faced by each successive sector of COMESA exports is also seen to escalate as particularly from primary through resource based to low technology products.



In comparison to the rest of Africa, COMESA relatively has a revealed comparative advantage in the primary products sector and the low technology sector against Africa at large. Despite having a revealed comparative advantage in low technology products in comparison to the rest of Africa, COMESA has not translated this advantage into exports. At global level, Africa, including COMESA, demonstrate no comparative advantage at all in low technology, medium technology and high technology products, while COMESA relatively has an advantage in low technology products.

Table X: The Normalised Revealed Comparative Advantage index in Technology Sectors between COMESA and the Rest of Africa (HS 2012, WITS database)



Note: 2018 global imports mirrored as exports.

## 1.2. Aim and Objectives

This aim of this paper is to explore how COMESA’s product exports presented as technological sectors will benefit from liberalization in the AfCFTA and how the AfCFTA agreement provides support for weak performing sectors. To answer these questions, we will:

- a) Analyse the trade effects arising from liberalization of trade in the AfCFTA on COMESA’s exported goods to Africa classified by technology sectors.
- b) Discuss the provisions aimed at supporting lesser-developed economies to develop technology intense sectors in the AfCFTA.

## 2. Literature review

### 2.1. Theoretical review

Balassa (2013) notes that the creation of a preferential trade agreement creates dynamic and static benefits. Static benefits accrue to member countries as trade creation and negatively impact on nonmember countries as trade diversion. Dynamic benefits of trade agreements are long term benefits to the economy emanating from economies of scale; externalities like enlarged skill pool, specialization and innovation; competitive market structures and; elimination of risks and uncertainties (ibid). According to the WITS (2011) Trade creation is defined as the direct increase in imports following a reduction on the tariff imposed on goods from exporting country by home country. A related static effect, Trade Diversion, will arise when the tariff reduction on goods from the trading partner country is a preferential tariff reduction i.e. it does not apply to other countries other than the trading partner. The preferential tariff reduction will cause imports of the tariff reduced goods from exporting partner country to further increase due to substitution of affected goods away from imports of similar goods from other countries that becomes relatively more expensive.

International trade theory states that gains from trade come from specialization in a country's comparative advantage (i.e., sectors in which a country produces relatively more efficiently than in other sectors). The revealed comparative advantage (RCA) index (Balassa, 1965) is defined as the ratio of a country's share of the commodity in the country's total exports to the share of world exports of the commodity in total world exports. Yu et al (2009) have proposed the normalized revealed comparative advantage (NRCA) index as alternative to other traditional measures with the

advantage that it is comparable across commodities, countries and time. When the  $NRCA > 0$ , the country's export from the commodity is greater than the natural point of its comparative advantage. On the other hand, where  $NRCA < 0$ , the country has no comparative advantage. Redding (1999) opines that selective intervention based on specialization may be welfare improving, both for the economy undertaking it, and for its trade partner. For firms based in the primary sectors in developing countries, exporting becomes a source of information, competitive motivation and productivity advantages (Krugman 1980, Bernard et al. 2003, Martins and Yang, 2009).

Laird and Yeats (1986) introduced the simulation of trade creation and trade diversion effects of free trade agreements using the World Integrated Trade Solution, Software for Market Analysis and Restrictions on Trade (WITS-SMART) simulation model. Cheong (2010) notes that the advantage of using SMART is that analysis can be performed at the most disaggregated level of trade data. This aspect has allowed us to reconfigure HS values at the 6-digit level into technology sectors proposed by Lall (2000).

The partial equilibrium analysis of the impact of trade agreements makes use of three different elasticities to measure the responsiveness of trade flows to policy changes i.e. an import demand elasticity, the Armington substitution elasticity and an export supply elasticity (WITS, 2011). First the import demand elasticity influences how much of each product relative to other products are purchased from various countries. Second, the Armington substitution elasticity influences how much of the product is imported from each of the exporting countries. The import demand elasticity and the Armington substitution elasticity are both demand side elasticities. Export supply elasticity is the third type of elasticity we use in this paper. Export supply of a given

good (say banana) by a given country supplier (say Kenya) is assumed to be related to the price that it fetches in the export market.

The product sectors in this paper follow the classification of products by technological content by (Lall, 2000). Lall sets five categories of products based on the Standard International Trade Classification. The classifications are arranged in order of increasing technological content i.e. primary products, resource based manufacturing products, low technology manufacturing products, medium technology manufacturing products and high technology manufacturing products. Lall underlies two profound propositions with regard to technological content in product sectors that are of interest to the quest of this paper. The first is that export structures have important implications for growth and development as illustrated by the fact Low-technology products have the least beneficial learning and spillover effects; Low-technology products tend to grow the slowest; technology-intensive products have the most beneficial effects; technology intensive products grow the fastest in world trade. The second proposition is that export structures are the outcome of long, cumulative processes of learning, agglomeration, institution building and business culture involving a broad set of deliberate policies (Redding, 1999, Rodrik, 1996, Lall, 2000).

## 2.2. Empirical review

Does regional integration matter for economic growth? Does regional trade agreements (RTAs) have any impact on growth? Vamvadikis (1998) using a panel data analysis of regional trade agreements notes that countries with open, large, and more developed neighboring economies grow faster than those with closed, smaller, and less developed neighboring economies. Clarke (2005) notes that even though tariff and

non-tariff barriers to trade have been falling, Africa's share of world exports has declined and most African countries remain highly dependent on a narrow range of primary commodities for export earnings. Morris and Fessehaie (2014) opine that the central question facing African economies at the moment having experienced most growth from primary exports is how to use economic growth to foster industrialisation and thereby facilitate general development. They propose the development of backward and forward linkages to contribute to the industrialisation project. Other literature notes that increasing intra-Africa trade has the potential to raise the level of welfare of the African population (Longo and Sekkat, 2001, Geda, 2008, Greda and Seid, 2015).

The relationship between the multilateral trading system and developing countries has evolved through a lot of debate and the frustration from developing countries on the effectiveness of SDTs. Keck and Low (2004) argue that concerns about graduation of economies has complicated the issue. They suggest a focus on specific measures of concern rather than on countries economic status and that SDT provisions should define economic needs that automatically identify the beneficiary members (ibid). Fukasaku (2000) and Michalopoulos (1999) argue that multilateral trade negotiations have a responsibility to seriously consider trade capacity building with binding commitments to meet the special need of Least Developed Countries. Nottage (2003) critically evaluates the potential applicability of special and differential treatment and notes that market access clauses are more export oriented than special and differential treatment clauses and the latter can borrow the approach in market access concessions.

Ahmed (2010) makes use of the online application WITS-SMART model to evaluate the sectoral dimensions of the India–ASEAN Free Trade Agreement as a result of tariff

liberalization the results indicate a surge of ASEAN's exports to India of processed food items, agricultural products and fisheries. Choudhry et al (2012) also used the online WITS SMART model to analyze the trade creation and trade diversion effects of the India-Sri Lanka Free Trade Agreements (ISFTA) at the sectoral level, they find that that the ISFTA will cause significant trade creation between the member countries than trade diversion among the non-member countries. Pasara and Diko (2020) have analysed the effect of the AfCFTA on Food Security Sustainability in the SADC region by analyzing the cereals trade also using the online WITS-SMART model, the results indicated that the AfCFTA will only lead to positive outcomes in four of the fifteen SADC countries that were previously closed economies, with the rest remaining unchanged. Punt and Sandrey (2016) illustrated an Excel based tariff simulation of trade diversion and trade creation of Zambia entering a hypothetical Free Trade Agreement with South Africa.

Kee, Nicita and Olarreaga (2008) have computed elasticities for supply and demand for over 4,625 goods at the six-digit level of the HS code. They report a simple average elasticity of -1.67 for all countries and goods. See also application in (Choudhry, Kallummal. and Varma, 2012). Other models have assumed an elasticity of -1.5 for both import demand elasticity and substitution elasticity and an export supply elasticity of 99 assuming infinite elasticity for all products (World Bank, 2010).

Unlike substitution elasticities, import demand elasticities are calculated at a detailed level specific for every product and bilateral trade flow. The paper utilizes import demand elasticities supplied in the SMART model calculated at a detailed level specific for every product and bilateral trade flow. An export supply elasticity of 99% for all products is reported in this paper under the assumption of infinitely elastic export supply (WITS, 2011).



## 2.3. Overview of literature

The anticipation that liberalization of trade in Africa will boost trade is corroborated in literature. Our paper takes this discussion a step further to break down the benefits of liberalization at sectoral level to influence a more targeted approach to liberalization and special and differential treatment.

Following Laird and Yeats (1986) and others this paper uses the WITS-SMART partial equilibrium model which has been applied in several studies to simulate the trade creation and trade diversion between COMESA and Africa. Our paper goes further to discuss how the protocol on goods in the AfCFTA will likely impact on progressive liberalization and the quest to increase the competitiveness in higher technological goods in Africa. In agreement with other authors that Africa should move away from the narrow the focus on primary products this paper attempts to initiate a debate to streamline liberalization and flexibilities towards export orientation.

Empirical research has demonstrated several models on how liberalization impacts on specific sectors. Closer to the COMESA neighborhood in SADC it has been demonstrated how liberalization in the AfCFTA will boost trade in the cereal sector. So far the focus has been narrowed down to specific sectors. The approach of this paper takes on board the entire spectrum of the HS 6 digit lines fragmented in order of technological content of products.

Our paper also attempts to be among the pioneering papers modelling COMESA's exports into the AfCFTA agreement area to fill the knowledge gap and inform further negotiation rounds in the AfCFTA with empirical information.

### 3. Methodology

The SMART model will require the following data, which will be extracted from WITS for the simulation of a fully liberalized FTA:

- a) Import values from the trading partner in this case COMESA and the AfCFTA
- b) The tariff faced by each foreign partner
- c) The import demand elasticity for the commodity,
- d) The export supply elasticity for the commodity, and
- e) The substitution elasticity between varieties of the commodity. Note that SMART accepts just one import demand elasticity for the commodity and not for each national variety.

Note that the export supply elasticity is similar for all foreign exporters of the commodity. SMART also sets the same substitution elasticity for any pair of varieties of the commodity

#### 3.1. The Basic SMART Model

The following notation are used in the model:

M	imports
X	exports
P	price
W	welfare
Y	national income
Mn	imports from non-preference receiving countries
V	output in the importing country
R	revenue
t	tariff rate or non-tariff distortion in ad valorem terms
Em	elasticity of import demand with respect to domestic price
Ex	elasticity of export supply with respect to export price
Es	elasticity of substitution with respect to relative prices of the same product from different sources of supply

TC	trade creation
TD	trade diversion
TTE	total trade effect
PE	price effect
TR	tariff revenue
Q	quantity of goods
i	subscript denoting commodity
j	subscript denoting domestic/importing country data
k	subscript denoting foreign/exporting trade partner country data
K	subscript used to denote data for foreign/exporting countries other than trading partner
d	prefix denoting change

In the basic model the importing country  $j$ 's import demand function for commodity  $i$  produced in country  $k$  may be expressed as:

$$(Equation 1) \quad M_{ijk} = F(Y_j, P_{ij}, P_{ik})$$

The producer/exporting country  $k$ 's export supply function for commodity  $i$  may be expressed as:

$$(Equation 2) \quad X_{ijk} = F(P_{ijk})$$

Expressions (1) and (2) are related by the following identity:

$$(Equation 3) \quad M_{ijk} = X_{ijk}$$

Assuming that in a free trade situation the domestic price of the commodity  $i$  in the importing market  $j$  will be equal to exporting country  $k$ 's export price plus transport and insurance charges, it follows that this price will rise by an amount equivalent to the *ad valorem* incidence of any tariff or non-tariff distortion applied to the good.

Thus:

$$(Equation 4) \quad P_{ijk} = P_{ijk}(1 + t_{ijk})$$

### 3.1.1. Trade Creation

The trade creation effect is the increased demand in country j for commodity i from exporting country k resulting from the price decrease associated with the assumed full transmission of price changes when tariff or non-tariff distortions are reduced or eliminated.

The trade creation model is given from the basic expressions (1) to (4). First, from expression (4) it is possible to derive the total differential of domestic price with respect to tariffs and foreign price:

$$(Equation 5) \quad dP_{ijk} = P_{ijk} \cdot dt_{ijk} + (1 + t_{ijk}) \cdot dP_{ijk}$$

The standard expression for the elasticity of import demand with respect to the domestic price can be rearranged as follows:

$$(Equation 6) \quad \frac{dM_{ijk}}{M_{ijk}} = Em. \left( \frac{dP_{ijk}}{P_{ijk}} \right)$$

Substituting from expression (4) and (5) into expression (6) gives:

$$(Equation 7) \quad \frac{dM_{ijk}}{M_{ijk}} = Em. \left( \frac{dt_{ijk}}{1+t_{ijk}} \right) + \left( \frac{dP_{ijk}}{P_{ijk}} \right)$$

The standard expression for the elasticity of export supply with respect to the world price can be rearranged as follows:

$$(Equation 8) \quad \frac{dP_{ijk}}{P_{ijk}} = \frac{\left( \frac{dX_{ijk}}{X_{ijk}} \right)}{Ex}$$

From expression (3) it follows that:

$$(Equation 9) \quad \frac{dM_{ijk}}{M_{ijk}} = \frac{dX_{ijk}}{X_{ijk}}$$

Substituting expression (9) into (8) and the result into (7) produces the expression that can be employed to compute the trade creation effect. From expression (3) this is equivalent to exporting country  $k$ 's growth of exports of commodity  $i$  to country  $j$ . The expression for trade creation can be written as:

$$(Equation 10) \quad TC_{ijk} = \frac{M_{ijk} \cdot Em \cdot dt_{ijk}}{(1+t_{ijk}) \cdot \left(1 \cdot \left(\frac{Em}{Ex}\right)\right)}$$

It may be noted that if the elasticity of export supply with respect to the world price is infinite then the denominator on the right hand side of expression (10) becomes unity and can be ignored.

### 3.1.2. Trade Diversion

The term trade diversion is used to account for the tendency of importers to substitute goods from one source to another in response to a change in the import price of supplies from one source but not from the alternative source. Thus, if prices fall in one overseas country there will be a tendency to purchase more goods from that country and less from countries whose exports are unchanged in price. Trade diversion can also occur not because of the change in the export price as such but because of introduction or elimination of preferential treatment for goods from one (or more sources) while treatment for goods from other sources remains unchanged. Again there could be simply a relative change in the treatment of the goods from different sources in the importing country by differential alterations in the treatment of different foreign suppliers.

Elasticity of substitution can be defined as the percentage change in relative shares associated with a one percent change in the relative prices of the same product from alternative sources. That is:

$$(Equation 11) \quad Es = \frac{d(\Sigma M_{ijk}/\Sigma M_{ijK})/(\Sigma M_{ijk}/\Sigma M_{ijK})}{d(P_{ijk}/P_{ijK})/(P_{ijk}/P_{ijK})}$$

Where  $k$  denotes imports from one (group) of foreign supplier(s),  $K$  denotes imports from another (group) of foreign supplier(s), and the summation is only across the country group  $k$  or  $K$  but not across product groups ( $i$ ) nor across imports ( $j$ ).

From expression (11) we can express the percentage change in the relative shares of the alternative suppliers in terms of the elasticity of substitution, the percentage change in relative prices and the original relative shares of imports from the alternative sources. By extensive expansion, substitution and rearrangement. We then obtain the following expression for the change in imports from one country – or trade diversion (TD) as a result of the change in tariffs and prices relative to the prices from other sources resulting from a trade policy change:

$$(Equation 12) \quad TD_{ijK} = \frac{M_{ijK}}{\Sigma M_{ijK}} \cdot \frac{\Sigma M_{ijk}/\Sigma M_{ijK} \cdot Es \cdot \frac{d(P_{ijk}/P_{ijK})}{P_{ijk}/P_{ijK}}}{\Sigma M_{ijk} + \Sigma M_{ijK} + \Sigma M_{ijK} \cdot Es \cdot \frac{d(P_{ijk}/P_{ijK})}{P_{ijk}/P_{ijK}}}$$

### 3.1.3. The Price Effect

The Price Effect is a third component reported in the Trade Total effect and occurs only with a finite export supply elasticity assumption. It reflects the rise in world price for the good which demand increases following the tariff reduction (also known as the “terms of trade effect?”). While trade creation and trade diversion effects depict impact

on quantity, the price effect represents the additional import value from increased world price and is given by:

$$(Equation 13) \quad PE_{ijk} = \frac{(TC_{ijk} + TD_{ijk})}{E_s}$$

### 3.1.4. The Total Trade Effect

The total trade effect  $TTE$  is obtained simply by summing together the trade creation and trade diversion effects.

$$(Equation 14) \quad TTE_{ijk} = TC_{ijk} + TD_{ijk} + PE_{ijk}$$

### 3.1.5. Tariff Revenue effect

The change in tariff revenue for good  $i$  symbolized as  $dR_i$  can be calculated as the new tariff revenue ( $TR_i$ ) less the initial tariff revenue ( $TR_0$ ) where the tariff revenue in each instance is calculated as the relevant quantity imported ( $Q$ ) multiplied by the relevant tariff rate ( $t$ ):

$$(Equation 15) \quad dR_i = TR_1 - TR_0$$

$$(Equation 16) \quad TR = Q \times t$$

### 3.1.6. Welfare change

Welfare Change, W: is what the economy as a whole gains by reducing the tariff from  $t_0$  to  $t_1$  after liberalisation. This gain is made of two components, firstly the additional tariff revenue entailed by the increase in imports from  $Q_0$  to  $Q_1$ :

$$(Equation 17) \quad (Q_1 - Q_0) * t_1$$

Secondly the additional consumer surplus entailed by the increase in imports:

$$(Equation 18) \quad \frac{1}{2} * (Q_1 - Q_0) * (t_0 - t_1)$$



### 3.2. Description of the Data

Bilateral trade data defined at the HS 6-digit level using the HS combined coding was obtained from the Trademap database and used for this analysis. The Trademap database used mirror country data for countries that were yet to report trade data for 2018. Simple average tariff data between Africa and the World was downloaded from the World Bank WITS database, we use the UNCTAD advalorem equivalent estimation applied tariffs.

The technology sectors used in this analysis were obtained by matching HS 6-digit lines (HS combined) from the trademap database with Lall's classification of sectors using technological content which was coded using the SITC revision 3 classification. UNCTAD concordance between HS combined and SITC revision 3 was used to match Lall's Classification with the HS combined lines.

The analysis simulated bilateral trade between Africa and two trading partners i.e. COMESA and the rest of the World. For Africa and the World the paper used the country groups from the trademap database. For the third group, the trademap database allowed us to create a COMESA group of the following 21 countries: Burundi, Comoros, D.R. Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Somalia, Sudan, Swaziland, Tunisia, Uganda, Zambia and Zimbabwe.

The analysis assumes an elasticity of -1.5 for both import demand elasticity and substitution elasticity and an export supply elasticity of 99 assuming infinite elasticity for all products. The paper also assumes 100% liberalization (full liberalisation) of bilateral exports from COMESA to Africa. These assumptions allow us to capture the

maximum potential impact of full liberalization and infinite elasticity of products among different sources of exports for home country i.e. Africa.

The data was analysed using an excel based template for the simulation of trade creation and trade diversion effects of a free trade agreement from Punt and Sundrey (2016). The excel based simulation allowed us to compute trade data from country groups which is not possible in the WITS SMART online application.

## 4. Results and Discussion

### 4.1. Results

The results of the simulation of trade liberalization between COMESA and Africa are provided in tables that follow:

Table 1: Summary of simulation of trade liberalization of exports from COMESA to the AfCFTA

<b>Parameter</b>	<b>Value</b>
Africa's trade creation from COMESA	2,466,917,037
Trade creation as share of initial imports from COMESA	14.5%
Trade creation as share of initial imports from World	0.4%
Trade diversion from Rest of World	1,813,724,826
Trade diversion as share of initial imports from COMESA	10.6%
Trade diversion as share of initial imports from Rest of World	0.3%
Price effect from trade with COMESA	43,238,807
Price effect as share of initial imports from COMESA	0.3%
Total trade effect for Africa from COMESA	4,323,880,670
Total trade as share of Africa's Imports from World	25.3%
Total tariff revenue loss for Africa from COMESA	- 2,175,665,084
Revenue loss as share of initial revenue	-100.0%
Welfare effect from trade with COMESA	629,698,056

Table 2: Breakdown of Trade Effects of trade liberalization of exports from COMESA to the AfCFTA per sector

	Africa imports from COMESA	Trade Creation: New COMESA trade	Trade Diversion: previously from Rest of World, now from COMESA	Price effect: COMESA only	Total Trade Effect: COMESA only
Primary Products	3,429,742,000.00	339,355,711.24	199,648,099.37	5,444,482.94	544,448,293.54
Resource Based products	7,789,411,000.00	1,375,053,536.52	963,786,017.95	23,624,641.96	2,362,464,196.43
Low Technology products	2,748,698,000.00	447,895,956.92	375,318,313.98	8,315,295.67	831,529,566.57
Medium Technology products	2,497,959,000.00	256,524,688.94	229,622,927.42	4,910,581.98	491,058,198.35
High-tech	541,960,000.00	42,475,354.45	39,611,543.64	829,160.59	82,916,058.68
Other products nes	51,151,000.00	5,611,789.08	5,737,923.68	114,643.56	11,464,356.33
<i>Overall</i>	<i>17,058,921,000.00</i>	<i>2,466,917,037.14</i>	<i>1,813,724,826.05</i>	<i>43,238,806.70</i>	<i>4,323,880,669.90</i>

Table 3: Breakdown of Tariff Revenue and Welfare Effects from the simulation of trade liberalization of exports from COMESA to the AfCFTA per sector

	Original tariff revenue from COMESA	New tariff revenue from COMESA	Tariff revenue effect from COMESA	Welfare effect
Primary Products	254,304,266.58	-	(254,304,266.58)	28,784,576.41
Resource Based products	1,341,133,892.58	-	(1,341,133,892.58)	502,579,849.84
Low Technology products	348,457,414.66	-	(348,457,414.66)	62,337,967.49
Medium Technology products	195,494,723.22	-	(195,494,723.22)	30,633,550.62
High-tech	32,172,307.41	-	(32,172,307.41)	4,902,371.52
Other products nes	4,102,479.82	-	(4,102,479.82)	459,739.70
<i>Overall</i>	<i>2,175,665,084.27</i>	<i>-</i>	<i>(2,175,665,084.27)</i>	<i>629,698,055.59</i>

## 4.2. Discussion of Findings

### 4.2.1. Trade Effects

In this section we will analyse the results of the simulation under the assumption of full liberalisation of trade between COMESA and the rest of Africa using the partial equilibrium model, WITS-SMART in response to the research objectives of this paper to analyse the trade effects arising from liberalization of COMESA's exported goods to Africa classified by technology sectors and to discuss provisions that will guarantee export orientation and growth in product sectors in the protocol on goods of the AfCFTA agreement.

For COMESA the biggest gain from liberalization of trade in the AfCFTA will come from the new trade created due to elimination of tariff barriers on COMESA exports followed by the trade COMESA will gain from diverted from world exports to Africa. This agrees with the findings from Ahmed (2010), Choudhry et al (2012) and Pasara and Diko (2020) that trade liberalization results in a surge in imports from the foreign trading partner in this case COMESA exports to Africa.

On the part of Africa there will be a loss in revenue due to liberalizing imports from COMESA. Some of the loss in revenue will be offset by static gains in welfare. Overall some governments within Africa will be subjected to revenue challenges due to this loss of revenue.

Figure 5 illustrates the proportional concentration of the various sectors in the initial trade and the trade effect after liberalization. Liberalization will result into higher growth rate in products with higher technological content compared to the rates before liberalization. The best performing sector to increase the share of trade is the low

technology sector followed by the resource-based sector. The results do not agree with the expectation from Balassa (1965) that since COMESA has a revealed comparative advantage in primary products and low technology products it has a competitive edge. The expectation is only true for low technology products, the upsurge in primary products goes contrary to the expectation., the diminishing in primary products also goes against the expectation.

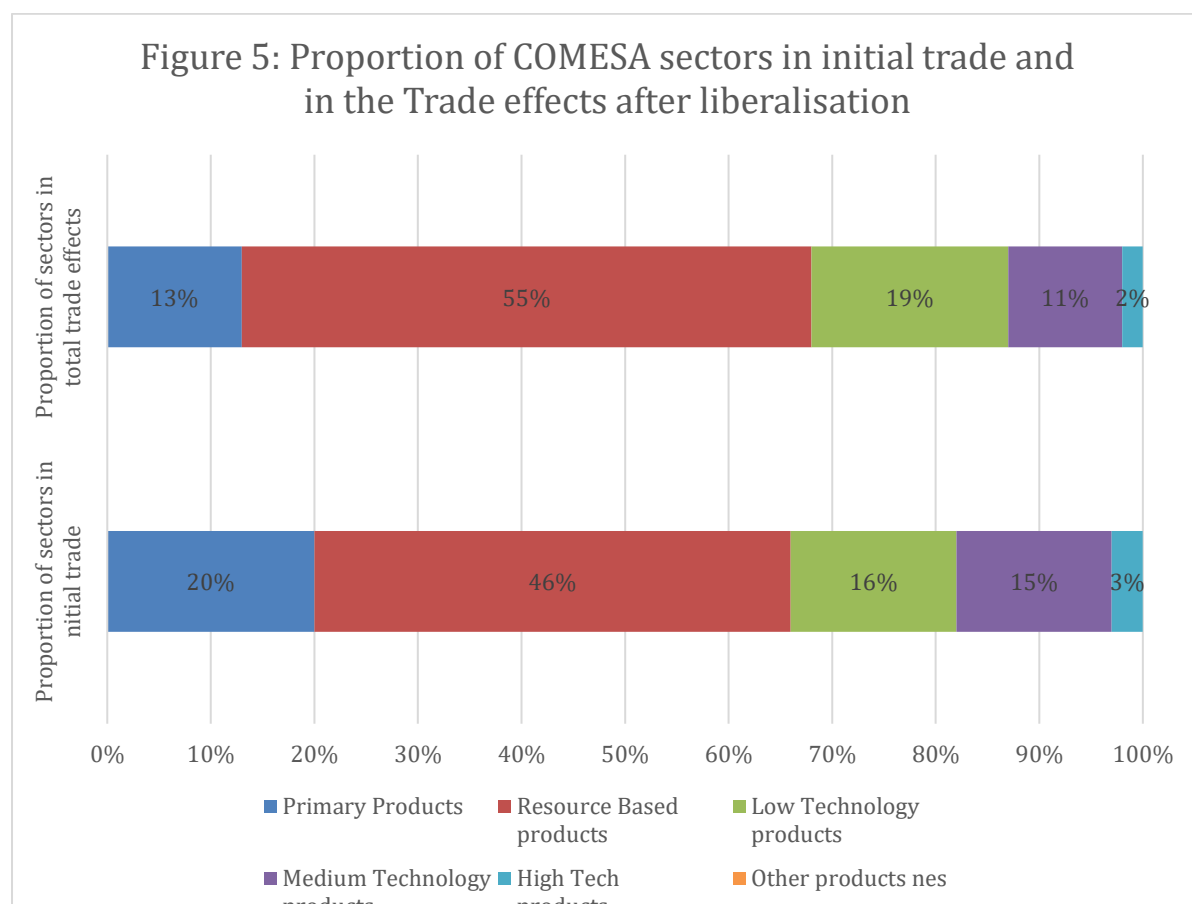
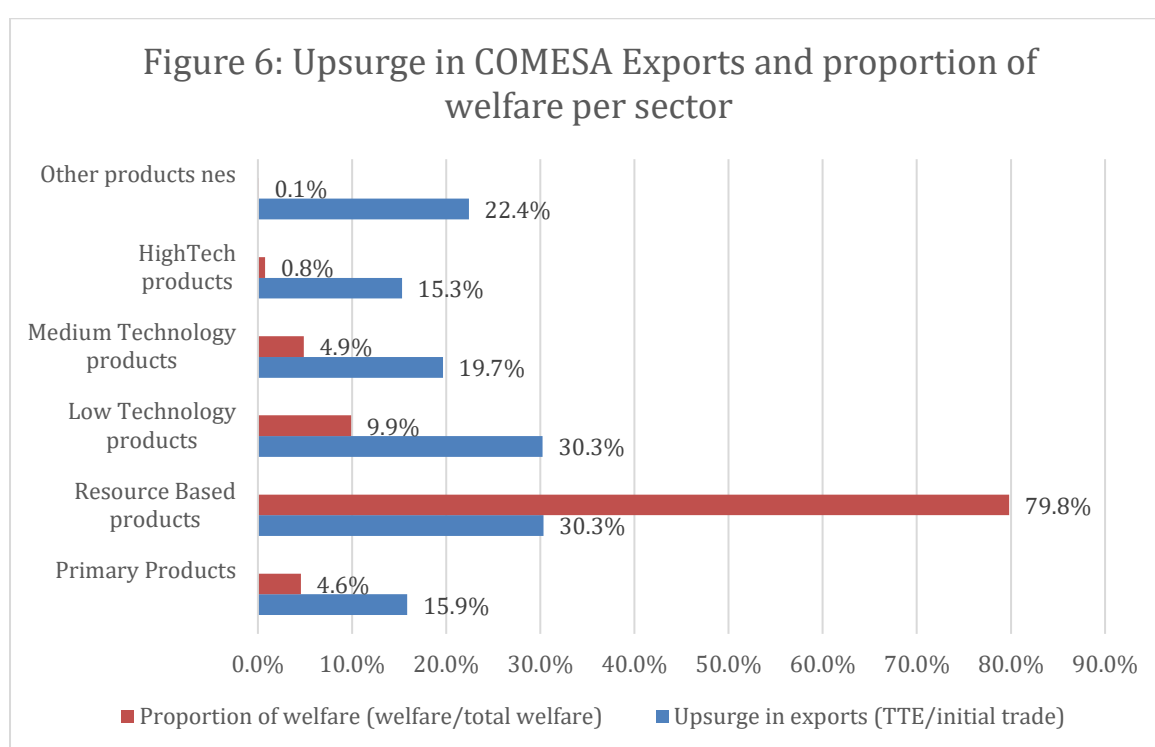


Figure 6 illustrates the relationship between trade effects and welfare in the African economy. The welfare emanating from the upsurge of COMESA exports in Africa will mostly emanate from resource based products, an upsurge of 30.3% in exports will be responsible for 79.8% of the welfare effects in Africa. Again we also observe that an upsurge in low technology and medium technology products will also contribute significantly to welfare in Africa. This is in agreement with Lall's (2000) observation that products with increasing technological content have more spillover effects in the economy.



It is observable in the static outcome of AfCFTA liberalization that there is a shift in the profile of COMESA exports towards products with higher technological content. Lall (2000) observes that export structures have important implications for growth and development as illustrated by the fact Low-technology products have the least beneficial learning and spillover effects; Low-technology products tend to grow the slowest; technology-intensive products have the most beneficial effects; technology

intensive products grow the fastest in world trade. Secondly Lall (ibid) also proposes that export structures are the outcome of long, cumulative processes of learning, agglomeration, institution building and business culture involving a broad set of deliberate policies (Redding, 1999, Rodrik, 1996, Lall, 2000).

In the background chapter of this paper we observed that tariffs in Africa tend to escalate as we increase the technological content of exported products. Some of the benefit from eliminating tariffs will go towards diminishing the barriers that hinder intra-Africa trade in technological products. In the long run this will encourage more dynamic benefits to spillover in the economy. This is a dynamic effect of liberalization that will add on to the static benefits of the linearization.



#### 4.2.2. Liberalization and flexibilities in the AfCFTA

The provisions for liberalization and special and differential treatment of the AfCFTA will be instrumental to sustain the continued growth in trade and support lesser-developed economies to develop technology intense sectors.

As observed earlier the provisions regulating the market access of goods are set with preconditions that focus on specific goods that members specify in the schedules of commitments. Article 7.1 of the protocol on goods stipulates that State Parties shall progressively eliminate tariffs on goods originating from other members in accordance with their Schedules of Tariff Concessions. This is also the standard approach in multilateral agreements.

The special and differential provisions are set out in a different fashion. Article 6 of the SDTs in the AfCFTA are preconditioned on the graduation of economies approach. The first part of the article stipulates that members state parties shall provide flexibilities to other State Parties at different levels of economic development. The approach is different in the multilateral GATT 94. The GATT 94 takes a robust approach to articulate specific sectors in several clauses to highlight special assistance towards the products of interest to developing countries e.g. the Agreement on Agriculture, the Anti-Dumping Agreement, Agreement on Subsidies and Countervailing Measures, Agreement on Safeguards, the TBT Agreement and the SPS Agreement. In the COMESA treaty, provisions for special assistance in chapter 22 on Least developed countries and economically depressed are also preconditioned on specific products: Article 144 is aimed at export oriented sectors, article 145 aims at infrastructure, article 146 aims at the industrial and energy sector, article 147 aims at agriculture and agro-industry sector and article 148 aims at services. Keck and Low (2004) argue that the

graduation of economies approach in SDTs complicates the focus of the provisions and the process.

In terms of oversight, the article 6 of the protocol on goods of the AfCFTA does not stipulate the committee overseeing the implementation of SDTs and leaves a lot of leeway for members' discretion. The second part of the articles opening statement stipulates that individual specificities [shall be] recognised by other State Parties. In the Gatt 94 the Committee on Trade and Development (CTD) of the World Trade Organisation (WTO) is entrusted with oversight over the SDT provisions. In the COMESA treaty the provisions for special assistance are under the oversight of the COMESA Fund Ministers committee.

Both the GATT 1994 and the COMESA treaty have labored to elaborate special assistance in robust manner in several specific clauses as elaborated above. The AfCFTA treaty however takes a simplistic view denying the special and differential treatment clause of any robust application in specific trade scenarios that will address the needs of member states. Given the fact that the developmental status of member states in Africa in to large extent homogeneous implementation of this provision will lack objective selection criteria to allocate assistance among lesser developed countries from the few developed members. As Redding (1999) opines that selective intervention based on specialization may be welfare improving, both for the economy undertaking it, and for its trade partner.

## 5. Conclusions and Policy Implications

Liberalization of trade in the AfCFTA will be beneficial for COMESA. Exports from COMESA into Africa will increase due to removal of barriers in intra-Africa trade. The removed barriers will also divert considerable trade from world exports destined to Africa to the benefit of COMESA. COMESA will however not capture all the diverted trade from World exports insinuating that other barriers will remain beyond tariff barriers,

A particularly added benefit of the increased intra-African trade flow as observed in this study is that exports from COMESA will shift the proportions away from primary products to products with high technology intensity. The study observes that increased trade flow in products with higher technological intensity is associated with the most welfare benefits from liberalization. The shift towards technological intensive products will have beneficial effects such as job creation; technology intensive products will also grow the fastest in world trade. This is a possible route to achieve the stated objective of the AfCFTA to create new jobs and improve competitiveness of African exports.

There will be considerable loss of revenue in Africa due to removal of tariffs on products originating from COMESA raising the potential for government budgetary distress across the continent. Considering that across COMESA and Africa there is a predominance of least developed economies is low income the provision for special and differential treatment should be a crucial part of the AfCFTA. The process towards full liberalization should also be a gradual process to avoid shocks to the economy of member states. Article 6 of the Protocol on Trade in Goods in the AfCFTA is a step in the right direction.

As a policy recommendation in order to equalize the benefits of liberalization to all countries in the AfCFTA there is need to draft a comprehensive framework for special support towards lesser-developed economies to assist them develop technology intense sectors. Adoption of special and differential treatment provisions should avoid the pitfall of relying on the precondition based on the graduation of economies but rather focus towards sectors of specific interest to lesser-developed members. The framework of chapter 22 of the COMESA treaty on Least Developed Countries and Economically Depressed Areas is a good starting point in that direction. COMESA should take a lead in proposing a draft of this provision.

The proposed amendment of special and differential treatment should include a focal point within the AfCFTA framework. Development of export structures are the outcome of long, cumulative processes of learning, agglomeration, institution building and business culture involving a broad set of deliberate policies. A focal committee in the AfCFTA should have mandate focusing on special and differential treatment provisions and providing the necessary institutional framework for the process. The draft provision on special and differential treatment proposed in this study should stipulate such a focal committee.

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