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The implications of the African Continental Free Trade Area on South African agricultural trade

An application of the partial equilibrium model

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The implications of the African Continental Free Trade Area on South African agricultural trade

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Abstract: The paper adopts the SMART partial equilibrium model to simulate the impact of a full tariff liberalization as proposed under the African Continental Free Trade Area on South African agriculture. The results of the model reveal that South Africa will gain a total trade value of about US$199 million, and the total trade diversion from third parties will stand at US$42 million. South African agricultural commodities with the greatest export potential to the African market include sugar cane, maize, citrus fruit, cigarettes, and sauces. Products that are vulnerable to the free trade area include groats cereal, cotton, vegetable, flowers, dairy produce, and poultry. The full tariff liberalization is projected to decrease the South African export revenue by 7 per cent. The study recommends that South Africa protect infant industries from increased imports to hamper job losses and diversify its tax base to tamper with the losses in tariff revenue.

Key words: African Continental Free Trade Area, trade liberalization, SMART partial equilibrium model, regional integration

JEL classification: F13, F15, F17

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1 Introduction

After many African countries achieved liberation and decolonization during the late 1950s, they began a rough journey towards regional integration and a united Africa. Created by the independent African states in 1963, the Organization of African Unity (OAU) affirmed the desire of achieving regional integration in Africa (Mkandawire 2005). In the early 1980s, the first executive secretary of the United Nations Economic Commission of Africa (UNECA), Adebayo Adedeji, provided substantive meaning and programmatic guidance to achieving regional integration in Africa (Adebajo 2014). His important leadership played an important role in establishing and launching the Lagos Charter as well as the Lagos Plan of Action in the late 1970s. The Organization of African Unity (OAU) endorsed the Lagos Plan of Action which supported integration based upon 'self-reliance, endogenous development as well as industrialization' of African member states. Even though Adedeji's approach to integration was based upon the idea of 'developmental regionalism', the Lagos Plan of Action was criticized for lacking a comprehensive implementation approach (Bach 2016).

Ten years after the inception of the Lagos Plan of Action, the OAU tackled this gap in its regional integration framework by endorsing the Abuja Treaty which set out a step-by-step method of how regional integration in Africa should be implemented. In addition, a path towards the creation of Regional Economic Communities (RECs) and an African Economic Community by 2028 was set forth. The initial step in this particular pathway was the development of Free Trade Areas (FTAs) in every region, followed by customs unions, monetary unions, and common markets. According to Bach (2016), advancements towards establishing RECs began in the early 2000s. As it stands, only eight RECs are recognized by the African Union (AU), namely: EAC (East African Community); SADC (Southern African Development Community); AMU (Arab Maghreb Union); COMESA (Common Market for Southern and Eastern Africa); ECOWAS (Economic Commission of Western African States); ECCAS (Economic Community of Central African States); IGAD (Inter-Governmental Authority on Development); and CEN-SAD (Community of Sahel Saharan States).

Economic progression in each regional economic community subsequently led to the aspiration of creating and forming a continental free trade area. The aspiration of forming a continental FTA was also motivated by low intra-African trade as compared to intra-regional trade in other continents. According to UNECA (2015), intra-African trade is approximately 15 per cent, while intra-regional trade is 68 per cent in Europe, 55 in America, and 59 in Asia. The low level of trade between African countries resulted in policy initiatives that attempt to enhance intra-African trade, the construction of local value chains, as well as the diversification of African economies (UNCTAD 2010). In 2012, the African heads of states and government endorsed the action plan and a pathway in establishing the African Continental Free Trade Area (AfCFTA), which would bring together 54 African countries by an indicative date of 2017 (DTI 2010).

Due to delays and divergences in trade negotiations, the implementation of the AfCTA by the proposed date was not achieved. One of the reasons owing to this delay is associated with the rules of origin to be adopted in the FTA. The African Tripartite Free Trade Area (COMESA, EAC, and SADC) is advocating for specific rules of origin, while other regional economic communities are proposing a general rule of origin. Moreover, some African member states like Eritrea and Nigeria were skeptical about the potential economic implications of the proposed FTA on their domestic industry, which has led to a lack of commitment and poor participation in general meetings of the AfCFTA.

Nevertheless, the establishment of the AfCFTA is among the paramount projects on the African Union's Agenda 2063, which typically strives to produce one continental market for goods and services in Africa. Proponents of this agreement support that it is going to benefit the African continent in addressing dilemmas of food security, unemployment, poor infrastructure, industrialization, and institutional development (UNECA 2015).

On 30 May 2019, 24 member states of the African Union deposited their instruments of ratification with the African Union Commission (AUC), and the AfCFTA entered into force. This particular date marked 30 days after 22 nations had deposited their instruments of ratification to reach the minimum legal threshold for the AfCFTA to enter into force. As of May 2021, 36 countries have both signed and deposited their instruments of AfCFTA ratification. Among the 55 African Union member states forming, only Eritrea has not signed yet. It was proposed that operations and business under this agreement will commence on the 1st of July 2020. Due to the impact of the national lockdowns caused by COVID-19, operations of the AfCFTA were further delayed, and the agreement eventually came into force on the 1st of January 2021.

South Africa is also a member of the AfCFTA and has expressed its commitment to the agreement since depositing its instrument of ratification in January 2019. The AfCFTA presents perhaps the greatest opportunity for South Africa in terms of diversifying its export basket, enhancing food security and agricultural development. Despite the positive intent of the AfCFTA, which stems from liberalizing trade by reducing and ultimately eliminating tariff barriers between African Union member states, its socio-economic consequences at the national and local level should not be overlooked.

Indeed, trade liberalization does not benefit all countries (Abbott et al. 2008; Chang et al. 2009; Nicita 2004). Scholars in both developed and developing countries argue that trade liberalization is harmful to less-developed nations because it forces domestic industries to compete with international markets and may further lead to the liquidation of domestic businesses and loss of jobs (Chang et al. 2009; Rodriguez and Rodrik 2001; Stiglitz and Charlton 2005). On the contrary, mainstream economic thought claims that trade liberalization increases economic growth and leads to export diversification for both developed and developing countries (Balassa 1965; Chandran and Munusamy 2009; Chang et al. 2009; Krugman and Obstfeld 2006). The potential impact posed by the AfCFTA is not clear, because the agreement has not been operational yet. In addition, proponents of the proposed FTA only point to numerous potential benefits, while less has been said about the potential cost of the agreement on strategic economic sectors like the agricultural sector. This study contributes to this debate by revealing the potential impact of trade liberalization as proposed under the AfCFTA on South African agricultural trade.

This study attempts to model the potential impact of a 100 per cent tariff liberalization as proposed under the AfCFTA on South African agricultural trade. To the best of my knowledge, this is the first study of its kind to explore the potential implications of the AfCFTA tariff liberalization on the South African agricultural sector.

2 Methodology

This study adopts the SMART partial equilibrium (PE) model to simulate the impact of a full tariff liberalization under the AfCFTA. The United Nations Conference on Trade and Development (UNCTAD), together with the World Bank, developed the SMART PE model as a basic methodology for quantifying the impact of changes in trade policy on international trade. The term 'partial equilibrium' refers to an analysis that only evaluates the consequences of a policy change

in the market that is directly impacted. In other words, the SMART PE framework ignores the macroeconomic relationship that exists between different markets in a single economy. This is contrary to a general equilibrium model framework, in which all markets are modelled concurrently, and the relationship that exists between the markets is considered.

The key benefit of applying the SMART partial equilibrium model is that it requires very minimal data. Trade flows, tariff values, and behavioural parameters are the only data required to run the model. As a result, the model can take advantage of the extensive World Integrated Trade Solutions (WITS) database, which contains all these data requirements. Another advantage of using this model is that it permits analysis at a disaggregated level, a degree of aggregation that is difficult and impossible to acquire using the general equilibrium model or any other models used in international trade.

Nevertheless, it can be argued that the main strength of the SMART PE model seem also to be its major limitation. The application of the SMART PE model for the current study is limited by the following constraints. Firstly, the SMART PE model is static and only operational under rigorous ceteris paribus assumptions. Secondly, the model offers a narrow overview of the anticipated impact of tariff liberalization and does not take into account any indirect consequences that accompany the tariff change. Secondly, the study is limited to trade flow projections, whilst ignoring changes in general prices and other macroeconomic factors. Despite the limitations highlighted above, the SMART framework was adopted by many scholars (Chang et al. 2009) focusing on trade policy and several nations, including the United States, to prepare their negotiation stance during the Uruguay Round. Thus, the SMART PE model is still a useful tool in providing the implication of changes in trade policy.

2.1 Data requirements

Trade data required for simulation in the SMART PE model include:

1. Trade values by an exporting country which is regarded as trade quantity.

2. Tariff values faced by each exporting partner allow calculating domestic price and

3. Elasticity parameters reflecting consumer and exporter behaviour, such as import supply elasticity, export supply elasticity, and substitution elasticity.

The SMART PE model is contained in the World Integrated Trade Solution (WITS) software which holds various trade information databases such as the UNCTAD COMTRADE, WTO-IDB, and TRAINS. The model, therefore, uses the TRAINS database for tariffs (applied tariffs). For trade values, TRAINS and COMTRADE databases are used. The PE model also incorporates the three kinds of elasticities needed to calibrate the simulation, and the study utilizes the 'default' elasticity parameters, which the literature suggests are a statistically significant estimate. It is also important to note that the availability of data on WITS software varies across years and countries. Thus, some of the West, East, and North African countries are not included in the analysis due to a lack of data. These countries include Sierra Leone, Liberia, Guinea, and Cabo Verde.

2.2 Theoretical framework

The research offers a thorough analysis of the SMART partial equilibrium model contained in the WITS software. The SMART PE model is selected because it incorporates an advanced trade analysis framework that allows for multilateral tariff reforms and preferential trade liberalization. A static partial equilibrium technique is applied, which allows the researcher to analyse the impact

of changes in trade policy in a single country. Since the focus of this study is based on a single market (South Africa), the application of the SMART PE model framework to this study is relevant. The research study emulates the methodology applied by Mcculloch et al. (2001), who applied the SMART PE model to explore the implications of trade liberalization between the United States and Morocco.

It is generally accepted that when import tariffs are abolished in post-AfCFTA negotiations, commodity prices will fall, leading to trade creation. Trade creation involves stimulating trade levels after the tariff liberalization, leading to unproductive companies being outcompeted by more productive rivals. Laird and Yeats (1986) strictly developed an equation necessary to predict trade creation, trade diversion, consumer welfare, and tariff revenue. The derivation of the equation commences with the following basic trade model, which involves changes in import demand and supply:

A generalized import demand function of product *i* from nation *k* for nation *j* is given as:

$$\mathrm{M}_{ijk} = f(Y_j, \mathrm{P}_{ij}, \mathrm{P}_{ik}) \tag{1}$$

On the other hand, the export supply function of product *i* of nation *k* is expressed as:

$$X_{ijk} = f\left(\mathrm{P}_{ijk}\right) \tag{2}$$

Given free trade conditions, with ad valorem tariff adjustments, the domestic price of product *i* in country *j* from country *k* will change as follows:

$$P_{ijk} = P_{ijk}\left(1 + t_{ijk}\right) \tag{3}$$

As suggested by Laird and Yeats (1986), to get the total trade creation formula, the commodity price formula (3) is completely differentiated to derive:

$$dP_{ijk} = P_{ijk}dt_{ijk} + \left(1 + t_{ijk}\right)dP_{ijk} \tag{4}$$

To get equation (5) below, equations (3) and (4) are replaced into the elasticity of import demand function:

$$\frac{dM_{ijk}}{M_{ijk}} = \eta_i^m \left(\frac{dt_{ijk}}{1+ t_{ijk}} + \frac{dP_{ijk}}{P_{ijk}}\right) \tag{5}$$

From the expression in equation (5), $\frac{dM_{ijk}}{M_{ijk}} = \frac{dX_{ijk}}{X_{ijk}}$ may be used to calculate the elasticity of export supply as follows:

$$\frac{dP_{ijk}}{P_{ijk}} = \frac{1}{Y_i^e}\frac{dM_{ijk}}{M_{ijk}} \tag{6}$$

The elasticity export function allows for accurate calculation of the trade creation effect when applied in equation (6). Counting from equation (3), the total trade effect is equal to the welfare gains of the exporting nation *k* of product *i* to nation *j*:

$$TC_{ijk} = M_{ijk}\eta_i^m \frac{dt_{ijk}}{\left(\left(1+t_{ijk}\right)\left(1-\frac{\eta_i^m}{Y_i^e}\right)\right)} \tag{7}$$

If $Y_i^e \rightarrow \infty$, equation (8) below is a simplified version of equation (7):

$$TC_{ijk} = \eta_i^m M_{ijk} \frac{\left(1+ t_{ijk}^1\right) - \left(1+ t_{ijk}^0\right)}{\left(1+ t_{ijk}^0\right)} \tag{8}$$

where TC_{ijk} is the total value of trade generated in millions of dollars after product *i* has been affected by the tariff adjustment; η_i^m is the import demand function for product *i* from the related trading partner; M_{ijk} is the normal rate of import demand of the given products t_{ijk}^0 and t_{ijk}^1 and reflects tariff rates for product *i* at the initial and end periods, respectively. The prevailing volume of imports, the import demand function, and the relative change in tariff all influence the total trade creation.

Trade diversion has the potential to increase or decrease trade internationally, as opposed to trading creation. Trade diversion is a process that happens in a free trade area when competitive industries from outside the free trade market are replaced in the preferential area by less efficient industries. Laird and Yeats (1986) developed the theory behind the estimation of trade diversion under the SMART framework. To understand the derivation of the theory clearly, the elasticity of substitution (σ_M) variable is first provided. The elasticity of substitution function can be represented as a percentage difference in the relative shares of imports from two separate sources attributable to a one per cent change in the relative prices of the same commodity from the following sources:

$$\sigma_M = \frac{\Delta(\sum_k M_{ijk}/\sum_k M_{ijK})/(\sum_k M_{ijk}/\sum_k M_{ijK})}{\Delta(P_{ijk}/P_{ijK})/(P_{ijk}/P_{ijK})} \tag{9}$$

where *K* denotes imports from other African countries in the free trade zone, and *k* symbolizes imports from the rest of the world (ROTW). Equation (9) can be extended and modified according to Laird and Yeats (1986) to obtain the trade diversion formula as provided below:

$$TD_{ijk} = \frac{M_{ijk}}{\sum_k M_{ijk}} \frac{\sum_k M_{ijk} \sum_K M_{ijk} \frac{\Delta\left(P_{ijk}/P_{ijk}\right)}{P_{ijk}/P_{ijk}} \delta_M}{\sum_k M_{ijk} + \sum_k M_{ijk} + \sum_k M_{ijk} \frac{\Delta(P_{ijk}/P_{ijk})}{P_{ijk}/P_{ijk}}} \tag{10}$$

As a result of equation (10), the total trade diverted to other African nations within the FTA can be described as follows:

$$TD^{FTA} = \frac{M^{AFR} M^{ROTW} \left(\frac{1+ t_{AFR}^1}{1+ t_{AFR}^0} - 1\right) \delta_m}{M^{AFR} + M^{ROTW} + \left(\frac{1+ t_{AFR}^1}{1+ t_{AFR}^0} m - 1\right) \delta_m} \tag{11}$$

where M^{AFR} denotes the current imports into South Africa from African nations; M^{ROTW} represents imports from the rest of the world; t_{AFR}^0 and t_{AFR}^1, respectively, denote the initial and end periods of import tariffs levied on agricultural products from African nations exported to South Africa with $t_{AFR}^0 > t_{AFR}^1$. An important observation from the equation is that TD^{FTA} increases with the value of σ_M. Therefore, the addition of trade creation and trade diversion is equal to the total trade effect.

Without a doubt, trade liberalization under the AfCFTA will have revenue implications, as tariff revenue is calculated by multiplying the tariff rate by the tax base, which is the value of imported goods. As a result, the tariff revenue prior to the introduction of the AfCFTA is represented as:

$$R_0 = \sum_i \sum_k t^0_{ijk} P_{ijk} M_{ijk}$$

Following the change in tariff rate, the current revenue collection will be provided by:

$$R_1 = \sum_i \sum_k t^0_{ijk} P_{ijk} M_{ijk}$$

Considering this perspective, the tariff revenue loss to South Africa as a result of the AfCFTA will be calculated as follows:

$$RL = \sum_i \sum_k \Delta t^0_{ijk} P_{ijk} M_{ijk} \quad (12)$$

Although the AfCFTA will lead to trade creation and trade diversion, it is with no doubt that the free trade area is expected to benefit South African consumers through lower market prices. The free trade area will encourage consumers to replace expensive agricultural products with cheaper ones as a result of the tariff liberalization on agricultural imports. Thus, trade liberalization will lead to gains in consumer welfare, which can be explained in the equation below:

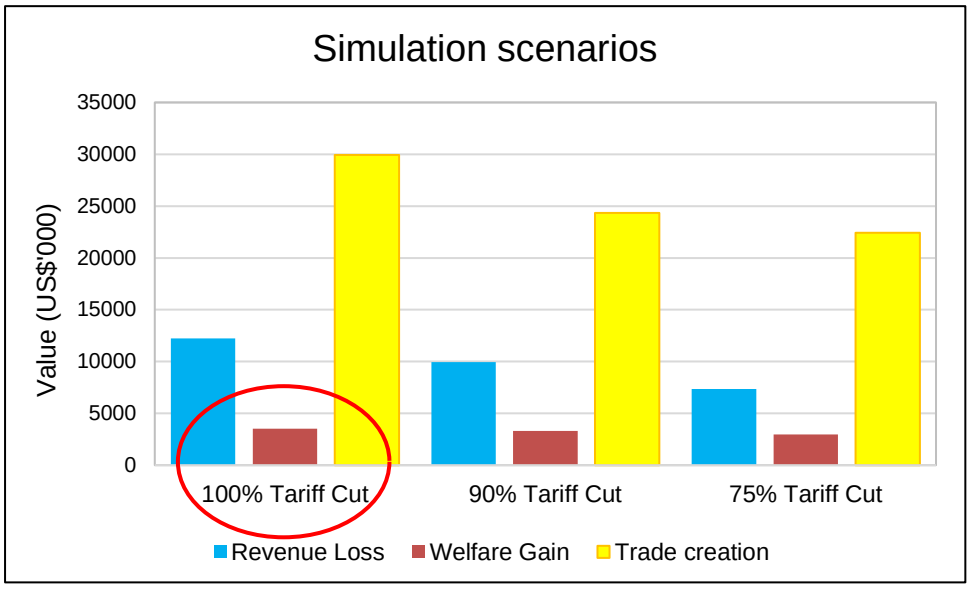
$$W_{ijk} = 0.5 \left(\Delta t_{ijk} \Delta M_{ijk} \right) \quad (13)$$

Where W_{ijk} denotes consumer welfare and 0.5 denotes the average difference in tariffs before and after their removal. Import prices in South Africa will decline less than they would if markets were fully liberalized, assuming an unlimited elasticity of export supply.

3 The results of the SMART simulation

This section provides the results of the SMART partial equilibrium model simulating a full tariff liberalization of agricultural tariff lines in the African market. Figure 1 below commences by presenting the possible effect of different tariff simulations on the South African market. This simulation was conducted because the AfCFTA tariff liberalization will be based on a tariff phase-down approach, depending on the economic growth of each member state negotiating the agreement. Figure 1 shows the first scenario depicting the impact of a full tariff liberalization (100 per cent tariff cut) on tariff revenue, consumer welfare, and trade creation. The second and third scenarios simulate the impact of a 90 per cent tariff cut and a 75 per cent tariff cut on tariff revenue, consumer welfare, and trade creation, respectively.

Figure 1: Three simulations of the model



Source: author's calculations using WITS-SMART.

The results of the model in Figure 1 above suggest that a 100 per cent tariff cut will lead to an influx of agricultural imports (US$29 million in value) from the AU market to South Africa as compared to a 90 or 75 per cent tariff cut. It was expected that full tariff liberalization will lead to greater tariff revenue (US$12 million) reductions than a 90 and 75 per cent tariff reduction. The model also depicts greater benefits to South African (SA) consumers under the 100 per cent tariff cut.

What is clear from the three simulations portrayed is the trade-off between a full tariff liberalization and the partial tariff cuts. African countries will benefit more from a 100 per cent tariff cut in the SA market as compared to a 90 and 75 per cent tariff reduction. The full tariff cut also presents greater losses in tariff revenue and possible displacement of infant industries. The diagram also shows that greater welfare gain to consumers is associated with a 100 per cent tariff cut. This gain to consumers includes the decrease in agricultural prices and the increase in a variety of agricultural products available on the market. Even though the ambition of the AfCFTA is to achieve a full tariff liberalization in the African market, the challenges that the agreement presents should not be overlooked. A detail of the benefits and challenges of a full tariff liberalization are discussed below.

3.1 Total trade creation on the South African market

This part of the study explores the implications of a potential increase in exports enjoyed by the AU on the South African market. For negotiation purposes, it is interesting to look at which African countries are bound to benefit the most from the full tariff elimination by South Africa. In total, 39 (excluding SADC) AU member states could gain more than US$1.87 million of increased exports to the South African market. The root of this gain is two-sided. Firstly, AU member states will gain from total trade creation arising from the South African market (the elimination of import tariffs on agricultural products make them affordable, leading to an increase in demand). Secondly, agricultural imports from the AU will benefit from preferential treatment, a principle that is mandatory to all negotiating parties of the AfCFTA. This special treatment will result in efficient industries outside the FTA being replaced by inefficient industries inside the FTA (a scenario called the trade diversion effect). The net growth in AU exports to the South Africa market is equal to the sum of added trade creation and trade diversion.

Table 1 shows clearly that agricultural exports from Egypt will increase by 56 per cent, equating to a value of US$26 million, followed by export from Kenya with 33 per cent of the total export gain. Together, these two countries plus Benin (24 per cent), Nigeria (22 per cent), Ethiopia (12 per cent), and Tunisia (11 per cent) will gain more than 50 per cent of increased exports to the South African market.

Table 1: Increase in AU export to SA after the FTA (US$)

Country	AU exports before the tariff change	AU exports after the tariff change	Export increase in %
Egypt	16 904 730	26 361 042	56%
Kenya	9 934 390	13 173 184	33%
Benin	5 199 178	6 453 023	24%
Nigeria	1 959 165	2 388 908	22%
Ethiopia	6 122 862	6 880 985	12%
Tunisia	2 672 109	2 952 898	11%

Source: author's calculations using WITS-SMART.

The highest export gains by both Egypt and Kenya reflect the large market size of these economies and relatively high tariffs in these markets before liberalization. Other member states that are not listed in Table 1 will also see an increase in their exports to the South African market, just below 5 per cent.

3.2 Trade creation and trade diversion on the South Africa market

One of the most significant features of the SMART PE model is the ability to simulate the trade creation effect stemming from changes in trade policy. Traditionally, total trade creation was perceived beneficial to consumers since it reflects extra amounts of agricultural products that consumers will afford because of trade liberalization.

Table 2: Total trade creation in the SA market (US$)

Country	Total trade effect	Trade creation	Trade diversion
Egypt	9 456 312	6 333 058	3 123 254
Kenya	3 238 794	2 706 961	531 833
Benin	1 253 844	950 497	303 347
Nigeria	429 743	192 996	236 747
Ethiopia	758 123	418 442	339 682
Morocco	454 621	306 413	148 208
Total	**15 591 437**	**10 908 367**	**4 683 071**

Source: author's calculations using WITS-SMART.

Table 2 shows the top six leading countries that stand to gain from the South African market in terms of total trade effect. Egypt is set to enjoy the highest total trade effect recording a US$9 million increase in total trade. Two other noticeable AU member states that stand to gain on the South African market are Kenya and Benin, recording a US$3 million and US$1 million increase in total trade, respectively.

3.3 Trade creation on the AU market

Table 3 below depicts the total trade creation gained by South Africa on the AU market when a full tariff liberalization is implemented on all agricultural imports. The results of the SMART model indicate that South Africa stands to gain most from Cameroon, recording a total trade creation of about US$74 million. The model also returned results pertaining to the impact of the agreement on trade diversion. In the context of this study, trade diversion is represented as the quantity of exports from non-members of the AfCFTA that will be replaced by SA agricultural products. South Africa records a total trade diversion of about US$42 million, and the highest trade diversion of about US$8 million is set to take place in Uganda, Kenya, and Nigeria.

Traditionally, trade diversion was deemed detrimental for global well-being as less productive industries are replaced by more productive industries. South African is also set to benefit more from the growing markets in Kenya and Nigeria, gaining a total trade of about US$25 million and US$26 million, respectively. South Africa stands to gain more than US$199 million in total trade from the AfCFTA.

Table 3: Total trade creation for South Africa on the AU market (US$)

Country	Trade creation	Trade diversion	Total trade created
Cameroon	68 640 332	4 962 642	73 602 974
Nigeria	17 868 350	8 457 799	26 326 149
Kenya	15 555 650	9 246 873	24 802 523
Ghana	12 896 062	6 981 799	19 877 861
Uganda	8 912 145	7 964 079	16 876 224
Rwanda	15 524 299	1 155 959	16 680 258
Togo	9 101 882	259 772	9 361 654
Gabon	5 395 550	1 813 129	7 208 679
Senegal	3 161 550	1 265 623	4 427 173
Total	**157 055 820**	**42 107 675**	**199 163 495**

Source: author's calculations using WITS-SMART.

For export diversification purposes, it is often vital to examine the implications of the trade creation effect at the product level. The SMART partial equilibrium model allows for an observation of the impact of a tariff change at the HS-6 level (harmonized system). This is one of the reasons why the SMART PE model was adopted in this study. Table 4 below reveals the products for which trade creation is largest and the markets that have the highest export potential for the identified products.

Table 4: South African products with the highest export potential

HS code	SA products with high export potential on the AU market	AU markets with high demand for SA exports
240220	Cigarettes containing tobacco	Cameroon
220710	Undenatured ethyl alcohol	Rwanda
110220	Maize (corn) flour	Togo
100510	Maize (corn)	Ghana
080810	Apples	Nigeria
170111	Cane or beet sugar	Uganda
441011	Wood and articles of wood; wood charcoal	Kenya
190410	Prepared foods obtained from cereal products	Nigeria
210310	Sauces and preparations	Nigeria

Source: author's calculations based on WITS-SMART.

The SMART simulation revealed South African products that have the highest trade potential on the AU market after full liberalization. Table 4 shows that South African exports of cigarettes, maize (corn), maize flour, apples, wood, cereal, and cane sugar stand to gain more from the FTA. The smart model also identified AU markets that South Africa will need to exploit in relation to the products highlighted. Cameroon conveys the strongest demand for South African cigarettes, followed by Togo and Ghana showing the strongest demand for South African maize exports. Nigeria, Kenya, and Uganda showed the strongest demand for cereal, wood, and sugar cane, respectively.

3.4 Impact in terms of revenues and welfare

The proposed tariff liberalization under the AfCFTA is revealed to harm the South African agricultural sector. In terms of other member states, the extent of revenue shortfall will vary across countries depending on the tariff phase-down approach as provided in the FTA. As indicated in Table 5 below, the results of the SMART simulation suggest that South Africa would experience a 7 per cent decline in tariff revenue.

Table 5: Revenue and welfare impacts on SA market after liberalization (US$)

Country	Revenue before FTA	Revenue after FTA	Revenue loss in %	Welfare effect
South Africa	316 037 070	295 619 925	7%	1 035 955

Source: author's calculations based on a WITS-SMART.

The SMART model also revealed the welfare impacts of the tariff shock. Welfare effects are beneficial material impacts on the domestic (importing) nation's consumer sector as a result of the cheaper imported goods. The results of the simulation model project a welfare effect of about US$1 million to South African consumers. The welfare effect in this context is known as 'consumers surplus' and refers to the additional consumption possible by South African consumers.

3.5 Vulnerable agriculture, forestry, and fisheries products at the regional level

Using the results of the model, the study isolates South African agricultural products that may be exposed to the high influx of imports from the AU market. This analysis will enable the South African negotiating team to consult with the private sector and formulate strategies that aim to

reduce the potential harm of the tariff liberalization and possibly to set up a list of products to be included under the exclusion list. Table 6 below depicts South African products that stand to be highly vulnerable to imports from the AU market. The table also conveys AU markets that are responsible for the influx of imports to the South Africa domestic market.

Table 6: SA vulnerable products from the FTA

Product description	Exporting country	Exports before FTA	Exports after FTA	Export increase in %
Cotton seeds	Benin	5 031 210	6 285 055	20%
Paper; banknote	Kenya	4 058 125	4 485 838	10%
Roses	Kenya	1 683 892	2 937 156	**43%**
Toilet or facial tissue stock	Tunisia	2 407 752	2 574 499	6%
Peas (Pisum sativum)	Kenya	464 838	973 741	**52%**
Crushed ginger	Nigeria	763 899	892 046	14%
Onions and shallots	Kenya	32 120	803 822	**96%**
Plants used in perfumery	Morocco	344 989	576 441	40%
Cut flowers	Kenya	319 832	422 521	24%
Edible vegetables	Nigeria	174 202	221 315	21%
Palm nuts or kernels	Nigeria	175 955	189 164	7%
Beer made from malt	Nigeria	108 910	118 945	8%
Pasta, whether or not cooked	Nigeria	61 349	100 235	39%
Cereal groats, meal, and pellets	Nigeria	5 677	55 112	**90%**

Source: author's calculations based on WITS-SMART.

It is evident from Table 6 that domestic production of cereal groats, onions, peas, and roses are vulnerable to imports from the AU market. The SMART model shows a 96 per cent increase in onion exports from Kenya to South Africa and a 90 per cent export increase of cereal groats from Nigeria. The import increase in all the products above will mostly benefit consumers from the reduction in commodity prices. South African consumers, especially those of cereal, roses, malt beer, and peas will enjoy the benefit of reduced prices and greater quantities. On the other hand, domestic producers will be left out of business if they are unable to compete.

4 Conclusion

The study aimed to investigate the implications of a full tariff liberalization as proposed under the African continental free trade area. It adopted a SMART partial equilibrium model to explore the impact of the FTA on South African agricultural trade. The model's results showed that the proposed FTA's impact on bilateral trade flows would most likely be unequal, indicating relatively large economic gains for developing economies like South Africa and less gains for small economies. The magnitude of this anticipated imbalance will be determined by the actual details of the agreement, which are still being discussed at the time this study is completed. Provided a full tariff liberalization of agricultural tariff lines, South Africa is set to benefit a total trade creation of about US$199 million. The South African agricultural industry will enjoy an increased export market access and be able to diversify its export basket on the continent.

While enjoying the preferential access on the African market, South African farmers—particularly of edible vegetables, malt beer, peas, sugar cane, wood, and apples—are set to compete with exports coming from different regions of the continent such as Kenya and Nigeria. This will leave less competitive industries out of business and those that are competitive will be more efficient. South African consumers of most agricultural goods will reap the benefits of the FTA through reduced commodity prices. This could translate to better food security for low-income and rural households who heavily rely on agricultural products for survival.

To ensure that the benefits of the FTA do not overweigh losses, the study recommends that industries vulnerable to excess exports from the FTA should be supported through direct subsidies. The government could in the short run exempt the identified products from full liberalization and list them under its exclusion list. In the long run, the government can offer production subsidies to vulnerable industries; this will allow the identified industries to maximize production, sustain jobs, and boost their competitiveness. In terms of revenue losses, it is recommended that AU member states, in particular South Africa, should optimize and diversify their tax revenue sources. Lastly, the study recommends an additional research on the overall impact of the FTA in all sectors and sub-industries that this paper did not attempt to analyse. The application of the computable general equilibrium (CGE) model would be most appropriate for such analysis because it measures not only the impact of tariff liberalization on trade flows but also the indirect consequences in general prices and other macroeconomic factors.

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