A General Equilibrium Analysis on the Potential Effects of the African Continental Free Trade Area (AFCFTA) on African Economies

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ABSTRACT

This study investigates the potential impact of the African Free Continental Trade Area on welfare, gross domestic product, labor demand, industrial output, and trade. To achieve the objectives, the study uses the Global Trade Analysis Project database 11. The database was used to aggregate Sub-Saharan Africa into five major regions according to geographical location Western, Southern, Northern, Eastern, and Central Africa. Sectors were grouped into agriculture, services, utility and construction, transportation and communication, heavy manufacturing, light, manufacturing, and extraction. The simulation scenario was conducted for three periods; 2025, 2030, and 2035. The result shows that gross domestic product will increase to 8,277,010 trillion by 2030. Western Africa will contribute the highest share followed by Northern, and Southern Africa. Trade result reveals that import and export will increase throughout the simulation periods with the highest potential discovered in southern Africa to be 34.1% for imports and 33.9% for exports in 2035. Labor demand shows an increase in 2025 and 2035 but a decline in 2030 in all sectors except agriculture which shows a resilience demand for labor up to 0.41%. The industrial output shows an increase in all periods with huge potential in the service industry with a 22.8% increase in 2035 followed by transportation with an 18.59% increase in 2035. Welfare also shows an increase through the periods with allocative efficiency producing the highest contribution to welfare with a total of 30% increase in all periods.

Keywords: Regional Integration, African Free Continental Trade Area, Welfare, Regional Economic Community, Gross domestic Product.

INTRODUCTION

The AfCFTA agreement was launched at an Extra-Ordinary Summit on 21st March 2018 in Kigali, Rwanda, where 44 countries signed the agreement. The AfCFTA agreement entered into force on 30th May 2019 after the 22nd ratification was done on 29th April 2019 and trading under the AfCFTA officially started on 1st January 2021. Different studies have revealed that the AfCFTA would increase intra-African trade by 25 to 30% from the current 14.6% in the coming decade (Geda, 2022). It is also anticipated that a successful AfCFTA will also have a significant impact on several sectors including manufacturing and industrial development, tourism, intra-African cooperation, and economic transformation.

According to (Kalaba, 2019), a successfully implemented AfCFTA will enable Africa to generate a

combined consumer and business spending of $6.7 trillion by 2030. It is expected that Africa's expand and more efficient goods and labour markets will significantly increase the continent's overall ranking on the Global Competitiveness Index. Increased market access, in turn, is expected to enhance the competitiveness of industries and enterprises, the exploitation of economies of scale, and the efficacy of resource allocation. Apart from creating a market of more than 1.4 billion people with a combined Gross Domestic Product (GDP) of more than US$3.4 Trillion, the AfCFTA is anticipated to expand intra-African trade and enhance the competitiveness of African industries through simplified cross-border trade and economies of scale, respectively.

As one of the implementation strategies for the African Union's Vision 2063 The AfCFTA was established to eliminate trade barriers in the form of tariffs, quotas, borders restriction among others to promote trading activities on the continent. The AfCFTA has its foundation in aspiration one, "a prosperous Africa based on inclusive growth and sustainable development with focus on goal four, ''transformed economies" (African, 2020). All states in Africa are signatories' members except Eritrea, 46 countries have deposited their instrument of rectification excluding Liberia, Libya, Sudan, South Sudan, Somalia, Mozambique and Madagascar. The regional economics groups are gradually moving from a customs union to a common market with one passport that allows the free movement of capital within the region. This has been noticed with the Economic Community of West African States (ECOWAS) and the East African Community (EAC). All of these regional Economic grouping form part of the AfCFTA which present a positive signal for active implementation of the AfCFTA protocol on free movement. This research article is an effort to access the potential economic effects of the African Continental Free Trade Area on African economies. The study accesses the effect of the AfCFTA on variables such as economic welfare, Gross domestic product, trade, industrial output, and demand for labor to determine the potential effects. The study used the General Trade Analysis Project (GTAP) as methodology.

Statement of the Problem

The major problems towards the effective implementation of the AfCFTA are on the following counts, infrastructure gap, high transactions cost, political instability, improper dissemination, careless national implementation, and external trade interferences. Free trade arrangement is not a new discourse on the African Continent. All of the eight recognized RECs have a trade agreement. For example, The ECOWAS Trade Liberalization Scheme (ETLS) which have the major objective to liberalize trade in western Africa by abolishing customs duties levied on imports and exports and eliminating non-tariff barriers among member states for the establishment of a free trade area at the community level. Another example is the tripartite that linked Common Market for Easter and Southern Africa (COMESA), East African Community (EAC), and Southern African Development Community (SADC) into a common trade area and form the foundation of the AfCFTA. The tripartite was established to strengthen and deepening economic integration among the regional economic groups in east and southern Africa. With all of this arrangement, research has proven that many countries in Africa export raw materials and import finished products mainly to and from China, Europe, and America which is causing huge disequilibrium in the balance of payment account of many African countries and slowing regional trade. (Lisandro Abrego, 2020) attributes the low performance of intra-African trade to infrastructure gaps and high transactions cost which derive from alternative to western trade providing low cost. An Example is the African Growth and Opportunity Act (AGOA) enacted by the United States Government which provide African Countries with duties free access to the US market for over 6800 qualified products under the Generalized System of Preferences Program (GSPP). Another is the Economic Partner Agreement Program that exist between the European Union, ECOWAS, and West African Economic Monetary Union among several others from China.

The highways linking most African countries are very poor, traveler have to take weeks and months to travel with goods while travel by air is seen to be luxury due to the associated cost. Many of the Countries to

which Africa export and import, have colonial heritage with our African countries. As a result, many of these foreign countries have established and own many multinational companies on our continent which they have total decision-making power over. Most of these foreign countries do not have power only over the companies they own but also decide and control our monetary and fiscal policy. For example, France in most Francophone countries in West and Central Africa, and Great Britain in East and part of West Africa among others. Political and security instability spread across the continent with special references to the Boko haram in Nigeria, the Anglophone crisis in Cameroon and military coups across many parts of west Africa. These instabilities stall the active movement of goods across the continent and post threat to free movement of labor established under the AfCFTA. The AfCFTA has received low publicity at the regional level with many national entrepreneurs and security personnel lacking the key knowledge on what it entails. As the result, national implementation is still very low. How effectively with the rules and mandate under the AfCFTA be respected and implemented when infrastructures gaps, high transaction cost, and Neo-colonialism which studies have proven to be hindrances to the performance of intra-African trade performance still existing today. When Neo-colonial masters are the ones shipping our raw material with decisions making power and great interest in our political affairs coupled with their currency being used to back up our local currency. Trade diversion to these countries will be a distractor especially the least cost scenario of obtaining their product compare to the product that comes from around Africa which will lead to neglecting the mutual arrangements in the AfCFTA agreement by countries.

(McDaniel, 2008) admitted that trade liberalization and globalization create new opportunities yet remain controversial because competition invariably causes dislocations. Another problem that could negatively impact the AfCFTA performance is the issue of hegemony, while it is truth that many African countries import finish and technological products while exporting large quantities of raw materials, few countries in Africa have moved from the primary stage of production to the tertiary stage and export more, making them far superior to other countries on the continent. The level of economic integration among regional economic groups in Africa are very unsimilar so is the economic level and production capacity of African counties. Some regional groups are customs unions, monetary unions, and money markets while many countries are underdeveloped, some are developed and others are developing. For example, (UNCTAD, 2022) observed that export potential under the AfCFTA is concentrated in three major economies which include Egypt, Morocco, and South Africa. How does the AfCFTA potentially effects these unsimilar integration level, unequal economic level, and unbalanced production capacities of African countries under a liberalized trade for the benefit of each country?

Research Questions

Main Research Question

The main research question of the study is, what are the potential effects of the AfCFTA on Africa economies?

Specific Research Questions

The specific questions will include

1. What will be the affect of AfCFT on welfare in Africa?
2. How will the AfCFTA affect industrial output in Africa?
3. What will be the AfCFTA affect on labor demand in Africa?
4. How will the AfCFTA affect Gross Domestic Product in Africa? and
5. What will be the AfCFTA impact on trade in Africa?

Objectives of the Study

Main Research Objectives

The major objective of this study is to conduct a general equilibrium analysis of potential effects of the African Free Continental Trade Area on African economies.

Specific Research Objectives

The specific objectives will include:

1. Examine the affects of the AfCFTA on welfare in Africa.
2. Investigate the effect of the AfCFTA on Industrial output in Africa.
3. Investigate the affects of the AfCFTA on Labor demand in Africa.
4. Examine the effect of the AfCFTA on Gross Domestic Products in Africa.
5. Investigate the impact of the AfCFTA on trade in Africa

Scope of the study

Temporal Scope

The study will conduct simulations for three liberalization periods namely: 2025, 2030, and 2035 thereby reflecting progressive liberalization commitments under the AfCFTA. 2025 takes into account when active trading and national implementation will start under the AfCFTA started, 2030 and 2035 allow for a five to ten years predictive periods which account for 10 years analysis. The periods are necessary to determine whether or not the AfCFTA will give the desire results as envisioned in helping to fulfill the agenda of the African we want.

Geographical Scope

Geographically Africa is the second largest continent in the world. It is bounded by the Mediterranean Sea, the Red Sea, the Indian Ocean, and the Atlantic Ocean. It is divided in half almost equally by the Equator. Africa's total land area is approximately 11,724,000 square miles (30,365,000 square km), and the continent measures about 5,000 miles (8,000 km) from north to south and about 4,600 miles (7,400 km) from east to west.

The West African coast comprises Liberia, Cote d' Ivoire, Guinea, Guinea Bissau, Ghana Sierra Lone, Mali, Senegal, Togo, Benin, Nigeria, Niger, Cabo Verde, Burkina-Faso and Gambia with the Economic Community of West African States (ECOWAS) being the largest regional group. In the East is Uganda, Kenya, Tanzania, Ethiopia, Burundi, Rwanda, Somalia, South Sudan, Malawi, Eritrea, Democratic Republic of Congo, Zambia, Djibouti, Madagascar, Sudan, Zimbabwe, Mauritius, Comoros, and Somaliland with the East African Community (EAC) being the largest regional group in the community.

In the south are: South Africa, Botswana, Lesotho, Eswatini, Seychelles, Mozambique and Namibia with Common Market for East and Southern African (COMESA) being the largest regional economic group. In the central are Cameroon, the Central African Republic, Gabon, Equatorial Guinea, the Republic of Congo, Chad, and Sao Tome Principe with Economic Community of Central Africa States (ECCAS) being the largest REC in the region. In the north are Algeria, Morocco, Egypt, Angola, Tunisia, Libya, and Mauritania with the Arab Maghreb Union (AMU) being the African Union recognized regional community. English, French, Swahili, and Portuguese are the major languages spoken on the continent with over 2000 local languages across the countries. Christianity, Islam and Ancestor/Traditional religions are the major form of

religion practices on the continent. The landscape is characterized by mostly flat to rolling coastal plains that contain mangroves and swamps, high mountains which rise to a rolling plateau, low mountains, hills, valley, rivers, lakes, Atlantic Ocean among other natural beauties.

Thematic Scope

The content of the study is limited to accessing the potential effects of the AfCFTA on Africa economies by analyzing the effects of the AfCFTA on welfare, demand for labor, industrial output, gross domestic product, and trade Using the General Equilibrium Analysis Model to study the specific objective and answer the specific research questions.

Significance of the Study

Countries join bilateral trade to benefit from comparative and absolute advantages. The fifty-four countries that signed and the forty-four countries that have rectified the AfCFTA agreement did with the understanding that their economies will benefit by collaborating with other countries. Accessing the general equilibrium analysis of those countries that have rectified the African Free Continental Trade Area will reveal how welfare, labor demand, trade, industrial output and gross domestic product will be affected. With the fact that bilateral trade makes available a wide range of products and services, it is also un-disputing that it posts threat to smaller and weaker countries that has infant industries. Export's potential in Africa is in fewer economies while many economies dominate the import categories. The result from this study will present analysis of the AfCFTA on all African Economies that have signed the AfCFTA agreement which will help policy maker at the regional and national level to formulate inform policies.

The study rreveals the equilibrium level of regions for the simulation years selected on welfare, trade, labor demand and gross domestic product. While the results obtained are group from geographical location, they will provide guidance for policy decisions including strategies for development both at the national, regional, and continental level.

At the regional level, regional economic groups such as COMESA, ECOWAS, EAC, AMU,SADC,ECCAS, CENSAD, SACU among others can use the result to formulate policies that will help them get on path with other regional economic communities or develop strategies that will sustain their contributions and benefits from the AfCFTA. The RECs could also develop programs that will make countries performing with high equilibrium level to assist countries performing low to improve their equilibrium level in the long run. At the national level, individual countries through their commerce, finance, trade ministries and other concern agencies can ascertain the equilibrium level of their economies to the AfCFTA implementation which will enable them design strategies or imitate their counterpart in term of legislations that favor the AfCFTA or production techniques which will lead to efficient contribution and maximum benefits in the long run.

The result obtain will also be helpful to the Organization of African Union, the administrative arms of the AfCFTA and other stake holder such as the African Development Bank (AFDB) to re-examine, formulate or design strategies where possible, through consultation with the regional economic groups to help high-level performing countries to maintain their performance and low level performing countries to improve their performance with each other. This will help weaker countries passed through the short-run impact of the AfCFTA implementation to adequately reap the benefits in the long-run while stronger economies will maintain their level which will lead to an efficient implementation of the AfCFTA.

Thus, this study will be quite unique since the study will be using variables such as welfare, demand for labor and industrial output and gross domestic product. It is meant to serve as a pre-condition for rectified members countries in Africa to established law or policy that will help their countries to identified and exploit potential opportunities and impacts that the AfCFTA will have on welfare, demand for labor and

industrial output, GDP and trade for the three simulation periods.

Organization of the study

This article is divided into five chapters. Chapter one constitutes the introduction of the study, the statement of the problem, research questions, objectives of the study, and scope of the study. Chapter two consists of the theoretical literature, empirical literature, and the research gap. Chapter three is made up of the methodology of the study which include study area, research design, data collection techniques, sources of the data. Chapter four will present the findings and explain the implication of the findings on the population. The final chapter, chapter five will summarize the result, conclusions, recommendations and give suggestion for farther studies relating to the subject.

LITERATURE REVIEW

In this section, existing literature on trade and integration are provided. In an attempt to provided major arguments that support this study, gaps that has been left behind by authors in the field were reviewed. The chapter branches out into two major sections, the first look at theories that has survive ages in stating the foundation and building the pillars on which the subject stands. The second section compare authors' contributions to the subject.

Theoretical Review

(Hecksher and Ohlin, 1979) identified the role of labor and capital as a determinant of advantage in free trade agreement. According to the major argument of the theory, countries exports goods whose production uses intensively the factor of production that is relatively abundant in the country. That means, countries endowed with capital will export capital intensive product, while countries endowed with labor will export labor intensive goods. According to Bertile Ohlin, trade arise due to the differences in the relative price of different goods in different countries. They attributed the differences in commodity prices to differences in the endowment of factors across countries. Factor endowment across African varies a little with high labor and low technology. The theory was criticized from many authors base on its limitations. (Wijnhold, 1980) criticized that it is not the factor price that determine the cost and commodity price rather, it is the commodity price that determine the factor price. (Leontief, 1979) also tested the theory using the American economy and found out that been capital endowed, the US exported labor intensive products.

(Haberler, 1936) theory of customs union argues that custom union is more beneficiary to small states on grounds that they incur more danger if they avoid each other goods. The theory stressed that the benefits of the customs union can only be reaped by free trade which will entail an international division of labour and comparative cost not dwelling on racial, cultural, or national associations. From an economic viewpoint, the theory welcomes the general removal of duties by states compared to the removal of duties within states. Before Viner developed the theory of customs union, there was a general belief that customs union raises the level of welfare as customs union is a movement towards free trade at least within a specific area. Viner pointed out that the conclusion concerning increase in welfare due to customs union is not necessarily true. He analysed the production effects of customs union through the concepts of trade creation and trade diversion. The works of the writers like Meade, Lipsey, Lancaster and many others analysed the consumption effects. H.G. Johnson followed a partial equilibrium approach to investigate fully the effects of a customs union by incorporating both the production and consumption effects.

Empirical Literature

Regional trade agreement has had divergent view among policies maker and academician. The interest of perspective benefits had prompted researcher to investigate the outcome of these agreement on different

variables.

(Charles, 2021) in a study "African continental free trade area: is there a trade potential for Cote d'Ivoire? The author studied the search for potential trading partner on the continent with regard to the AfCFTA. The study used the structural gravitational model to estimate trade potential by considering export data from 2001 to 2016 on 45 Countries in Africa. The result reveals that there is great trade potential for Cote d'Ivoire among 25 Countries with the greatest potential being Lesotho, Algeria, Seychelles, and Gabon. Others Countries with potential in Niger, Benin, Gambia, and Guinea all from ECOWAS.

In another study (Masunda, 2021) on the implication of the African Continental Free Trade Area on Intra-COMESA trade using trade-based indices and structural gravity model to examine the effect of the AfCFTA on the intra trade within the region, the result shows limited trade diverting effects of the AfCFTA on the region. These results are fertile because many countries are still lacking behind with infant industries and low human development proving to be a mismatch to countries that are fully prepared for the implementation of the AfCFTA on the continent.

(Zhang, 2018) used the CGE modeling technique, the Global Trade Analysis Project (GTAP) model, to assess the economic impacts of the China-Australia Free Trade Agreement (ChAFTA) on both the Australian and Chinese economies and the rest of the world. The study showed that China and Australia could benefit by fully or partially implementing the ChAFTA and the benefits would be in the form of increased GDP growth rates, exports, factor prices, and economic welfare. However, the rest of the world would be at a disadvantage on account of the resultant trade diversion effect of the ChAFTA as the new RIA would favor member countries.

(Simola, 2022) studied the evaluation of the economic effects of the AfCFTA with the dynamic Computable General Equilibrium (CGE) model MAGNET. The analysis accounts for import tariff cuts and non-tariff measure (NTM) elimination and harmonization. This study focuses on agri-food sectors to assess the AfCFTA's potential in contributing to Africa's food security. Food security remains one of the most pressing issues in Africa. In 2020, 282 million Africans were undernourished, which is one-third of the global amount. The economic integration achieved by the AfCFTA could enhance food security by making the continent-wide trade of food commodities more efficient and responsive to market signals. The economic effects of the AfCFTA are positive, although the GDP increase is moderate (0.4% in 2035 in the AU level). Intra-African trade increases considerably, and the shares of intra-African trade increase by 2.5 and 3 percentage points for imports and exports, respectively (from 12% and 14% in the baseline, respectively). The bulk of the income gain is achieved by NTM harmonization, whereas the impacts of tariff cuts are more moderate.

The output of agri-food commodities increases at the African level, although unevenly. Countries that have their comparative advantages in other industries increase their food imports. This is especially the case in resource-rich countries that increasingly export their products to other African countries. The effects on food security are nevertheless almost uniformly positive. Food consumption increases throughout Africa, and the number of undernourished people decreases by one million by 2035. Although the decrease is moderate considering the total number of undernourished, it coincides with higher income growth. This study also finds evidence of increasing food prices in several regions of the continent, but in all cases, wages increase more than food prices. Thus, purchasing power for food is positively affected throughout.

Research Gap

Many studies on the impact of the African Continental Free Trade Area on economies within Africa used the Gravitational model methodology which categorized countries base on the openness and proximity to sea ports and open borders. The method assume that benefits obtained from regional trade is fulfill when all

members react by playing an active part through imports, exports, and trade facilitations. The reality is that the production capacities of countries in Africa are very dissimilar with large disparities. Many African Countries will be in the importation categories entirely within the short run while others will dominate the export categories within the short run. For example, (Charles, 2021) used the structural gravitational and the result found that few countries were potential trade partners to Cote d'Ivoire while some had little or no trade potential. (Masunda, 2021) also used the gravitational model and trade base indices which reveal a little trade diversion within COMESA.

The Global Trade Analysis Project have been used extensively within studies done on trade integration mainly within Latin America, Europe and Asia. For example, (Khoso, 2011) used the GTAP and the result showed that Pakistan will benefit net exports from the SAFTA. (Lewis, 2003) use the CGE and the result showed that SADC will benefit trade creation within the FTA. The sensitivity of the GTAP to far sight regional economic activities including the different factor of productions makes it efficient for findings. However, many studies on the AfCFTA have prefer the gravitational model. Making this study more unique from others is the Simulation application which will capture tariff liberalization in time series for more effective findings. Most studies on regional integration and trade liberalization have been able to reveal mainly the tariff reduction and trade agreements in Africa have more direct impact on regional group proximity to countries compared to other groups, and far away countries. For example, (Richardson K. Edeme, 2020) studied proved that becoming a member of the RECs have a more positive impact on agricultural product compare to becoming a member of the AfCFTA, this was because of the method employed. Each REC has openness to border and share more social and economic activities where each country currency is easily traded. This makes it easy for the gravity model to capture since the model is built to account for trade openness.

METHODOLOGY

The study adopt the General Equilibrium Analysis model (GCE) design and formulated by the Global Trade Analysis Project. The GTAP model host aggregation database for regions, sectors, and factors that is manipulated to satisfied the objectives of the study. Countries in the South Sahara Africa (SSA) region is disaggregated into West, East, North and central Africa. The sectors are aggregated into agriculture, extraction, process food, services, light and heavy manufacturing.

GTAP Model

To obtain a General Equilibrium Analysis of the African Continental Free Trade Area (AfCFTA) on economies in Africa, the Computable General Equilibrium Modeling and the Global Trade Analysis Project (GTAP) model was used. These models have been chosen on account of it far sighted potential to capture and predict economic phenomenon of regional integration across different regions (Zhang, 2018).

Simulation Scenarios

The simulations scenarios will focus on the effects of import and exports adjustments negotiated under the AfCFTA. The study will perform simulations for three liberalization periods namely: 2025, 2030, and 2035 which is gear towards predicting the impact of the AfCFTA on African economies during these periods. .

Data Sources and Description

The study use the GTAP 11 database which has the most recently updated data on trade for different countries, sectors, and regions. The database was aggregated into six sectors namely (i) agriculture, (ii) extraction, (iii) processed foods, (iv) light manufacturing, (v) heavy manufacturing, and (vi) services. Five regions as Western, Southern, Northern, Eastern, and Central Africa. Two factor as skill and unskilled

labors which are all mobile. These disaggregation will help to assess how different regions, sectors, and factor of the economies would be affected by the AfCFTA.

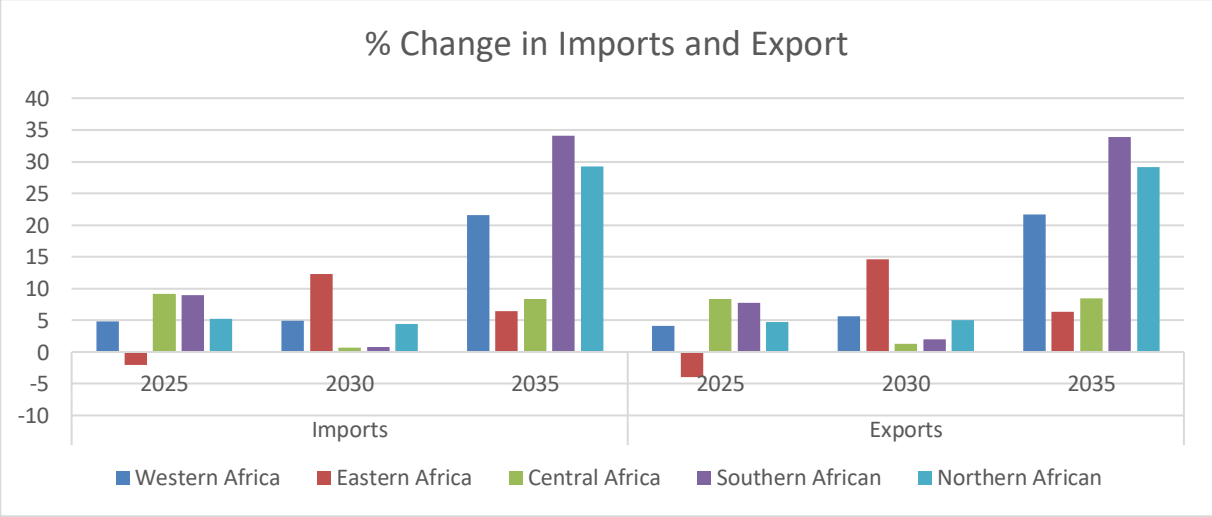
STUDY FINDINGS

This chapter present and interpret the result with the aim of answering the research questions. Results are presented on the concerns variables; welfare, Gross domestic product, trade and industrial output for the simulation period of 2025, 2030 and 2035.

Total Intra Continental Trade Simulation for Imports and Exports

Figure 4.1 below shows the simulation result for the percentage changes in imports and exports for the simulations years of 2025,2030 and 2035 to account for the value of trade within the continent. Though the graph shows that general imports activities will increase more than exports activities, the simulation result shows that 2035 will have the highest result from the simulations periods. In 2035 imports activities in Southern Africa will increase by 34. 1 % while exports activities will increase by 33.9% making the region to have the highest activities of imports and exports in the AfCFTA agreement. The next higher performing region for imports and exports activities will be the Northern region which will have an increase of 29.2% in imports activities and 29.1% in exports activities in the simulation year 2035, follow by Western Africa with an import activity of 21.6% and exports activities of 21.7% in 2035. The negative performance will occur in 2025 within the Eastern African region which will have a decrease import activity of 2% and a decrease export activity of 4%.

Figure 4.1: simulation for Import and Export value for 2025, 2030 and 2035 in billions of dollars



Source: Author's Simulation Computation using GTAP database 11.

Table 4.1 present the result for imports and exports activities and conclude with the market value for the three simulations period under the AfCFTA agreement. From table 4.1, huge imports and exports potential is found in the Southern Africa economy, particularly in 2035 with an import value of 34.1%, and an export value of 33.9, follow by Northern Africa with an import value of 29.2% and an export value of 29.1% and Western Africa in third place with an import value of 21.6% and an exports value of 21.7% all in 2035. The best trade value will occur in 2030 with eastern African having the highest potential of 2.3% followed by southern African with a trade balance increase of 1.3 % and western Africa with 0.7% all in 2030. Decrease in imports and exports is observe in eastern Africa in 2025, with imports decline of -2% and export decline of -4%

Table 4.1: Result from Imports, Exports and (Trade value)

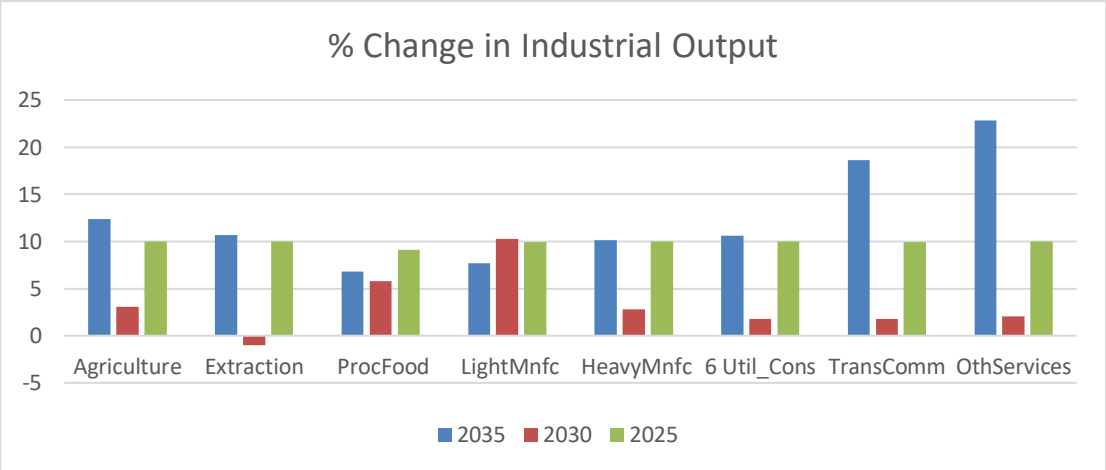
% Change	Imports			Exports			Trade balance		
	2025	2030	2035	2025	2030	2035	2025	2030	2035
Western Africa	4.8	4.9	21.6	4.1	5.6	21.7	-0.7	0.7	0.1
Eastern Africa	-2	12.3	6.4	-4	14.6	6.3	-6	2.3	-0.1
Central Africa	9.2	0.69	8.4	8.4	1.3	8.5	-0.8	0.61	0.1
Southern African	9	0.8	34.1	7.8	2	33.9	-1.2	1.2	-0.2
Northern African	5.2	4.4	29.2	4.7	5	29.1	-0.5	0.6	-0.1

Source: Author's Simulation Computation using GTAP database 11

Intra Continental simulation for changes in industrial output

Figure 4.2 below shows results from industrial activities under the AfCFTA arrangements. The simulation results show an increase throughout the simulation year with 2035 producing the highest result. Compare to 2025 and 2030. The industries were grouped into Agriculture, extractions, processed food, heavy manufacturing, light manufacturing, transportation and communication, utility and construction and services. From figure 4.2, the service sector will have the highest percentage change of 22.8% in 2035 follow by the transportation and communication industries with an increase of 18.59 and the agriculture industries with 12 % changes in 2035. 2030 will produced the least percentage increase with a negative value of -1.03 in the extractive industry.

Figure 4.2: Showing industrial performances over the simulation periods of 2025, 2030 and 2035



Source: Author's Simulation Computation using GTAP database 11.

From Table 4.2, the simulation year 2035 has the highest output value follow by 2025. The huge potential for output in industrial activities is within the service industry with the highest output of 22.8% increase in 2035 follow by transportation and communication industry of 18.59% increase in 2035. The least performing simulation year is 2030 with a decrease of -1.03% in the extractive industry.

Table 4.2: Result from Industrial Output

%Change	2025	2030	2035
Agriculture	10	3.1	12.4

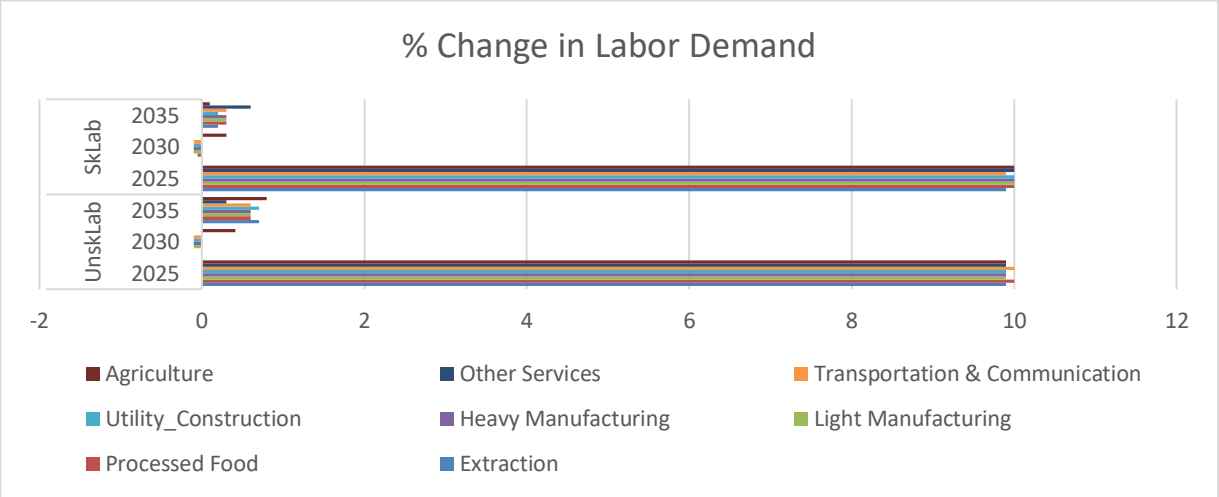
Extraction	10	-1.03	10.7
ProcFood	9.09	5.77	6.8
LightMnfc	9.9	10.28	7.7
HeavyMnfc	10	2.8	10.1
Util_Cons	10	1.8	10.6
TransComm	9.9	1.8	18.59
OthServices	10	2.05	22.8
Total	78.89	26.57	99.69

Source: Author's Computation using RunGTAP and GTAP datrabase 11

Inra continental simulation for changes in labor demand

From the simulation result presented by figure 4.3, labor demand is expected to have a huge effecct in 2025, a negative effect in 2030 and a positive effect in 2035. In 2025 which is consider to be the year with the highest simulation scores, processed food will demand the highest amount of labor with a 10% increase for both skilled and unskilled labor, follow by the transportation and communication industry with a 10% increase in the demand for unskilled labor and a 9.9% increase demand for skilled labor. In 2030 which produce the negative effects among the simulation periods, heavy manufacturing, light manufacturing, utility and construction, and transportation and communication will all experience a decrease demand for both skill and unskilled labor with a -0.1% decrease. The 2035 simulation with the positive values, will be dominated by the agriculture sector which will demand 0.8% increase in unskilled labor and 0.1% increase in demand for skill labor, follow by the extractive industries and the utility and construction industry which both will account for an increase percent of 0.7 demand for unskilled labor and a 2% demand for skill labor in 2030.

Figure 4.3: Showing simulation for percentage change in Labor Demand



Source: Author's Computation using the GTAP data base 11

Table 4.3 shows that labor demand potential is increasing in 2025 and 2035 while 2030 shows a decrease demand. The demand for unskilled labor under the AfCFTA agreement will be slightly higher than the demand for skill labor in 2025 with transportation and communication accounting for the highest employment level in 2025. In 2030 labor demand is negative and zero between all industries except for the agriculture industrial which is accounting for employment increase up to 0.41% of unskilled and 0.3% of skill labor. Labor demand in 2035 from all sectors are below 1% with the agriculture industry accounting for

the highest demand of unskilled labor up to 0.8 % follow by the extractive industry with 0.7% while the service sector will account for the highest increase of skilled labor up to 0.6%.

Table 4.3 Result for Labor Demand

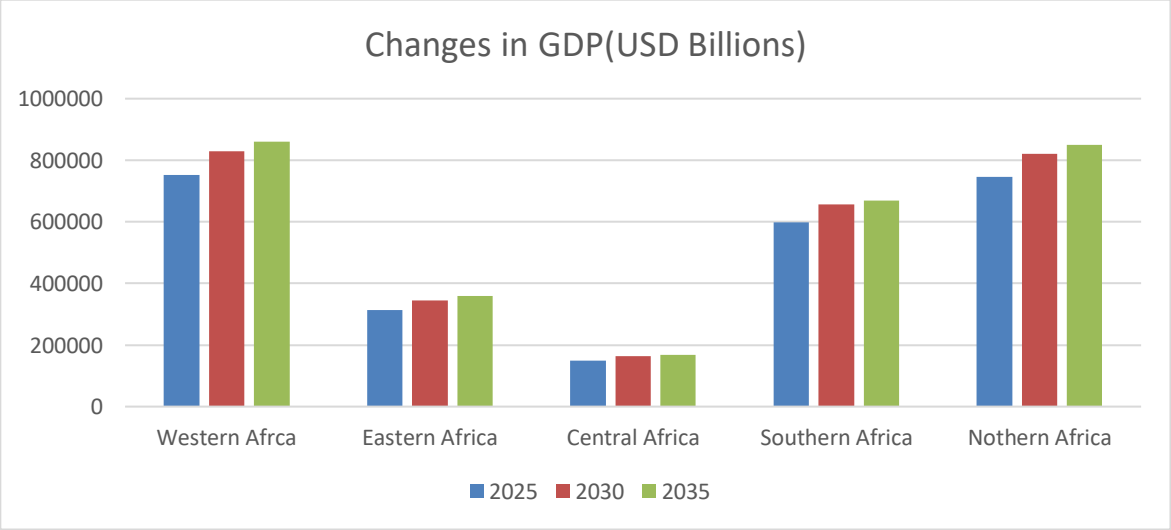
	UnskLab			SkLab		
	2025	2030	2035	2025	2030	2035
Extraction	9.9	0	0.7	9.9	0	0.2
Processed Food	10	0	0.6	10	-0.05	0.3
Light Manufacturing	9.9	-0.1	0.6	10	-0.1	0.3
Heavy Manufacturing	9.9	-0.1	0.6	10	-0.1	0.3
Utility_Construction	9.9	-0.1	0.7	10	-0.1	0.2
Transportation & Communication	10	-0.1	0.6	9.9	-0.1	0.3
Other Services	9.9	0	0.3	10	0	0.6
Agriculture	9.9	0.41	0.8	10	0.3	0.1
Total	79.4	0.01	4.9	78.8	-0.15	2.3

Source: Author's Computation using the GTAP data base 11

Intra continental simulation for changes in GDP

Figure 4.4 present the total simulation result for real gross domestic product. From figure 5, the simulation result shows that total GDP will increase to 8,277,010 trillion by 2035 in Africa under the AfCFTA agreement. In Western Africa, GDP will rise from 752,897.12 billion in 2025 to 828,186.9 billion in 2030 and 849,852 billion in 2035, making it the highest regional contributed to GDP in the AfCFTA arrangement. In Northern Africa GDP will increase form 745,572.16 in 2025 to 820,129.3 million in 2030 and 849,168.1 million in 2035. In Southern Africa, GDP is expected to rise from 597,396.05 million in 2025 to 657,135.7 in 2030 and 668,933.5 million in 2035. For Eastern Africa, GDP is expected to rise from 313,276.35 in 2025 to 344,604 in 2030 and 360,146.5 in 2035. In Central Africa, GDP will rise from 148,776.32 in 2025 to 163,654 in 2030 and 167,282.4 million in 2035.

Figure 4: Showing Changes in Real GDP for 2025,2030 and 2035



Source: Author's Computation using the GTAP database 11.

Table 4.4 shows that the AfCFTA has a positive and increasing impact on gross domestic product on the continent from 2025 to 2035. From table 4.4, GDP will increase up to 8,277,010 trillion by 2035 which is the highest simulation period. At the continental level, western African will experience the highest increase among other regions with an increase GDP up to 2440936 billion in 2035 follow by northern Africa with an increase up to 2414870 follow by southern African of up to 1923465 billion in 2035.

Table 4.4: Result for GDP

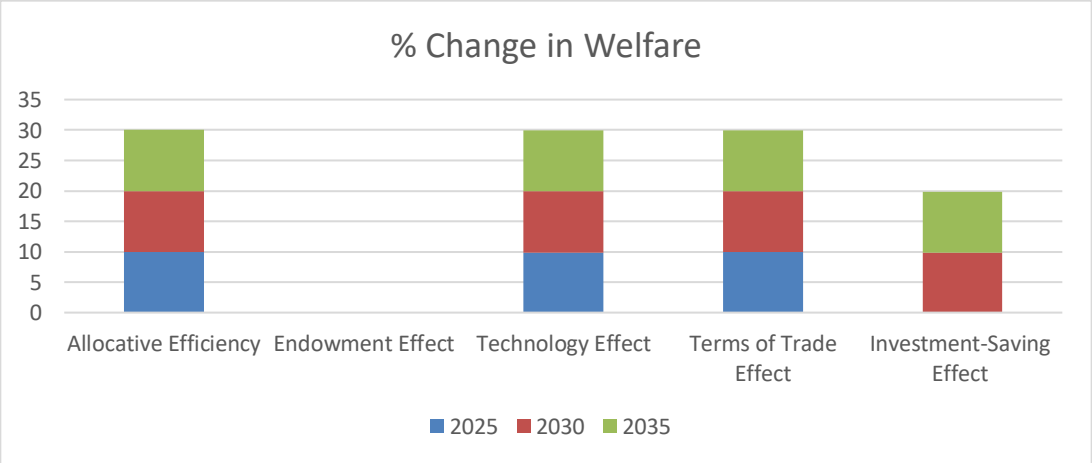
GDPEXP	2025	**2030**	**2035**	**Total**
Western Africa	752897.12	828186.9	859852	2440936
Eastern Africa	313276.35	344604	360146.5	1018027
Central Africa	148776.32	163654	167282.4	479712.6
Southern Africa	597396.05	657135.7	668933.5	1923465
Nothern Africa	745572.16	820129.3	849168.1	2414870
Total	2557918	2813710	2905382	8277010

Source: Author's Computation using RunGTAP and GTAP database 11

Intra Continental Simulation for Welfare

Figure 4.5 shows the simulation result for welfare. From the result presented by figure 4.5, welfare under the AfCFTA agreement is found within allocative efficiency, terms of trade effect and technological effect throughout the three simulation periods. With investment and saving effect experience in 2030 and 2035 while endowment effect remains unexperienced. Allocative efficiency topped the three periods with a uniform increase of 10% in the three simulation years, follow by terms of trade effect with a 10% increase in 2025, 9.9 % increase in 2030 and a 10% increase in 2035, and the technological effect with an increase of 9.9 % in 2025, and a 10% increase in 2030 and 2035 respectively. Investment and saving presents a 0% increase in 2025, and 9.9% increase in 2030 and 2035 with endowment effect experiencing 0% increase throughout the periods.

Figure 4.5: Changes in welfare for 2025,20230 and 2035



Source: Author's Computation using the GTAP data base 11

Table 4.5 show the result for welfare. Welfare under the AfCFTA agreement is positive and increasing. Total welfare under the agreement will increase from 29.9% in 2025 to 39.8% in 2030 and 39.9% increase

in 2035. Huge welfare is derive from the allocative efficiency follow by terms of trade effect and technological effect which both has the same contribution to welfare. Endowment effect remain zero throughout the simulation periods.

Table 4.5: Result for welfare

% Change in Welfare	Allocative Efficiency	Endowment Effect	Technology Effect	Terms of Trade Effect	Investment-Saving Effect	Total
2025	10	0	9.9	10	0	29.9
2030	10	0	10	9.9	9.9	39.8
2035	10	0	10	10	9.9	39.9

Source: Author's Computation using RunGTAP and GTAP database 11

SUMMARY OF THE FINDINGS

The study examine the potential impact of the African Free Continental Trade Area in sub-Saharan Africa using the simulation years of 2025, 2030 and 2035. The specific objectives were to examines the effects of the AfCFTA on GDP, trade, labor demand, industrial output and welfare in Africa. These objectives were achieved by using the GTAP 11 database, the RunGTAP and the RunDynam. The GTAP 11 database was used to access the data and conduct the sectoral, regional and factor aggregations. RunGTAP was used to run the sensitivity and simulation test while RunDynam was used to conduct the dynamic simulation for the three years periods. The effect of Gross domestic product established a positive effect of an increment of GDP from 2025 to 2030, and 2035 at the continental level. At the regional level, Western Africa will experience the highest effects and contribute the highest to GDP follow by Northern Africa and Southern Africa.

The effects of industrial output show a positive impact throughout the simulation periods 2025, 2030 and 2035. 2035 produce the highest simulation periods among African Industries. At the industrial level, the services sector will produce the highest impact in 2035 follow by the transportation, communication, and the agriculture industries accounting for the highest impact in 2035. In 2030, the light manufacturing industry will account for the highest effect follow by process food and the agriculture industries. A negative impact is experience in the simulation period of 2030 within the extractive industries.

Labor demand result shows a significant impact in 2025, an insignificant effect in 2035 and a negative impact in 2030 with only agriculture industrial having improved level of effects for labor demand throughout the simulation periods. A similar result was found by Zembele A. (2022) on the Malawi economy where all other industries exhibited negative demand for labor except for processed food and the services industries which shows potential demand for additional labor.

The potential effect for trade that took into consideration the imports and exports sector reveal that the three simulations periods have potential positive impact on trade in Africa. The imports and exports sectors will both experience increase throughout the simulation periods. However, 2035 will produce the highest effects compare to 2025 and 2030. At the regional level, Southern African will have huge potential for both imports and exports compare to any other region, followed by Northern Africa and Western Africa. A negative effect will be experience in the simulation 2025 in the Eastern region of Africa.

Welfare effect will experience a positive impact throughout the simulations periods with 2035 producing the

highest result, compare to 2030 and 2025. The highest welfare effects will derive mainly from the Allocative efficiency follow by terms of trade and technological effects.

CONCLUSION

An objective of this study was to examine the effect of the AfCFTA on welfare. This objective was achievable using the RunGTAP and the GTAP database 11. The result shows that the AfCFTA will have positive effects on welfare through the simulations periods.

The second objective of this study is to investigate the effect of the AfCFTA on industrial output. The objective was achieved by grouping industries into Agriculture, services, transportation and communication, light manufacturing, extraction, heavy manufacturing, utility and construction. The result show that except for extraction in 2030, the AfCFTA have positive and increasing effects on all other industries through the simulation periods.

The third objective is to investigate the effect of the AfCFTA on labor demand. The study findings on this objective were achieved by disaggregating labor into skill and unskilled across industries. The findings reveal that for the 2030 simulation period, labor demand will have negative effects while the 2025 and 2035 periods show a positive and increasing effect of labor demand.

The fourth objective of this study is to examine the effect of the AfCFTA on gross domestic product. This objective was achieved by dividing the continent into geographical region. The result proved that the AfCFTA will have a positive and general increase in GDP on the continent with west, north and southern Africa reaping the highest rewards.

The final objective was to investigate the impact of the AfCFTA on trade. To achieve this objective, activities on imports and export were examine per region. The result shows that the AfCFTA will have a positive and increasing effect on trade throughout the simulations except for 2025 where Eastern Africa will have a negative effect on trade.

RECOMMENDATIONS

The following recommendations are made base on the findings of the studies:

Based on the result that derive from the demand for labor, the AfCFTA need to prioritize the enforcement of the free movement of labor and goods under the agreement and the adoption of a single passports that will increase the supply of affordable labors. Kudos to Rwanda, Benin, Gambia and Seychelles for eliminating all visa requirement for their African counterparts, others need to follow this example.

African needs to focus on specialization and absolute advantage if we must reap the actual benefits from trade. Product production in Africa is unanimous especially by geographical region. However, there are some countries that produce such product at lower cost compare to others. A good example is rubber to Liberia and Cote d' Ivoire. If each country recognizes its absolute advantage and focus on specialization in that area, the AfCFTA will flourish beyond expectations.

In modern production, technology is the way to efficiency and effectiveness. African major old-age obstacle to completing the stages of production has been the lacking of technology. For this reason, bulks of raw materials leaves Africa every minute to Europe, Asia and America which are refined and brought back at prices triple than the raw mater exported. Africa need to invest into technology. The AfCFTA need to set up its own processing site were certain raw materials can be process at a discounted agreement.

STATEMENT AND DECLERARION

We sincerely declare that this Article is our original work. We have followed every ethical procedure in the data preparation, collection, and analysis in the completion of this article. We have accurately given credit to every source through in-text citations and inclusion in the reference list to avoid plagiarism.

We vouch that this work has never been submitted to another journal for publication or review.

Cassius submit this research work to the Pan African Institute of Governance Humanity and Social Science as a partial requirement for a PhD degree in Governance and integration.

Concerning authorship, scholars and researchers can use quotations of this work without authorization when proper referencing is done. Except for academic purpose, user will need permission from head of departments and deans, to have a reproduction of this article.

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