Impact of AGOA on Agricultural Exports Growth of Member Countries: A Dynamic Shift-Share Analysis

Osei Yeboah
North Carolina A&T State University

Saleem Shaik
North Dakota State University

Jamal Musah
North Carolina A&T State University

Since the commencement of AGOA, U.S. exports to Sub-Saharan Africa (SSA) have grown by 23% attaining $21 billion while the exports from the U.S. to the rest of the world increased by only 15%. Total bilateral trade between the U.S. and SSA also increased by 5.8%, up from $36.9 billion in 2015 to $39 billion in 2017. U.S. imports from SSA region have also increased more than three times reaching $26.7billion in 2014. However, others have argued that AGOA has failed to enhance member countries' agricultural exports to the U.S. But these studies only focused on overall export growth. Using dynamic shift-share analysis, this study evaluates potential impact of AGOA on U.S. export growth for four major aggregate commodity groups – bulk, consumer, intermediate and ag-related. Export performance is empirically examined by comparing pre-AGOA (1980-200), post-AGOA (2000-2019) and complete time-period (1980-2019). The results suggest member countries' exports have grown from a deficit of $436 million pre-AGOA to $1,487 million in Post-AGOA with bulk commodities contributing close to 50%.

Keywords: AGOA, Sub-Saharan Africa, shift-share, bulk commodities, consumer commodities, intermediate commodity, Ag-related commodities

INTRODUCTION

Despite the vast natural resource endowment of Sub-Saharan Africa (SSA) countries, they have been categorized by low national and per capita incomes for the past years with a high rate of poverty and weak global trade performance. Trade is an essential drive to economic growth and development. Therefore, allowing SSA countries to participate in global trade will help create jobs, and reduce poverty. The enhancement of SSA trade performance is essential for the improvement of the region's economy and to be self-sufficient without depending on foreign aid from the U.S. and other developed countries (Park, 2019). If the countries in Africa were collectively able to increase their share of world trade from the current 2% to 3%, that 1% increase would generate about $70 billion of additional income annually for Africa, and about three times the total developmental assistance the content receives from the entire world. Regional

trade agreements help reduce trade barriers and serve as an instrument for increased trade and economic growth, as countries and trading partners have easier access to foreign markets (U.S. Trade Representative 2019).

The African Growth Opportunity Act (AGOA) is a trade agreement signed between the U.S. and SSA countries on May 18th, 2000 as Title One of the Trade and Development Act 2000. The primary goal of the trade act was to offer opportunities to SSA countries to continue their efforts to open their economies, build free markets, and improve economic relations. It also provides easy access to the U.S. market for eligible AGOA member countries. Further, the trade act was designed to initiate economic and commercial reform policies to benefit both the U.S. and member countries (International Trade Administration, 2019).

The economic and commercial policy reforms driven by AGOA would lead to improved marketplace prospects and robust salable associates in Africa for U.S. companies, and integrate Africa into the global economy by giving U.S. firms new opportunities in privatizations of African-State owned enterprises or partnerships with African companies in infrastructure projects (Trade Development Center, 2018).

Created for forty-eight eligible member countries, the trade act ended up with only thirty-four, but as of 2019, there are 39 active countries. The yearly evaluation of AGOA eligibility has been criticized for being an investment risk and could thereby prevent investors from investing with the member countries (Jones & Williams 2012). However, other studies have argued that the yearly evaluation is linked to human rights because in exchange for duty-free access under AGOA, countries must have or be moving toward free-market economies, the rule of law, and labor protections (Curtice,2016; Hafner-Burton,2005).

Since the commencement of AGOA, U.S. exports to SSA improved by 23% attaining $21 billion in exports, and the exports from the U.S. to the rest of the world increased by only 15% showing a relative increase in exports to Africa compared to the rest of the world (International Trade Administration, 2019). Total bilateral trade between the U.S. and SSA also increased by 5.8%, up from $36.9 billion in 2015 to $39 billion in 2017. Under AGOA, U.S. imports from SSA region have also increased more than three times and reached $26.7 billion in 2014 (Huie, 2015). Studies, including Didia, Nica,& Yu (2015); and Cook, & Jones (2015); suggest that the inception of AGOA has been of a mutual benefit between the U.S. and AGOA countries. However, Zeneba (2013); and Nouve, & Staatz (2003) have argued that AGOA has failed to enhance agricultural member countries' exports to the U.S. There have been very studies on the effects of AGOA on agricultural exports to the U.S. Earlier studies for example, evaluate policy impacts and the growth in exports using dynamic shift-share analysis (Hayward and Erickson, 1995; Gazel and Schwer, 1998; Markusen, Noponen, and Driessen ,1991) but their application of dynamic shift analysis only focused on overall export growth. The growth of individual classified agricultural commodities were not evaluated.

This study employs a dynamic shift-share analysis model to determine the overall growth of AGOA using member countries' exports of four major classified agricultural commodities to the U.S. Historically, the agricultural products being traded by the U.S. are categorized into four major commodity groups, namely; bulk, intermediate, consumer, and agriculture-related commodities.

This paper is organized into six sections. Section 2 discusses the theoretical framework of shift-share analysis; Section 3 presents the data construction and sources; the empirical application and estimation procedures are presented in Section 4; while Section 5 presents the results and discussions; and Section 6, summary and conclusion.

THEORETICAL FRAMEWORK OF SHIFT-SHARE ANALYSIS

A shift-share analysis is a statistical technique extensively used by economists to study the changes in economic growth in a locality or a region. It was used to analyze the employment growth between two time periods (Dunn, 1960; Fuchs, 1962; Ashby, 1964; Rupasingha Patrick 2009).

Building on the classical comparative static model, Dunn (1960) developed the shift-share analysis to examine employment growth between two time-periods. Specifically, the employment growth of each sector in a region was decomposed into three components: national growth, industry-mix, and competitive effect as presented in equation (1)below:

$$E_{ij}^{t} - E_{ij}^{t-1} = NG_{ij} + IM_{ij} + C_{ij} \quad (1)$$

where;

t and t_{-1} are respectively two time-periods.
E_{ij}^{t} is the level of employment of sector *i* in region *j* in the current year.
E_{ij}^{t-1} is the level of employment of sector *i* in region *j* in the previous year.
NG_{ij} is the national growth effect of sector *i* in region *j*.
IM_{ij} is the industry mix effect of sector *i* in region *j*.
C_{ij} is the competitive effect of sector *i* in region *j*.

The goal of Dunn's (1960) proposal was to identify which parts of the regional economic development can be traced back to national trends, effects of the regional industry structure, and the distinct regional factors. The national growth component of shift-share analysis is defined as the share of local employment growth that can be attributed to the growth of the national economy or the expected growth when the local economy follows the same trend as the national economy, and it is derived by multiplying the level of employment in the first period by the national growth rate (Dunn, 1960; Fuchs, 1962; and Ashby, 1964). This is presented mathematically in equation (*2*) below:

National growth = (base year level of local employment) x (national growth rate) (2)

Presented in equation *(3)*, is the industry mix effect component which captures the fact that, at the national level, some industries grow faster or slower than others, and these differences are reflected in local industry structure (Rupasingha & Patrick, 2009).

Industrial mix = (industry growth rate – national growth rate) x (base year level of local employment (3)

The competitive effect component is the number of employment changes within a given locality that is due to some unique competitive factors of the locality (Dunn, 1960; Fuchs, 1962; and Ashby, 1964). To measure the competitive effect, the expected change is subtracted from the actual regional employment change in the industry of interest as in equation (*4*).

Competitive Effect =Actual Change – Expected Change (4)

In contrast to the shift-share comparative static approach which only compares two years in its analysis, Barff and Knight (1988), proposed a dynamic shift-share approach that considers every year of the study. The dynamic shift-share employs the same procedures as the comparative static approach, including the same three shift-share components. However, instead of two years comparison, the dynamic approach utilizes a time-series of the comparative shift-share to compare each current year to the previous. The yearly shift-share effects are then added up for the entire study period. The dynamic shift-share analysis allows for unusual years and years of economic transition to be identified. They also argued that the results of dynamic shift-share are theoretically more accurate because there is less change in industrial structure from year- to- year, and it accurately allocates growth between the three components (Barff and Knight, 1988). Equation *(5)* presents the computation of dynamic shift-share. .

$$\sum_T (E_{ij}^{t} - E_{ij}^{t-1}) = \sum_T NG_{ijt} + \sum_T IM_{ijt} + \sum_T C_{ijt} \quad (5)$$

where, $\sum_T$ is the summation of the sequence of adjacent years, *t*.

Shift-share analysis has gradually been extended to other economic areas of interest including policy effectiveness and international trade (Markusen, Noponen, and Driessen, (1991; Hayward and Erickson, 1995; Gazel and Schwer, 1998; Cheptea, Gaulier, Zignago 2005).

Data Construction and Source

Time series data from 1980 to 2019 for SSA countries and the 34 active member countries' commodity groups exports were obtained from the USDA-Foreign Agriculture Service (USDA-FAS, 2019) (*See Appendix I Table 1 for list of member countries*). The four classified major commodities are bulk, intermediate, consumer, and ag-related. The bulk commodity is made up of wheat, corn, coarse grains, rice, soybeans, oilseeds, cotton, pulses, and tobacco. The intermediate commodity group consists of soybean meal, soybean oil, vegetable oils, animal fats, live animals, hides & skins, hay, distillers' grains, feeds & fodders, planting seeds, sugar, and sweeteners. Beef & beef products, pork &pork products, poultry meat, meat products, egg & products, dairy products, fresh fruit, processed fruits, fruit & vegetable juices, tree nuts, chocolate & cocoa products, snack foods, breakfast cereal, condiments& sauces, and non-alcoholic beverages constitute the consumer-oriented while distilled spirits, ethanol, biodiesel, forest products, and fish products form the agriculture-related commodity group.

Empirical Application and Estimation Procedures

For this study, equation (*5*) is modified as equation (*6*) below:

$$\sum_T (Ex_{ij}^{t} - Ex_{ij}^{t-1}) = \sum_T SSA_{ijt} + \sum_T PG_{ijt} + \sum_T C_{ijt} \quad (6)$$

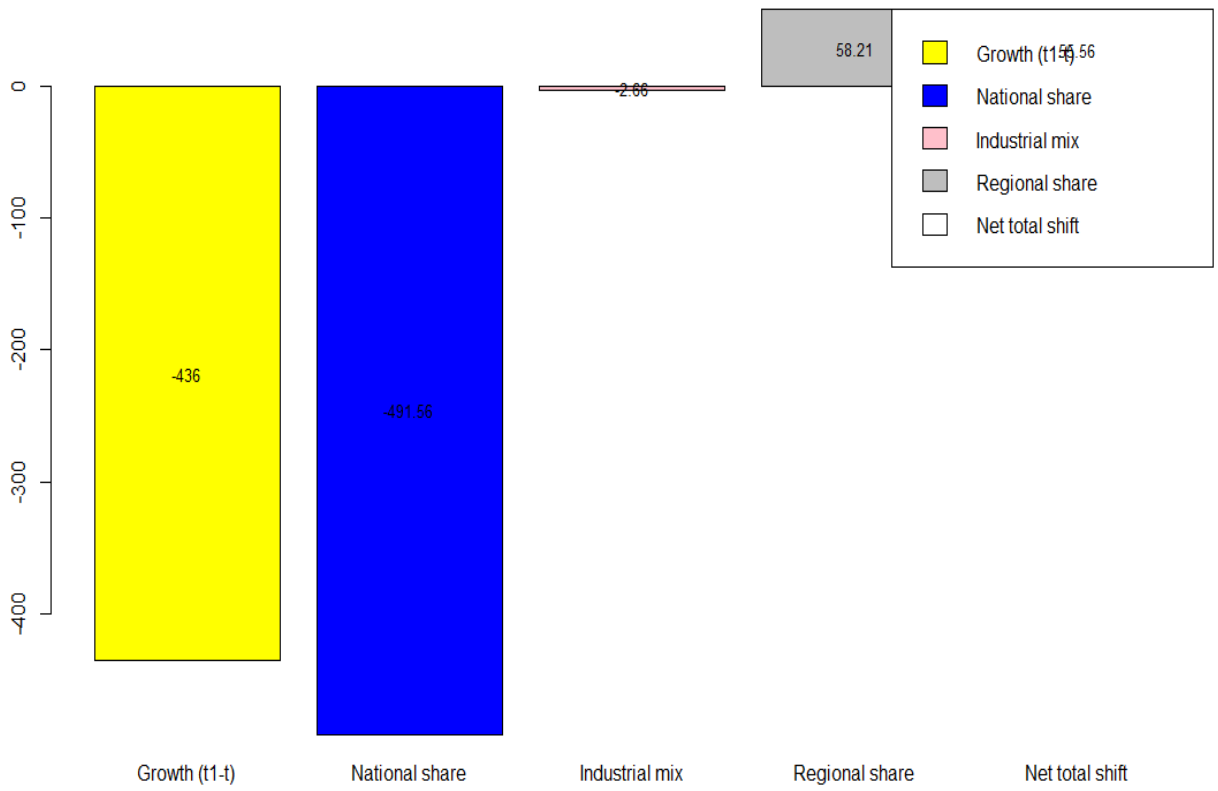
where $(Ex_{ij}^{t} - Ex_{ij}^{t-1})$ is the change in export value of an i^{th} agricultural commodity group from the j^{th} AGOA member country to the U.S. between years *t* and t_{-1}. SSA_{ijt} is the total expected growth of the j^{th} member country's export of *the* i^{th} *commodity* when growth follows the same trend as that of SSA; PG_{ijt} is the sum of the growth of the commodity group mix, and it explains the total growth observed by each commodity group relative to the performance of the same commodity group in the SSA mix. PG_{ijt} can further be decomposed to isolate the specific commodity groups that recorded faster or slower growth than others while C_{ijt} represents the sum of competitiveness of member countries' exports relative to SSA.

Equation (*6*) was applied to the export data and estimated using the R software tool. To determine an absolute growth attributed to AGOA, the estimation was done in three stages: First, for pre-AGOA (1980-2000), second, post-AGOA (2000-2019), and the overall period (1980-2000). The sum of the estimated values for the pre and post should be equal to that of the overall period. The commodity group effect was further decomposed to assess individual performance in each analysis.

Results and Discussion

Figure 1 presents the results of Pre-AGOA analysis which shows an export decline of $436 million. This represents the actual growth of member countries' export for that period, and the national share of ($491.56) million indicates the expected growth if exports had grown at the same rate as that of the SSA. The growth deficit may be attributed to higher U.S. import tariffs before the inception of AGOA. The difference between this national share and the actual growth is ($55.56) million. This represents the growth deficit that member countries would have incurred if exports had declined at the same rate as that of SSA. But that of SSA declined faster, all due to the fact that non-member countries including Sudan, Somalia, the Democratic Republic of Congo, and Zimbabwe, all had a very high index of political instability. Consequently, the region's export growth was hampered. The industry mix describes the differential growth rates among the commodity groups. The average export value of ($2.66 million) for the industry mix suggests a slower growth for all the commodity groups relative to that of SSA.

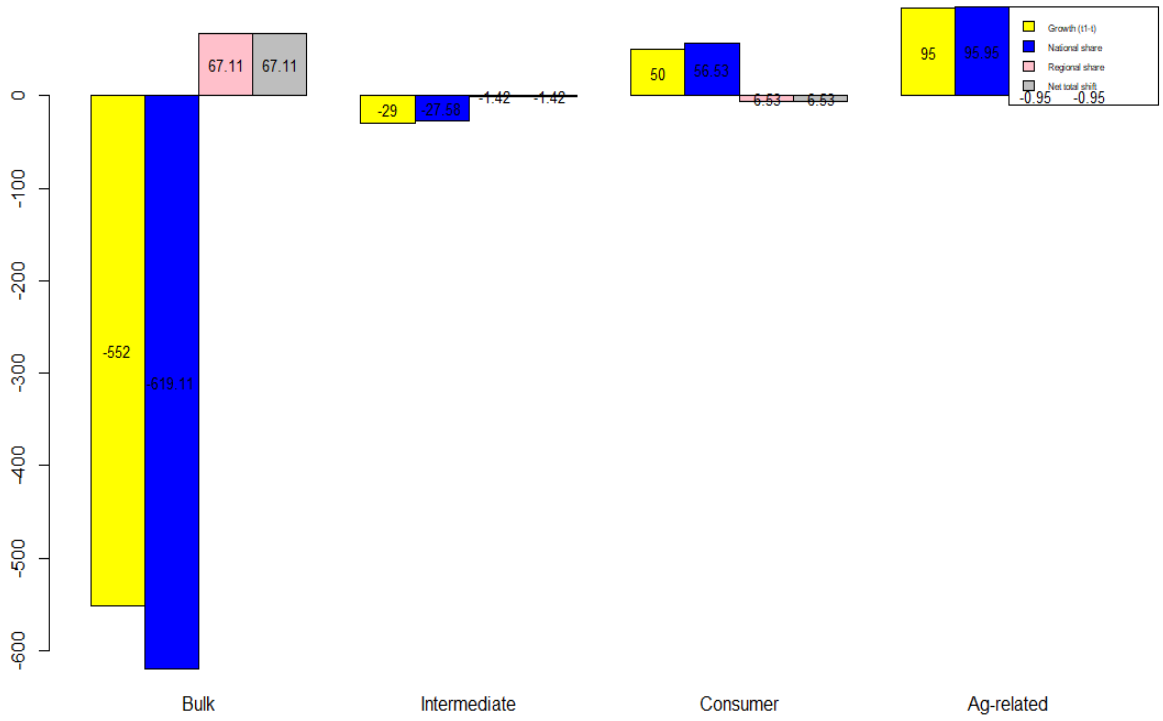
FIGURE 1
DYNAMIC SHIFT SHARE: PRE-AGOA (1980-2000) EXPORTS TO THE U.S. IN $ MILLION



Source: Authors' computations, based on data from USDA Foreign Agriculture Service (https://www.fas.usda.gov/data).

Figure 2 decomposes the overall commodity group effect, and this helps isolate the contribution of each commodity group. The contribution of ag-related was the highest, $95 million, followed by the consumer, $50 million while bulk and intermediate had negative effects ($552million) and ($29 million) , respectively. This might be a primary reason why they all joined AGOA, and as expected, the bulk commodity has performed extremely well since the inception of the trade act.

FIGURE 2
DSS- COMMODITY GROUPS: PRE-AGOA (1980-2000) EXPORTS TO THE U.S. IN $ MILLION

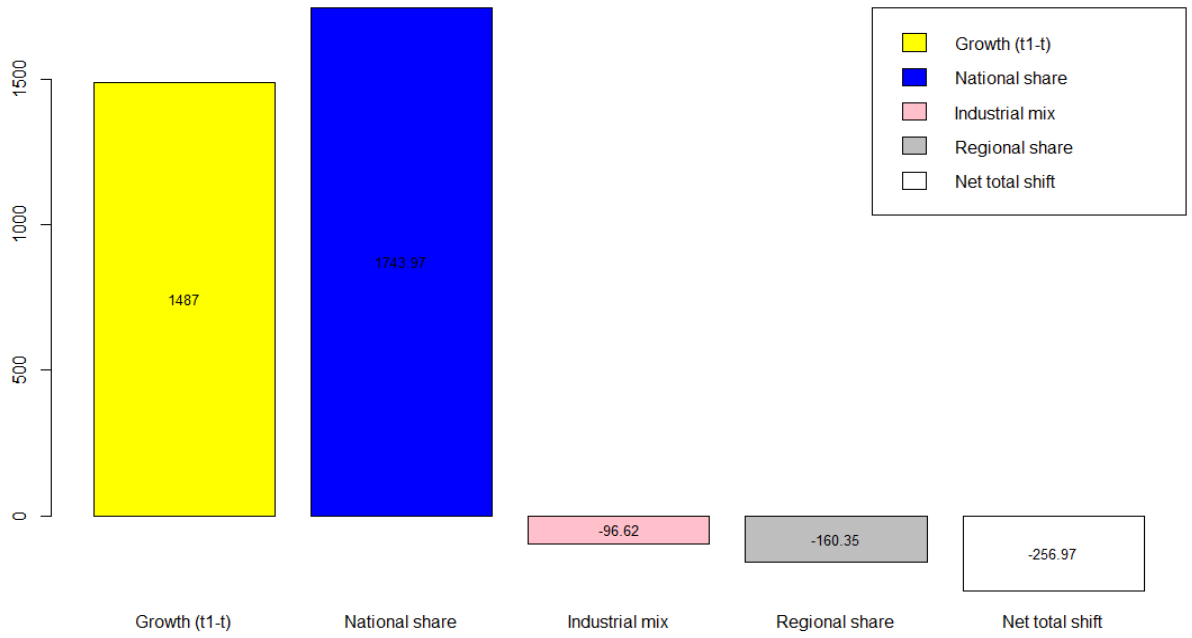


Source: Authors' computations, based on data from USDA Foreign Agriculture Service (https://www.fas.usda.gov/data).

The results of the post-AGOA analysis are presented in figure 3. Exports grew out of a pre-AGOA deficit of $436 million to $1,487 million, a 441% increase. The growth value of $ 1,487 million represents the actual change in growth for the period while the $1,743.97 million represents what would have occurred if the member countries' exports had grown at the same rate as that of the entire SSA.

The ($96.62) million represents the share of export growth that was lost due to slower average growth for commodity groups from member countries than the SSA average. This loss may be coming from non-active AGOA member countries with higher export values. For example, Madagascar, a major exporter of vanilla beans lost its AGOA eligibility in 2010. The country's total agricultural export to the U.S. was $35 million in 2010, up from $32 million in 2009 (USDA-FAS, 2019). Also, most of the current member countries with high export values are latecomers. They only became active members during the last five years. Mali, for example, was only reinstated into AGOA in 2015 but had overall agricultural export of $1.6 million between 2015-2019 (USDA-FAS, 2019). On the other hand, Seychelles a major seafood exporter dropped out of AGOA in 2016. The value of the country's agricultural exports in that year alone was $1.8 million up from $122 thousand, an increase of (over 1,375%). The value of the regional share was -$160.35 million suggesting the AGOA countries were less competitive than the entire SSA region. The regional share indicates member countries' export competitiveness relative to SSA. Even though member countries' agricultural exports might not have been competitive as expected, the actual export from the AGOA countries was enhanced by over 441% compared to the Pre-AGOA period.

FIGURE 3
DYNAMIC SHIFT SHARE: POST-AGOA (2000-2019) EXPORTS TO THE U.S. IN $ MILLION

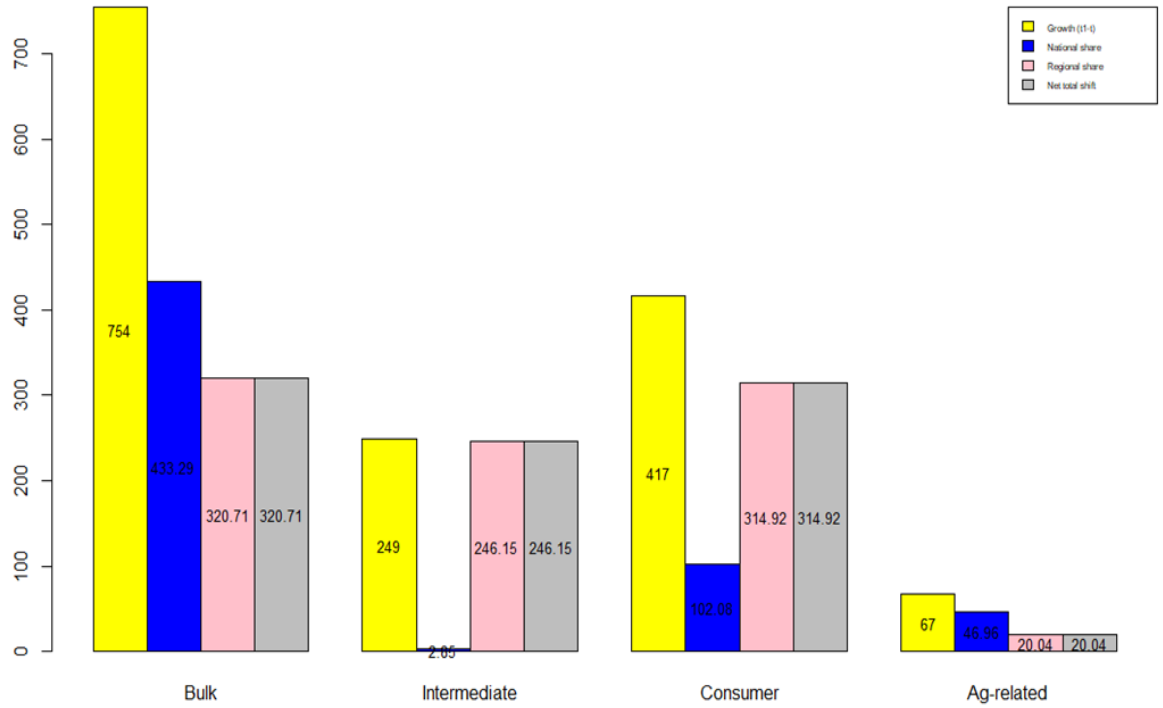


Source: Authors' computations, based on data from USDA Foreign Agriculture Service (https://www.fas.usda.gov/data).

The specific commodity group growth effects during post-AGOA are presented in figure 4. The post, unlike the pre, has all four commodity groups recording significant positive growths with performance far better than expected. Contribution by bulk commodities was the highest, $754 million, followed by consumer, $417 million, and intermediate and ag-related contributing $249 million and $67 million, respectively. For example, consumer commodities grew from only $50 million under pre to $417 million during the post (734%) while intermediate commodities also grew by 959% from a deficit of $29 million to $249 million.

The growth of bulk was substantially driven by the export of major primary products such as cocoa beans, coffee, and rubber from Ghana, Cote D'Ivoire, South Africa, Ethiopia, and Nigeria. In addition, export promotion activities undertaken by USAID which include value-added production projects in AGOA countries contributed to the overall growth. Finally, the attraction of foreign direct investments (FDIs) into the SSA region, might have also contributed to the impressive performance of consumer and intermediate commodities (USAID, 2019). On the other hand, the negative impacts of climate change, a high rate of deforestation, and water pollution may have slowed the export growth of ag-related products like logs and lumber, softwood, and fish products (Jones & Olken, 2010).

FIGURE 4
DSS- COMMODITY GROUPS: POST-AGOA(2000-2019) EXPORTS TO THE U.S. IN $ MILLION



Source: Authors' computations, based on data from USDA Foreign Agriculture Service (https://www.fas.usda.gov/data).

The overall results of the study are summarized in table 2. The overall actual growth of member countries' exports was $1,051 million with $1,252 million being the expected. The difference between the expected and actual growth is $201.4 million with total commodity groups contribution of $99.28 million (49%). The remaining 51% can be attributed to bilateral trade enhancing factors resulting from AGOA. A key example would be reduced import tariffs rates offered by the U.S. on member countries 'agricultural exports. But in all, member countries' growth was 16% lower than SSA.

There is increased growth of $ 1,051 million which was highly dominated by the growth of exports during the post- AGOA, $1,487 million compared to the deficit of $436 million for the pre-AGOA. The results also present the contribution of each commodity group towards the overall growth. Consumer commodities contributed the highest, $467 million, followed by intermediate,$220 million while bulk and agriculture-related commodities contributed the least, $202 million and $162 million, respectively. The performance of the consumer commodities was driven by exports of fresh fruits, tree nuts, and fresh vegetables which constitute major U.S. imports. Over the previous five decades, the U.S. annual consumption of tree nuts has grown from an average of 1.38 pounds per person in 1970 to an average of 3.69 pounds per person in 2016, over 167% in growth (USDA,2019).

TABLE 2
SUMMARIZE SHIFT-SHARE ANALYSIS COMPONENTS IN $ MILLION

Time-Period	Industry (Commodity Group)	Actual Growth (AGOA)	National share (SSA)	Industrial mix (Commodity Group)	Regional share (AGOA Competitiveness)	Net total shift
Pre-AGOA (1980-2000)	Overall	-436	-491.56	-2.66	58.21	55.56
	Bulk	-552	-619.11		67.11	67.11
	Intermediate	-29	-27.58		-1.42	-1.42
	Consumer	50	56.53		-6.53	-6.53
	Ag-related	95	95.95		-0.95	-0.95
Post AGOA (2000-2019)	Overall	1487	1743.97	-96.62	-160.35	-256.97
	Bulk	754	433.29		320.71	320.71
	Intermediate	249	2.85		246.15	246.15
	Consumer	417	102.08		314.92	314.92
	Ag-related	67	46.96		20.04	20.04
Total Periods (1980-2019)	Overall	1051	1252.4	-99.28	-102.14	-201.41
	Bulk	202	111.98		90.02	90.02
	Intermediate	220	217.59		2.41	2.41
	Consumer	467	655.36		-188.36	-188.36
	Ag-related	162	168.21		-6.2	-6.2

Source: Authors' computations, based on data from USDA Foreign Agriculture Service (https://www.fas.usda.gov/data).

SUMMARY AND CONCLUSION

The primary goal of this paper was to determine the overall growth of AGOA using member countries' exports of four major agricultural commodities to the U.S. Dynamic shift-share analysis was applied to the pre (1980-2000); post-AGOA(2000-2019); and the entire period (1980-2019) export data. To isolate the contribution of each commodity group towards the growth, the effects of the four commodity groups were decomposed into the specific commodity group's growth effect. The pre-AGOA period indicated a deficit export growth, while a significant growth (441% increase) was recorded during the Post-AGOA period. Bulk commodity contributed the most, $754 million (51%). This result is consistent with the literature (Huie (2015), Didia, Nica, & Yu (2015), and Cook, & Jones (2015) all suggest that the creation of AGOA has enhanced trade between member countries and the U.S.

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APPENDIX

TABLE 1
LIST OF SSA COUNTRIES INDICATING AGOA ACTIVENESS AND ELIGIBILITY

Countries	Active	Non-Active/Non-Eligible
Cote d'Ivoire	✓	
South Africa	✓	
Ghana	✓	
Ethiopia	✓	
Kenya	✓	
Malawi	✓	
Mauritius	✓	
Cameroon	✓	
Uganda	✓	
Liberia	✓	
Nigeria	✓	
Senegal	✓	
Mozambique	✓	
Rwanda	✓	
Tanzania	✓	
Congo (Kinshasa)	✓	
Gabon	✓	
Benin	✓	
Burkina Faso	✓	
Togo	✓	

Cabo Verde	✓	
Comoros	✓	
Namibia	✓	
Sierra Leone	✓	
Mauritania	✓	
Guinea	✓	
Zambia	✓	
Djibouti	✓	
Lesotho	✓	
Sao Tome and Principe	✓	
Botswana	✓	
Angola	✓	
Niger	✓	
Chad	✓	
Madagascar		✓
Zimbabwe		✓
Eswatini (Swaziland)		✓
Congo (DRC)		✓
Burundi		✓
Seychelles		✓
Guinea Bissau		✓
Central African Republic		✓
Somalia		✓
Sudan		✓
Mali		✓
Gambia		✓
Eritrea		✓
Equatorial		✓