The impact of AGOA on Export Flows from sub-Saharan Africa: A dynamic system GMM analysis

Oro Oro Ufuo and Paul Alagidede

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Abstract

This study seeks to understand the relationship between the United States imports from sub-Saharan Africa (SSA) and the overall exports from SSA between 1996 and 2018. It examines the drivers of that relationship drawing from the existing theories of international trade. The study found that the bilateral economic size of the US and SSA, the economic similarity index and relative factor endowment differences correlate positively with exports from SSA. Our results align with Linder's hypothesis, gravity model on trade and H-O-S theory of international trade. We recommend policy reforms.

1 Introduction

This study seeks to understand the relationship between the United States imports from sub-Saharan Africa (SSA) and the overall exports of the SSA between 1996 and 2018. It examines the drivers of this relationship drawing from the provisions of international trade theories including the Heckscher, Ohlin and Samuelson (H-O-S), New Trade Theory (N-T-T) and Linder's hypothesis. We consider that it is the aggregate demand and supply, subject to multilateral trade resistance (MTR) such as tariff, transport costs, and market access, that drives international trade (Matyas, 1977). The African Growth and Opportunity Act (AGOA) implemented by the US in 2000 serves the purpose of reducing the MTR. Knowledge of these drivers would be useful to policymakers and trade practitioners. The politicians would be interested in promoting trade and economic growth while the practitioners would need to understand the movement in the drivers to device trade strategies. The temptation is that countries could

*Africa Centre for the Study of United States, University of the Witwatersrand, Johannesburg. Ufuo.oro@wits.ac.za; ou58oro@yahoo.com

†Wits Business School, University of the Witwatersrand, Johannesburg. Paul.alagidede@wits.ac.za

treat AGOA as trade driver and hope to earn trade flows ignoring to make complimenting policies to take advantage of the trade preference. Investigating the impact of trade preference in general and AGOA on trade performance of the sub-Saharan African countries have received increased attention in the literature. This increased research attention comes perhaps because of the worldwide interest in the economic growth of countries and in evaluating the performance of the AGOA as a trade policy. Several researchers have documented evidence on different aspects of the impact of the US imports on SSA exports and economy. Researchers give only patchy attention to the drivers of the relationship. The examples of such studies include Didia, Nica and Yu (2014) who evaluated this impact by examining the flow and composition of trade between the US and SSA countries. Tadesse and Fayissa (2008) documented evidence on trade initiation and intensity of the US/SSA trade relationship. Nouve and Staatz (2003) and Frazer and van Biesebroeck (2010) examined the trade composition effect of AGOA.

Our study, which is a complement to the existing research on AGOA and trade flow between the US and SSA, seeks to understand the relationship between the US imports from SSA and the SSA exports, and investigates the drivers of that relationship. We draw from the classical theory of international trade, for example, Heckscher, Ohlin and Samuelson (H-O-S) (Helpman 1999). The comparative advantage model holds that trade occurs based on the differences in factor endowments, technology, or taste among nations. However, Bergstrand (1990) found that bilateral trade among the developed countries is negatively related to the difference in relative factor endowments. Bergstrand's evidence implies that the trade between developed countries is positively associated with similarity in preference which agrees with the Linder's hypothesis (Linder 1961). We also draw from the so-called New Trade Theory (N-T-T) (Baltagi et al. 2003). This theory proposes that trade occurs where there are market failures, where monopoly, externality and other forms of imperfection develop. We tested data from the AGOA trade relationship between the US and SSA against these theories. They formed the basis of our model specifications.

Most studies on AGOA considered lightly the influence of the international trade theories. They did not consider the provisions of the existing theories to explain why trade should or should not occur. Besides these differences, we agreed with Baltagi et al. (2003) on the use of the main and interactive fixed effects in our model specification. They may not have been relevant for Didia, Nica and Yu (2014) to consider in their models. Our study is slightly different from the existing ones for the reasons we have stated.

In using gravity model (GM) to model trade flow between the US and SSA under AGOA, several studies, for example, Moyo, Nchake and Chiripanhura (2018) preferred to use cross-sectional data, and some researchers even use time-series data. UNCTAD (2014), the advance guide on trade policy analysis, and Baltagi (2001) recommended the use of panel data and method. We design our study to correct those oversights.

The overview of our results points to the following: the lagged exports from SSA showed a positive influence on the dependent variable in the short. The

bilateral GDPs, similarity index (computed as described in Baltagi et al. (2003), and relative factor endowment differences of the trade partners returned positive and elastic coefficient with SSA's exports.

2 The contributions of this paper

We contribute uniquely to the existing trade flows between the US and SSA under AGOA research in the following ways. First, we update the study on the impact of AGOA by Nouve and Staatz (2003) by using up-to-date data and improving on their model analysis. For example, Nouve and Staatz (2003) reported two results – one from difference GMM and the other from system GMM and used no clear criteria to choose one. We used the rule of the thumb by Bond (2002). Bond (2002) gives a guide on how to evaluate the model analytically to select between the difference and system GMM for the model analysis. The study had used data that ended in 2002; the data of this study ended in 2018 and captures the recent exchanges between the trade partners. Second, we extend Baltagi et al. (2003) by controlling for bilateral size, relative factor endowment difference, and similarity index in our gravity model for the study of trade flows between the US and SSA under AGOA. Baltagi et al. (2003) had used this model specification in studying trade flows between the US, Japan, and Europe; we use it to analyse the trade flows between SSA and the US. We extended the same paper in adopting the interactive fixed effects in our model specification in analysing the impact of AGOA on exports from SSA. No study, to our knowledge, had done this. Third, we engage cutting-edge tool – dynamic system GMM, a popular method, and panel data to account for the persistence over the years in the SSA exports variable. It improves our model specification. Researchers know GMM for its controls over heteroscedasticity and autocorrelation problems. By adopting GMM, we have checked biases in the estimated coefficients due to heteroscedasticity and autocorrelation.

Our model specification is a strength in this study. Our coefficients are appropriately

measured. For instance, the coefficient for the impact of AGOA (0.00081) appears to be the smallest and more accurate than the coefficients in the existing studies. The range of coefficients of the relationship between AGOA and SSA trade flows in several studies is between 0.16 and 0.45 (Nouve and Staatz, 2003). We simulated our regression with OLS. Our regression efficiency, judging from the R-squared statistic of 97% - 98% (Table 4) is persuasive of our specifications. We can make well-conjectured inferences from our results because our test of autocorrelation (AR 2) suggests that the model does not suffer from second-order serial correlation. Our Hansen J-statistic shows the validity of our instruments. Lastly, our results align with known theories of international trade, such as the H-O-S theory, Linder's hypothesis, and gravity model.

Going forward in this report, we briefly examined the literature on trade preference, AGOA, and the methods of data analysis in the next section. In section four, we discuss data, models, and model analysis. In part five, we

present and discuss the results of the study's analysis and conclude the report in section six.

3 Literature review

We start with what determines the formation of preferential trade agreements (PTA). The determinants of PTA explain how economic systems distribute the benefits accruing to PTAs. For example, one expects the principal advantages of PTA created by the participating countries to apply to the states. Where PTA are motivated, as widely speculated, by multinational corporations (MNCs), they also stand to draw its benefits. We also examine the political and economic impacts of trade preferences, the costs of adopting trade preferences and why trade preferences could fail to generate trade flows and economic growth. We review the creation of AGOA. Together, we expect these reviews to provide a theoretical basis to answer the questions posed in this study.

3.1 The political economy of trade preferences

Researchers consider PTAs welfare-enhancing either in solving terms of trade externality according to Bagwell and Staiger (1999) and Baier and Bergstrand (2007) or in meeting the local economic need of protecting infant industries as in Maggi and Rodriguez-Claire (2007) and Nitsch (2009). Countries with similar needs can also form PTAs (Linder, 1961). This assertion supports the arguments in Vernon (1971) and Wells (1969) on product life cycle theory but rejects that of David Ricardo (1887) 's comparative advantage theory of international trade. Baccini (2019) confirms that 80% of the existing PTAs are formed based on similar needs and economic sizes. Besides economic utility, states also form PTAs for political reasons (Mansfield and Miner, 2012; Mansfield et al.,2002; Baccini and Urpelainen (2014a). In addition to economic utility and political cases, Multinational corporations (MNCs) also mastermind the formation of PTAs (Raess et al. 2018; Manger (2009). Baccini (2019) reports a strong association between FDI and the creation of PTAs. According to these authors, MNCs do not only influence the formation but also provide the provisions of the trade agreements.

Another compelling argument for creating PTAs is that developed countries now

substitute trade preference for development assistance to developing countries (Elamin and Khaira, 2003). These authors justify this practice by claiming that trade preference provides developing countries the opportunity to achieve self-sustained economic development and hopefully socio-political progress. This argument appears to have ignored the fact that preferential market access may not result in trade, and trade may not result in growth (Stiglitz and Charlton, 2006; Nielson (2006). It also overlooks the fact that the distribution of trade benefits depends on the tax capacity of the countries. If the profits go to the MNCs, states can only benefit from that if they could effectively tax the

MNCs or if MNCs create employment opportunities for their population. PTAs would, therefore, be a poor substitute for development assistance. In summary, these reviews support the notions of using the formation of PTA to reduce trade barriers and other MTRs and encourage free trade.

3.2 Economic and political effects of PTAs

Trade preference has multiple effects on the economies of the participating countries. In this section, we examine it impact on trade and investment, economics and political

reforms and welfare. PTAs has more impact on trade and investment than it has on other areas such as economic welfare (Caliendo and Parro, 2015). Baier and Bergstrand (2007) found NAFTA members doubled their bilateral trade in 10 years. Buthe and Milner (2008) also demonstrate that developing countries that belong to WTO and participate in more PTAs experience higher FDI inflows than others. Mansfield and Reinhardt (2008a and b), also found that countries in PTAs experience reduction in the volatility of trade policy, trade flows and terms of trade. Baier, Bergstrand and Feng (2014) and Spilker, Bernauer, Kim, et al. (2018) report increases in trade volume and variety for countries in PTAs. However, Fernandes, Ferero et al. (2019) studied countries in AGOA and report that the trade preference agreement has boosted Africa apparel exports and that there was no significant response to the AGOA in Central and West Africa. Besides these benefits, literature also reports that countries in PTAs easily accept to undertake positive economic reforms (Baccini and Urpelainen 2014a; Ether 1998; Fernandez and Portes 1998). However, we did not investigate these claims, but we think that these effects of PTAs could add value to increase trade and growth in the sub-region.

3.3 PTAs adjustment costs distribution

Trade liberalisation has adjustment costs (Neilson (2006; Stiglitz and Charlton 2006). A recurring theme in empirical evidence is that these costs are hasher on the people and governments of the developing countries than others. These costs, according to Neilson (2006), explain in part the low utilisation of many trade preference facilities. According to Stiglitz and Charlton (2006), the adjustment costs comprise loss of revenue due to tariff waiver and the lack of cheaper alternative revenue sources for the countries. The paper maintains that import and export tariffs constitute 1% of total revenue in most developed countries but 32-35% in developing countries. The logic is simple. The pain of losing 1% as compared to losing 35% of revenue is the issue. Besides, the time between when states incur the costs and when they realise the benefits does not synchronise. Financing the costs and waiting for the benefits could be a problem in developing countries.

Other costs of trade adjustment include the direct and indirect costs of industrial restructuring as firms grapple with supply responses toward the agreement. The cost of implementing new regulations, for example, to implement AGOA,

participating countries must acquire and install efficient visa equipment to trap the origin of imported raw materials. Countries must buy and train staff to operate such equipment. Neilson (2006) shows that excessive documentation to meet the requirements of a trade agreement is a big challenge in many developing countries.

The costs of preference erosion arising from the unplanned suspension of participants by the US government from eligibility lists, or where there are changes in trade policies that give other countries rights to compete in the markets which previously were available only to members of the PTAs, or the coming into force of multilateral global free trade could be a lot for developing countries. The costs of providing safety-net for individuals and firms incurring losses because of international trade could be unbearable, especially where insurance markets are in their infancy. The burden of these costs is more substantial in developing countries than in the developed ones because developing countries are vulnerable to policy shocks owing to their undiversified export industries. Developing countries must make more extensive changes to comply with new regulations than the developed ones because of their levels of development.

Developing countries face international trade that is most distorted against them.

Currently, the US and the UK are still subsidising their wheat, and cotton farmers in the markets developing countries have a comparative advantage (Elamin and Khaira, 2003). Besides, developing countries face tariff regimes that increase as their products improve. For example, a tariff on live cattle in Canada is zero, but for fresh/frozen beef is 13.2%. Cocoa bean in the US has 0% tariffs but 14.7 % if countries process cocoa into chocolate. Green coffee has 0% tariff in Japan, but the roasted one has a duty of 12%. When one considers the above tariff regime, processing agricultural products as a pathway to development for developing countries becomes difficult. Developing countries are home to the world poorest people with incomplete and poorly functioning markets (Stiglitz and Charlton, 2006) making trade adjustment costs hasher on them. Empirical evidence is in consensus that these adjustment costs must be shared between the developed and the developing countries to ensure that market access through trade preferences increases trade.

This sub-section summarises that although the US has implemented preferential trade opportunity to SSA, these adjustment costs would frustrate the region and cause them not to respond to the occasion. This situation would affect supply responses given the demand for products from the importers.

3.4 Trade preference and economic growth

Trade preference policies bring benefits to the participating countries in two ways. One is the transfer of tariff revenue and quota sacrifice as rents from the importing countries to the exporting countries. In the case of AGOA, Hoekman, Martin, and Primo Braga (2006) report that the rents could be quite big grossing over $11bn annually and the benefit to SSA could be as much as $500 million annually. The second value of trade preference policy is in supplies response. Tariff

cut and quota increase could induce an increase in manufacturing and employment. Collier and Venables (2007) report that rent transfers most likely affect current activities. In the case of SSA, the main current export activities are agricultural and other unprocessed natural resources. According to the paper, benefits from supplies response should apply to the expansion in manufacturing capacities. Collier and Venables (2007) conclude that manufacturing supplies response has a better impact on economic growth than the increase in the production of agriculture and other natural resources due to diminishing marginal returns. Land and resources stock are subject to diminishing returns because they are wasting assets and exhaustible. Expansion in manufacturing may be relieved of the diminishing marginal returns problems because export eases the domestic economies of their limited sizes, enabling production expansion to continue (Haumann, Hwang and Rodrik (2006; Jarrau and Poncet 2011). Besides easing the diminishing returns to scale in the domestic economies, manufacturing can increase productivity and positive externality which could be induced by business clustering effect. Our study is not concerned with the change in trade composition effects of AGOA but on the drivers of trade between the US and SSA.

3.5 A brief description of AGOA

This section spells out the opportunities and risks which the agreement (AGOA) potent and how they affect exports from the sub-region. The Africa Growth and Opportunity Act (AGOA) is a nonreciprocal trade preference, created by the United States Congress and signed into law on 18 May 2000. AGOA provides duty-free treatment to eligible exports1 from the eligible Sub-Saharan African countries to the US The object of this law is to boost trade between the US and SSA, thereby integrating them into the global economy. The AGOA law, set to expire 2015 was enhanced and extended to 2025 by new law President Obama signed on 29 June 2015 (Ismail, 2017). AGOA covers certain eligible products covered by the Generalised System of Preference (GSP) as well as those the President of US may determine provided those products are not import-sensitive in the US AGOA also covers specific apparels and footwear not eligible under GSP. For countries' eligibility and to be beneficiary of AGOA, a country must be included in a statutorily created list of SSA countries. The law also mandates the President to determine countries to be added or taken from the list based on prerequisite qualifications. The conditions include the operation of a market economy, reduction in poverty, upholding the rule of law, removing of barriers to US trade and investment, not supporting terrorist activities, non-interference with the US national security and foreign policy effort and must be a country eligible for GSP. The eligible product includes petroleum products, clothing, agricultural and industrial products (Condon and Stern, 2011).

There are additional conditions for textile and apparel in the AGOA. They include duty-free treatment for specific apparel and textile products. Some of these products may be subject to quantitative restrictions. The law requires countries benefiting from tax-free provisions in textile and apparels to have effi-

cient visa systems to ease the tracking of unlawful transhipment. Their products must also be clothing assembled from US yarn and fabrics, SSA (regional) yarns and fabrics subject to an absolute cap until 2015. They must make apparel from yarns and fabrics not produced in commercial quantity in the US, and textile produced entirely in SSA countries, certain hand-loomed, handmade, ethnic printed materials, or folklore articles. The AGOA also makes provisions for the President of the United States, in consultation with the congress and other arms of government to hold annually, US/SSA forum to discuss trade and economic cooperation. The US government and the African counterparts hold these fora in the alternate year in the US and SSA countries. The Forum held its 2015 conference in Gabon representing the Central African Countries while it held 2014 meeting in Washington DC, USA. The other provisions of the law include technical assistance and capacity building for the benefiting countries. The technical support is to encourage the benefiting countries' government to liberalise trade, harmonise laws with the requirements of WTO, adopt appropriate financial and fiscal policies and promote agribusiness. AGOA also encourages private sector business development and networking between SSA and US enterprises. Reports, for example, Williams (2015) show that US government spent an average of $600 million from 2006 to 2011, $ 191 million in 2012 and $209 in 2013 in trade capacity-building assistance to the SSA countries. The US used 53% of this fund to provide trade-related infrastructure, 31% for trade-related agriculture projects and 11% for trade facilitation (Williams, 2015). The AGOA legislation makes provision to mobilise the resources of the US private sector organisations to contribute to the development of SSA countries. This legislation underscores the importance US government attaches to the AGOA trade policy for SSA. For another instance, Section 123 mandates the Overseas Private

Investment Corporation to support projects in SSA and to increase funds directed to SSA countries. Section 124 directs Ex-Im Bank to expand its financial commitment to its loan guarantee and insurance programs to African countries. Section 117 supports the creation of an Assistant US Trade Representative (USTR) for Africa to serve as the primary point of contact for those engaged in trade between the US and SSA, and Chief Adviser to the USTR on trade and investment issues in Africa. Section 125 requires the posting of at least 20 Commercial Service (CCS) Officers in not less than ten countries in SSA by 31 December 2001. Reports show by 2012 that there are 15 CS officers in SSA following this directive of the law.

To further the implementation of AGOA, USAID has funded trade capacity building

initiative in SSA by $1.6 billion between 2001 and 2014. As provided in Section 124(a), the US government announced the funding of $30 million per annum for Africa competitiveness and trade expansion (ACTE), Trade and Investment Initiative toward the development of SSA. ACTE initiative of the USAID actively supports the three trade hubs based in Ghana, Kenya, and South Africa (www.watradehub.com.

www.eatradehub.nationbuilding.com; www.satradehub.org). Trade-hubs help potential exporters become globally competitive and make full use of their

AGOA benefits. Right as the features of AGOA appear, critics, observe that some provisions of AGOA are not adding value to the objects of the law. For example, SSA countries do not have access to standard inputs from the US through AGOA (Mealy 2000). Thompson (2004) observes that the AGOA does not attract FDI from the US to SSA contrary to expectation. The author also criticises the uncertainty created by the right for the US president to cancel any beneficiary and to remove items from the eligibility lists without consultation with the trade partners.

4 Data and methods

This paper investigates the extent to which the US imports from SSA associates with trade flows from sub-Saharan Africa and the drivers of this association. Equation 1 is the augmented gravity model for trade flows used and recommended by Baltagi et al. (2003) and Nouve and Staatz (2003). Below, we present the model as:

$$lexports_{ijt} = \beta_1 lexports_{ijt(-1)} + \sum_{i=1}^{n} \beta_2 X_{ijt} + \sum_{i=1}^{n} \beta_3 Y_{ijt} + \sum_{i=1}^{n} \beta_4 Z_{ijt} + \varepsilon_{ijt-} - 1$$

Where lexports is the natural log of exports from SSA to all countries at time t; X_{ijt} is the K x 1 row vector of explanatory variables including the overall bilateral size, and spatial distance, in kilometre, of the trading partners, similarity of income, difference in relative factor endowment, US imports from SSA and relative effective exchange rate. Y_{ijt} is a vector of control variables including exporter, importer, and year fixed effects (main control variables). Z_{ijt} is the vector of interactive effects variables including exporter-importer, exporter-year, and importer-year fixed effects. n is the size of the cross-section in the analysis and t is the time in years.

The distance is expected to have an inverse relationship with exports. The imports under AGOA is expected to have a positive relationship with exports. The real effective exchange rate is expected to show a negative relationship with exports. The economic size is expected to show a positive relationship with exports. Our control

variables are recommended by Matyas (1997) and Baltagi et al. (2003). Matyas (1997) pointed out that in gravity models, exporters, importers, and time effects should be included in the model specification to control for any factor affecting trade that is exporter, importers, and time specific. In similar tone, Baltagi et al. (2003) recommend that the interactive fixed effect variables should be included in gravity models to control for any bilateral time-invariant determinants such as bilateral distance, common language, common border, and guard against omitted variable bias. The authors show that the omission of one or more interactive effects variables can result in biased estimates and misleading inferences. We used data from 39 SSA countries[1] for 23 years (1996 - 2018) as shown in Table 1 below.

[1] Angola, Benin, Botswana, Burkina-Faso, Burundi, Cameroon, Chad, Central African Re-

4.1 Empirical strategy

We used a dynamic system GMM to analyse equation one following the suggestion by Arellano and Bond (1991) that when time (T) is shorter than cross-section and the dependent variable is persistent, the system GMM will provide gains in precision, and reduce small sample bias. In this study, the cross-section is higher than time (39 >23), and the dependent variable is persistent. Besides, some variables entered the model at level (based on our unit-root tests) while others came after the first difference, making system GMM most suitable for the analysis. The variables are all mean reverting as they enter the model. We adopted a 2-step system GMM estimator because we suspected heteroscedasticity and serial correlation due the combination of variables such as the GDP of exporters and GDP of the importer in the index variables such as similarity, bilateral size and the relative factor differences. We expected serial correlation also from the lagged export variable in the model with the error term. The use of system GMM brings about the proliferation of instruments (instruments >groups). The effect of instrument proliferation is overfitting of the endogenous variables in the model and weakening of Sargan/Hansen test of instrument validity. We adopted xtabond2 (collapse) command (Rootman, 2014) to ease instrument proliferation (instrument/group became 32/39 after the application of appropriate treatment). We acknowledge that GMM provides short-run results to regression problems. Users of our report should take the short run information by the GMM estimator into account in their policy formulation.

5 Empirical results

This section reports the main empirical results of the study. From Table 2, we ensure the variables were mean reverting as they entered the models for analysis. Our unit root tests followed PP- Fisher method. The PP- Fisher method assumes variables are asymptotically normal, allowing us to use the variable at a level and first difference to achieve mean-reverting before we analyse them. We simulated our analysis with Levin-Lin-Chin method. There was no marked difference in the results.

5.1 Descriptive Statistics

We present the descriptive statistics below. The standard deviation from the mean reflects the gaps between the maximum and the minimum values of the variables. It also reflects the volatility of the variables when considered about the mean. For example, a low standard deviation of 1.66 compared to the mean of 21.18 for SSA exports, denotes that variable has low volatility compared to

public, Congo, Cong DR, Cote-D' Ivoire ,Egypt, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Kenya, Lesotho, Malawi, Mali, Mauritania, Mauritius, Namibia, Nigeria ,Niger, Rwanda, Senegal, Seychelle, Sierra-leone, South Africa, Eswatini, Tanzania, Togo, Uganda, Zimbabwe.

the US imports from SSA. The table also shows that most of our variables were of low volatility after they had been log-transformed.

5.2 The key results of empirical analysis

Given the natural log of exports from SSA which is our dependent variable (Table 4), the US imports under AGOA (lagoa) returned a positive but marginal coefficient of 0.0081. The result suggests that a percentage change in the US imports from SSA under AGOA, associates with 0.0081% average change in the exports of SSA countries at 1% significance level ceteris paribus. The bilateral size measured by the countries' GDPs (lgdp2) showed a positive coefficient of 32.47 with the dependent variable. The result suggests that a percentage change in bilateral size associates with 32.47% change in SSA exports on average at 1% significant level ceteris paribus. The bilateral economic size of countries enjoys an elastic relationship with exports in SSA. It agrees with the basic tenet of the gravity model, which holds that countries' national income has a direct link with its exports and an inverse relationship with the bilateral distance between them. Our result agrees with Bergstrand (1990) and is in the tradition of Heckscher – Ohlin – Samuelson trade theory. The index of similarity in size among the countries (Lsimijt) returned a positive and elastic coefficient of 32.81 with the dependent variable. The result suggests that when this index changes by 1%, the exports in SSA will change on the average by 32.81% at significance ceteris paribus. It implies that the more similar the trading partners are in size and preference, the higher the volume of their bilateral trade. Our result supports the Linder's hypothesis of income similarity and the increase in bilateral trade. The relative factor endowment differences returned a positive coefficient with SSA exports only when the main and interactive fixed effects are included in the model. It returned a positive coefficient of 0.053 at 10% significance all being equal. The result suggests that when countries are different in factor endowment, it could promote trade exchange between them. The result supports the classical theory of trade with regards to factor endowment differences. We demonstrate in Table 4 that there is information in the model specification. We show that model 1 with full interactive fixed effects returned better results than the others.

5.3 Robustness checks

We simulated our regression using linear regression to check the effects of control variables. The results are shown in Table 5 below. Most coefficients that are significant under full controls specification are not significant when fixed effects are removed.

Second, we made the US imports from SSA dependent variable. We wanted to see how SSA export relates to it. The results are in Table 6 below shows a positive coefficient of 0.57 at 1% significance between SSA exports and the US imports under AGOA.

Third, we demonstrate that our gravity model specification ensures the efficiency of the regression by using linear regression setting. The results show about 98% of changes in the dependent variables are accounted for by the independent variables; details, including R-squares, are as shown in Table 7 below. Model 1 has full fixed effects, and model 2 has no interactive fixed effects.

6 Concluding remarks

We set out in this paper seeking to understand how imports from the US under AGOA relates to exports from SSA countries. We examined the drivers of that relationship and drew from the theories of international trade, including H-O-S, N-T-T and Linder's hypothesis. We based our gravity model specification on the provisions of these theories and controlled for the main and interactive fixed effects. We report the key results of our analysis in Table 4.

Based on our results, the US imports from SSA under AGOA correlates positively with exports from SSA at 1% significance ceteris paribus. The result shows that the US imports have an inelastic relationship with SSA exports in the short run. Policymakers also need to understand the long-run behaviour of this relationship which we are unable to cover in this study for the reason of space. This result is a success story for PTAs and their impacts on exports. Government, trade practitioners and MNCs would benefit from this understanding and try to increase exports by increasing trade agreements, reducing MTRs, reforming their policies to allow trade in services and work-in-progress.

Our results also show that the trade partners' bilateral size, proxied by the log of the sum of SSA and the US GDP, returned an elastic relationship with exports from SSA countries at 1% significance ceteris paribus. This result agrees with the gravity model and provides information for policy engagements. It suggests that the bigger the bilateral size, the bigger the exports. The result encourages trade relations with more significant economies as against the smaller ones subject to the unequal power of negotiation. The multilateral trade agreement could be the solution; however, bilateral agreements are becoming popular. Table 4 also shows results for economic similarities. Similarity index returned a positive and elastic relationship with SSA exports at 1% significance which agrees with Linder's hypothesis. It shows that some aspects of the US economy resemble SSA economies. This resemblance is the driver of the SSA's exports and the US imports subject to AGOA. Future research should aim at unearthing these similarities so SSA countries can strengthen them through policy changes. Relative factor endowment differences positively correlate with SSA's exports at 1% significance ceteris paribus. The result agrees with the classical theory of international trade (e.g. H-O-S). There is a marked difference between the gross fixed capital formation of the US at an average of $314,857,000,000 per annum compared to $6,641,853,042[2] of the SSA countries. The result suggests that as this difference widens, unfortunately, the trade will increase. However,

[2] Source =World Development Indicator.

government policy changes could cause the business to grow by other means while also growing equally necessary capital formation.

The concluding remarks summarise first that, there is a positive relationship between the US imports and SSA's exports. The coefficient of this relationship is negligible. The positive policy change could improve it. Second, this trade relationship is driven by international trade theories, including H-O-S, Linder's hypothesis, and the gravity model. The confirmation of the operations of the classical international trade theories suggests that the results do not support the New Trade Theory (N-T-T). The results further indicate among others that trade in manufacturing components may not be significant in quantity in SSA countries. It is a piece of information to policymakers to engage industrial development policies to stimulate the industrial sector of their economies.

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Table 1: Variables and data sources

Variable	name	Proxy	Data source	reference
lexports	Log of SSA exports	Merchandise exports in current US$	WDI	
lpop	Log of SSA population	Population in million	WDI	Nouve & Staatz (2003)
lgdpssa	Log of SSA GDP	GDP in current US$	WDI	Nouve & Staatz (2003)
Lgdp2	Log of sum of GDP US/SSA	Economy Bilateral size US/SSA	WDI and authors computation	Baltagi et al. (2003)
lsimijt	Index of economic similarity US/SSA	log [1 — ($gdpit$/ $gdpit + gdpjt$)2 — ($gdpjt$/ $gdpit + gdpjt$)2]	WDI and authors computation	Baltagi et al. (2003)
lagoa	Log of US imports under AGOA	US cif imports in Dollar	Usitc.gov	
lrfac	Log of relative difference in factor endowment	$\left\|log\left(\frac{gdp_{it}}{capital^{1}{}_{it}}\right) - \log\left(\frac{gdp_{jt}}{capital_{jt}}\right)\right\|$	WDI and authors computation	Baltagi et al. (2003)
lreer	Real relative exch rate		UNCTAD	
ldist	Log of distance between US/SSA	Log (distance in km)	CEPII	

Table 2 Unit root tests with time trend

Variables	Levin-Lin-Chin Stationary at	PP – Fisher Stationary at
lexports	Level	First difference
lsimijt	First difference	First difference
lgdpssa	Level	Level
Lgdp2	Level	Level
lrfac	Level	Level
reer	Level	Level
lagoa	Level	Level
ldist	Level	Level
Lpop	Level	Level
lusgdp	Level	Level

We adopted PP-Fisher because it is widely used in the literature.

[1] Capital = gross fixed capital formation

Table 3: Descriptive statistic

Variable	means	Std deviation	Maximum	Minimum
Lexports	21.18	1.66	25.48	15.83
Lagoa	7.83	8.56	23.63	0.00
Lsimijt	0.69	0.00	0.69	0.66
Ldist	9.19	0.25	9.61	8.71
Reer	95.5	52.55	854.5	0.00
Lusgdp	277.91	7.85	294.06	258.75
Lgdpssa	211.45	18.79	287.77	175.02
Lgdp2	694.98	57.96	936.1	572.59
Lrfac	0.51	0.62	6.02	-0.15

Table 4: The results of the dynamic systems GMM analysis (D/var =lexports)

variable	Model 1	Model 2	Model 3	Model 4
Exports (-1)	0.669***	0.695***	0.710***	0.863***
	(0.034)	(0.027)	(0.024)	(0.0105)
US imports	0.0081***	0.011***	0.115***	0.0122***
	(0.0017)	(0.0009)	(0.00096)	(0.00035)
Econ similarity	37.815***	36.616***	33.952***	10.749***
	(8.105)	(5.775)	(5.406)	(3.015)
Factor diff	0.053**	-0.0456**	-0.0495**	-0.122***
	(0.024)	(0.0187)	(0.0204)	(0.0132)
Reer	-0.00025**	-0.00022***	-0.00022**	0.00024***
	(0.00012)	(9.73E-05)	(9.86E-05)	(7.62E-05)
Bilateral size	32.473***	3.937	-0.4525**	0.0415
	(4.743)	(2.681)	(0.055)	(0.0305)
Main FE	Yes	yes	yes	yes
Interactive FE	Yes	yes	yes	Yes
J-statistic	0.506	0.3914	0.3832	0.4138
observation	819	819	819	819

Note: Model 1= specification with exporter, importer, year fixed effects and interactive fixed effects. Model 2= include main fixed effect and only two interactive effects. Model 3 = include main fixed effects and only one interactive effect. Model 4 = include main fixed effect and no interactive effect. ***, ** stands for significant at 1% and 5% respectively. () = standard error.

Table 5: Comparing model with control variables and model without control variables in linear regression.

D/VARIABLES	Lexp	Lexp
L.Lexp	0.663***	0.904***
	(0.069)	(0.021)
Lusimp	0.034***	0.021***
	(0.010)	(0.006)
LSim	-76.250**	-9.139**
	(29.672)	(3.866)
Rfac	-1.224*	-1.002**
	(0.691)	(0.464)
AUSgdp	-1.357**	-0.118
	(0.582)	(0.077)
Ldist	0.737***	-0.044
	(0.201)	(0.033)
Constant	159.802**	18.870**
	(64.959)	(8.407)
Observations	697	697
R-squared	0.990	0.984
Main FE	Yes	No
Interactive FE	Yes	No

Table 6: Regression making US imports dependent variable

D/VARIABLES	Lusimp
L.Lusimp	0.395***
Lexp	0.570***
LSim	11.719
Rfac	1.716
AUSgdp	0.395
Ldist	1.421**
Constant	-47.787
Observations	697
R-squared	0.930

Table 7: showing R^2 *of regressions*

D/VAR (Lexp)	model 1	model 2
LSim	-121.7829***	-178.9783***
	(38.7367)	(25.6250)
Rfac	-1.4193*	-2.5064
	(0.7199)	(1.9062)
Ldist	2.3704***	0.0345
	(0.1142)	(0.0690)
Lgdp	-1.7431**	-2.9700***
	(0.7891)	(0.5196)
Lusgdp	2.2496***	19.9977***
	(0.5334)	(3.8456)
Lusimp	0.0993***	0.2218***
	(0.0151)	(0.0115)
Constant	108.0066**	-323.0495*
	(46.9794)	(156.1585)
Observations	738	738
R-squared	0,9768	0,874

Notes:
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1