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Trade Openness and Economic Growth in Nigeria

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Abstract
The study scrutinized the relationship existing between trade openness and economic growth in Nigeria by disaggregating trade openness into solid mineral export earnings, manufacturing export earnings, agricultural export earnings and oil export earnings. The study employed the Autoregressive Distributed Lag (ARDL) model covering data period from 1986 to 2020. Accordingly, the bound test result revealed that all four sectoral exports variables had long-run equilibrium relations with economic growth in Nigeria. In the short run, the study found that economic growth is significant and positively responsive to changes in agriculture and crude oil exports contrary to its significant and negative response to changes in solid mineral exports. However, manufacturing exports were found to be statistically insignificant in exerting impact on economic growth in the short run. In the long run, the study also found that agriculture and manufacturing exports had significant positive impact on growth while the effect of solid minerals and oil exports is negative and statistically significant. It is the recommendation of the paper that the federal government may consider a strategy of making all exports to go through export processing zones thereby adding more value to the exportables and creating demand for the products as well as more revenue for the government.

Keywords: Economic Growth, Trade Openness, Exports
JEL Classification Codes: O47, P45, Q37

1. Introduction

The issue of trade openness and how it affects economic growth is well known in the extant literature. The power of trade on the economy dates back to the publications of Adams Smith and David Ricardo who submitted that a country tends to gain from trading relation with other countries as a result of division of labour predicated on absolute cost advantage proposed by Smith and comparative cost advantage postulated by Ricardo (Solomon

& Tukur, 2019; Nwadike, Ani & Chukwuma, 2020). In the last three decades, various countries and government most especially developing economies have tried to embrace the policy of trade openness which connotes partial or total removal of all trade barriers and restrictions in order to promote the growth of the economy.

As a result of the adoption of trade openness policy, there has been tremendous increase in world output through efficient allocation of resources, increase in flows of technological advancement, capital accumulation and healthy competition between trading nations. Although, Africa is plagued with these problems of deficient infrastructures, poor transportation system, increase in sectoral fragmentation value, acute shortage of power supply as well as production deficiency occasioned by high prices of energy, but with advancement in trade openness, the countries are making gains (Oloyede, Osabuohien & Ejemeyovwi, 2021).

Tkalenko, *et al.*, (2023) submitted that the recent trend in globalization manifested in diverse measures such as political, civic and economic structures. They argued that the key attribute of modern development has remained trade liberalization and globalization making it possible for the removal of barriers to trade as movement of capital is fast-tracked with relative ease, a development partly predicated on tremendous improvement in communication. Supporting this view, Sunde, Tafirenyika and Adeyanju (2023) argued that a strong and stable export sector stands to benefit the economy in several aspects including innovation in technology, capacity utilization, increase in resource allocation and economies of scale, all of which lead to global market competition.

It has been argued in the literature that trade openness is a vehicle that enables globalization to thrive thereby promoting the spirit of entrepreneurship, finance and investment. For instance, the remarkable economic performance of the Asian tigers (Singapore, Taiwan, Hong Kong, South Korea) and BRICS (Brazil, Russia, India, China and South Africa) have all been fueled by increased exports predicated on trade openness resulting in rapid industrialization that had triggered high level of economic growth since 1960. The belief was that these economies attained the high growth performance as a result of earlier adoption of opening their economy to other countries for trade relations. The theoretical underpinnings for opening up the economy is that it has the potential to enhance trade with concomitant impact on investment both domestic and foreign; making the economy to be promoted into higher growth level (Burange, Ranadive & Karnik, 2019).

The belief that speedy growth of the economy is anchored on trade openness is embraced by many developing countries including Nigeria to

embrace liberalization reforms in the 1970. The reforms took the forms of import and export tariffs reductions as well as non-tariff barriers (Adama, Ohwofasa & Onabote, 2022). To this end, the Structural Adjustment Programme (SAP) introduced in Nigeria in 1986 on the recommendation of International Monetary Fund (IMF) in a bid for more liberal trade is already well known. The SAP liberalization policy was driven by restructuring targeted at diversification of the economy productive base, created and enhanced a sustainable and realistic exchange rate regime, privatization and commercialization of the Nigerian economy as well as tariff reform among others.

This realization led many emerging economies including sub-Sahara Africa (SSA) countries to welcome openness in trade with open hands since trade is a necessary prerequisite for any dynamic modern economy to be successful. When trade takes place, production across boundary is inevitable and high rate of growth is accelerated thereby boasting life expectancy and living standards (Burange, *et al*., 2019). However, despite a growing body of literature in which many agreed that openness of trade promotes economic growth, there has been very little structural improvement in the Nigerian economy. For instance, only very few sectors such as petroleum sector, information and communication technology, tourism and probably the entertainment sector can be regarded as the building block upon which the Nigerian economy is be sustained.

On the contrary, vast majority of sectors some of which include agriculture, solid mineral, manufacturing, transportation, construction, education and health have tended to perform very poor. Nonetheless, the benefits and increased opportunities arising from trade openness necessitated the reason why the study is undertaken. The promoters of trade openness in the literature averred that it helps to promote efficiency, stimulate production which in turn minimizes production cost thereby increasing the confidence of trading partners at the world market. A number of benefits were claimed to have sprang from trade openness, and among which economic growth, is relatively more pronounced (Yakubu & Akanegbu, 2018; Solomon & Tukur, 2019; Malefane, 2020; Oloyede *et al.*, 2021). However, there is a dearth of knowledge regarding which sector has the best stimulus for economic growth and upon which the choice of the study is informed aimed at ascertaining the suitability of trade openness as a stimulus for enhancing economic growth.

In furtherance of this argument, most economists submitted that if relationship ever exists between growth and trade openness, it can be termed inconclusive, mixed or at best very controversial (Fredrick, *et al.*, 2019). Whilst studies by Aiyedogbon and Ohwofasa (2010); Malefane (2020) and

Mallick and Behera (2020) found positive impact of trade openness on economic growth. Zahonogo (2016) established a negative relationship. Contrariwise, the study by Adesola *et al.*, (2018) could not found a relationship. Previous studies used trade openness variable on a single sector and relate same to growth dynamics in Nigeria which may be the reason for discordant conclusions. To address this concern, this paper uses an autoregressive distributed lag (ARDL) model to propose the direction of trade openness that the country can adopt given the weak export base.

Thus, the current study explores the relationship that exists between growth and trade openness disaggregated into oil and non-oil in which the non-oil is further disaggregated into solid mineral export, agricultural export as well as manufacturing export. The rest of the paper is structured as follows: preceding this section on introduction is section 2 which presents a review of relevant literature include theoretical and empirical literatures. In section 3, the methodology of the paper is presented while section 4 contains the results and discussion. Finally, section 5 is the conclusion and recommendations.

2. Literature Review

2.1 Theoretical Literature

The Richardian theory of comparative advantage alluded that efficient allocation of resources is only likely to be possible when nations engage in trade with concomitant effect on level of income. Richardo (1817) argued that countries stand to reap welfare gains if only they allow specialization in the production of the goods with low opportunity cost. When this happens the surplus arising therefrom can then be exchanged for foreign products as long as the exchange rate of the goods guarantees acceptable opportunity cost ratios between the trading partners. Earlier in the 18th century, the work of Smith (1776) was documented extensively on trade liberalization. According to Aiyedogbon and Ohwofasa (2010), Smith postulated that trade liberalization was a necessary condition for economic growth and further stressed the roles of division of labour in the growth process. Writing further on division of labour, Smith (1776) anchored his argument on the forces of 'invisible hand' for the economy with the tendency to provide a leeway for individual self-interest. Smith believed that restrictions on international trade were unnecessary as they limit the scope of international specialization with a concomitant effect on domestic productivity.

Thus in the 19th century, the benefits derived from the doctrine of trade predicated on productivity form the foundation upon which export strategy was anchored, a belief which was tenaciously held to by all classical

trade theorists. On the other hand, the endogenous growth theory postulates that the more an economy becomes open the faster the possibility of high level of technology to occur on a wider dimension. This is predicated on the fact that as the country opens its borders for trade, a number of benefits such as technological know-how, finance and skill man-power will accrue. These schools of thought include Solow (1956); Lucas (1988) as well as Romer (1994). The works by these authors revealed that trade openness may raise economic growth rates depending on economies of scale, on the job training as well as relevant knowledge acquisition from abroad. Accordingly, the resulting gains from trade are likely to shift outward the entire production possibility frontier of the countries concerned. This development is of course predicated on the condition that trade led to greater investment and productivity had grown very fast as to cause changes in export and economic growth. Notably, the Solow growth literature is built on the Cobb-Douglas production function and which invariably form the theoretical framework of the current study.

2.2 Empirical Literature

From the empirical corridor, the conventional wisdoms that trade liberalization or openness has the tendency to exert positive impact on economic growth has assumed an alarming dimension among economists. Several studies carried out in the literature tried to uncover the relationship that exists between trade openness and economic growth. Thus, Aiyedogbon and Ohwofasa (2010) assessed the existence of the impact of trade openness on economic growth using data from Nigeria. Two equations were developed by the study with common explanatory variables namely, terms of trade, real export and degree of openness. The dependent variables consisted of index of industrial production and economic growth respectively. Utilizing a vector error correction model on a data spanning 1980-2009, the study found among other things that economic growth is significantly and positively responsive to changes in degree of openness.

Similarly, Echekoba, Okonkwo and Adigwe (2015) study tried to assess the response of economic growth to changes in trade openness. The scope of the study covers 1971-2012. The study found that imports and exports had positive and significant impact on economic growth in Nigeria. The study used the Ordinary Least Squares (OLS) to explore the contemporaneous dynamics among the variables. However, a similar study by Olowe and Ibraheem (2015) revealed contradictory results as it noted that economic growth is negative and significantly responsive to changes in trade openness during the review periods, 1970-2012. In a related study, Adedoyin, *et al.*, (2016) employed ARDL model to scrutinize the growth

impact emanating from the effect of financial development and trade openness in Nigeria. The study found evidence of long run relations existing between growth and trade openness at least during the review period.

The relationship between volatility in economic growth and trade openness was carried out for the Ghanaian economy. Using data covering 1970-2013, Kwame, Ellen and Daniel (2017) study revealed that trade openness exerted significant positive impact on economic growth volatility in Ghana. The study which found that the variables exhibited co-integration tendency employs the ECM methodology. The study therefore was in line with Adedoyin *et al.,* (2016) who had earlier reached similar findings in Nigeria.

The findings of Olowe and Ibraheem (2015) was however challenged by Yaya (2017) who argued that the series of conflicting results documented in the trade openness-growth nexus may have be due to the fact that capital stock and labour that play crucial role in the growth process were usually omitted in several studies. Assessing the response of economic growth to changes in trade openness in Cote d Ivoire, the study indicated that a positive and statistical significant relationship existed between the variables. The paper explored this relationship using the Granger causality approach and the ARDL model on a data covering the periods, 1965-2014. This study led credence to several other prior studies such as Aiyedogbon and Ohwofasa (2010) in Nigeria, Adedoyin et al. (2016) also in Nigeria and Kwame, *et al.,* (2017) in Ghana.

In a study conducted by Ojeyinka and Adegboye (2017), the authors investigated the extent at which the manufacture and agriculture sectors are affected by changes in trade openness in Nigeria. The study used the Generalized Method of Moment (GMM) to explore the contemporaneous dynamics existing among the variables. The study indicated a positive significant relationship between trade liberalization and agricultural output contrary to a significantly negative relationship with manufacturing output in Nigeria. In Zimbabwe, the effect of trade openness on productivity for selected African countries was assessed by Puruweti (2017). Using a pooled OLS technique on data spanning 1980-2014, the study found a significant positive impact of trade openness on manufacturing and service value added thereby leading supporting claims to the findings of Ojeyinka and Adegboye (2017) in Nigeria.

Menwhile, Yakubu and Akanegbu (2018) documented the response of economic growth to changes in trade openness in Nigeria, 1981-2017. The study found a unidirectional causality running from real gross domestic product (growth) to trade openness. Also, the study found a co-integrating relationship between trade openness and growth. The study employed the

OLS technique for the analysis. In a related studies, the relationship existing between trade openness and economic growth using a sample of SSA countries was documented in the literature. One of such studies is Malefane and Odhiambo (2018) who scrutinized the impact of trade openness on economic growth in South Africa. The study disaggregated trade openness into ratios of exports to GDP, imports to GDP, trade to GDP and trade openness index which captured the size and geography of the South Africa economy. Utilizing the ARDL model on data covering 1975-2014, the study found that trade openness had positive and statistical significant impact on economic growth in South Africa.

Furthermore, Solomon and Tukur (2019) assessed the impact of trade openness on economic growth in Nigeria, 1981-2018. The study made real GDP as a function of exchange rate, trade openness and inflation. The co-integration test and error correction methodology were employed for the study. The study found the presence of long run equilibrium relationship for the variables. Similarly, the study observes that economic growth is significant and positively responsive to changes in trade openness thereby giving credence to the finding of Adedoyin et al (2016). Also, it was found out by the study that whilst exchange rate had insignificant positive impact on growth, inflation rate exerted significant positive impact on economic growth in Nigeria.

Likewise, Burange *et al*., (2019) conducted their study on the causality between economic growth and trade openness using data from BRICS countries. The study covered four export sectors namely services export, merchandise exports, services import and merchandise imports. The findings of the study showed growth-led trade in services in India and growth-led import and growth-led export hypothesis in China. Likewise, the finding revealed export-led growth and import-led growth for South Africa whilst in the case of Brazil and Russia, no evidence of causality was detected. This finding is similar to Yakubu and Akanegbu (2018) who had earlier established unidirectional causality in the case of Nigeria.

In their research paper, Fredrick, Olusegun and Olamitunji (2019) make investment as a function of trade openness, import and export as a ratio of GDP respectively to assess the impact of trade openness on growth in SSA. Using a panel corrected standard error (PCSE) on data covering 35 African countries, the study indicated that growth is positively and significantly responsive to changes trade openness and import contrary to its negative response to changes in export growth. The study therefore leads credence to several other studies in the extant literature such as Puruweti (2017) in Zimbabwe, Yaya (2017) in Cote d'Ivoire and Yakubu and Akanegbu (2018) in Nigeria.

In a recent study, Nwadike *et al.,* (2020) submitted that different territories in the world had in the time past engaged in some forms of trade or another with their neighbours, a practice which has continued to the present time. Their thesis assessed the extent at which trade openness affected economic growth in Nigeria with data covering 1970–2011. The study employed co-integration to test for long run equilibrium relationship between the dependent and the explanatory variables. Likewise, the OLS methodology was utilized to explore the contemporaneous dynamics. Accordingly, the study found evidence of long run equilibrium relationship between the variables. Similarly, it was observed by the study that a significant positive impact of trade openness on economic growth in Nigeria was discernable. This supported the findings of Fredrick et al., (2019).

In India, Mallick and Behera (2020) used data covering the period of 1960 to 2018 to assess the effect of trade openness on economic growth. The study had a break point of pre-trade reforms 1960 through to 1990. Also, the post-trade reforms covered the period between 1991 and 2018. A threshold co-integration and ECM technique was utilized by the study. Observably, evidence from the study suggested the presence of long run equilibrium relationship existing between trade openness and economic growth in the Indian economy. Specifically, it was observed from the ECM dynamic regression that the response of trade openness to shock in economic growth could be positive as quickly as negative thereby leading support to the findings of Fredrick *et al.,* (2019).

In Botswana, Malefane (2020) assessed how economic growth responded to changes in trade openness utilizing data for the periods, 1975-2014. Using the ARDL model in exploring the effect of different indicators of trade openness on economic growth, the study found that the impact of total trade and exports on economic growth is positive. Specifically, the study observed that the impact of trade openness on economic growth is positive and statistically significant thereby giving credence to earlier studies of Malefane and Odhiambo (2018) in South Africa and Mallick and Behera (2020) in India. In a recent study, Omoke and Opuala-Charles (2021) appraised the relationship existing between economic growth and trade openness in Nigeria for the period, 1984-2017. Three proxies for trade openness namely, export trade, import trade as well as total trade formed the explanatory variables for the study. The technique of ARDL model was utilized for the study and the variables were confirmed to be co-integrated signifying the existence of long-run relationship between the dependent and the regressors. Also, the study found evidence of significant positive impact of export trade on growth as against negative relationship from import trade.

In the same vein, Oloyede *et al.*, (2021) scrutinized the impact of trade openness on macroeconomic variables in two of the regional economic communities in African countries among which the growth rate of real GDP is relatively more pronounced. Specifically, the focus of the study was on Economic Community of West African States (ECOWAS) and Southern African Development Community (SADC) covering the data period, 2006-2017. Using random and fixed effect models predicated on pooled OLS methodology, the study could not find evidence of relationship nexus between trade openness and economic growth in both sub-regional economic blocs namely, ECOWAS and SADC. The study stressed the role of effective government policies in order to bring about increase in trade and economic growth in Africa. The findings of this study run contrary to numerous other studies (Malefane & Odhiambo, 2018; Solomon & Tukur, 2019; Nwadike *et al*., 2020; Omoke & Opuala-Charles, 2021).

In more recent studies using Ukrainian data, Tkalenko *et al*., (2023) assessed to what extent trade openness has tended to influence economic growth in the light of the recent globalization trend in world trade. Exploring the relationship with Granger causality technique, the study found overwhelming evidence of causality running from exports to economic growth. However, the study observed that increase in import growth over exports growth resulted in a deleterious balance of foreign trade in the same way as negative overall growth rate.

Likewise, Sunde, *et al.*, (2023) appraised the effect of trade openness, exports and imports on economic growth in Namibia in the context of ARDL bound testing approach to co-integration technique. Accordingly, the study found that the import subsector exerted negative and significant effect on growth as against significant positive impact from trade openness and the export subsector. The study concluded that growth in Namibia is spurred by export-led growth and trade liberalization most especially in the short run.

A close look at the avalanche of literature reviewed gave a lot of insights such as the nature of variables employed and the methods of analysis. It can be observed that most studies used single sector variables and may have missed the benefits of multi-sector variables. This therefore constitute the lacuna that the present study set out to fill. Accordingly, trade openness is disaggregated into crude oil export trade, manufacture export trade, solid mineral export trade and agriculture export trade and the impact of individual variable is assessed on economic growth in Nigeria. This sectoral analysis is critical to the Nigerian economy. Even the isolated attempts by Malefane and Odhiambo (2018) and Burange *et al.*, (2019) to employ disaggregated variables does not fall in the manner intended by the

current study. This is predicted on the fact that these studies were carried out in South Africa and BRICS economies whose performance is better than the Nigerian economy. Also, the data utilized by these studies were export and import. On the contrary, the current study employed only export data disaggregated into sectoral export variables as mentioned earlier.

2.3 Stylized Facts Sectoral Exports and GDP Growth Rate

The Nigerian economy is currently being faced with severe revenue shortfalls. This is because oil which is the mainstay of the economy has continued to witness decline in price at the global market thereby affecting the revenue and policies of government. This in turn affected government policies and programmes and there is very little the non-oil sector could do due to many years of neglect. The result is that a number of abandoned projects is in everywhere a common sight.

Table 1 reveals that over the last three decades, the growth of petroleum sector has been volatile which explains the attendant instability in government revenue since this sector accounts for about 90% of foreign exchange need of the country and over 60% of government revenue. On the other hand, the non-oil sectors consisting of agriculture, solid mineral and manufacturing sectors have performed fairly better. However, it can be observed that the growth rate of GDP is consistently less than double digit, a situation which is partly caused by the unstable revenue from export trade sector most especially crude oil export trade whose prices are determined at the international market. The situation became more worrisome as the country entered into recession in 2016 recording negative growth of -1.6% while the negative growth of -1.9% recorded in 2020 was occasioned by the advent of the deadly covid-19 pandemic. On five years average, positive growth performance can be observed between 1986 and 2015 for the all-four sector exports trade except for solid mineral exports during the 2011-2015 periods.

Table 1: Growth Rate of GDP and Sectoral Export Trade (%), 1986-2020

Year	Real GDP	Agriculture	Solid Mineral	Manufacturing	Crude Petroleum
1986-1990	5.3	44.0	6.1	3.0	79.9
1991-1995	1.1	6.8	4.5	7.3	88.8
1996-2000	3.1	1.8	2.0	5.7	23.9
2001-2005	9.6	46.2	19.5	17.5	35.2
2006-2010	7.8	28.0	484.0	20.2	11.3
2011-2015	4.8	41.9	-19.0	74.3	-4.3
2016	-1.6	-18.3	16.4	10.9	-0.1
2017	0.8	42.8	294.1	-0.3	57.9
2018	1.9	1.2	-5.1	-9.7	38.2
2019	2.3	-3.1	-6.6	4.8	-8.0
2020	-1.9	3.5	-6.0	0.6	-1.1

Source: CBN Annual Report and Statement of Account (various issues)

The behaviour of the sectoral export trade was exhibited in Figure 1. It shows that the trends of the export variables were relatively unstable which account for high fluctuation in government revenue. Accordingly, the poor performance of the economy occasioned by declining government revenue has resulted in a number of macroeconomic fundamentals such as increasing unemployment and rising poverty level in Nigeria. For instance, poverty and unemployment which stood at 60% and 10% in 2013 rose to over 70% and 20% in 2020 respectively (CBN ARSA, various issues).

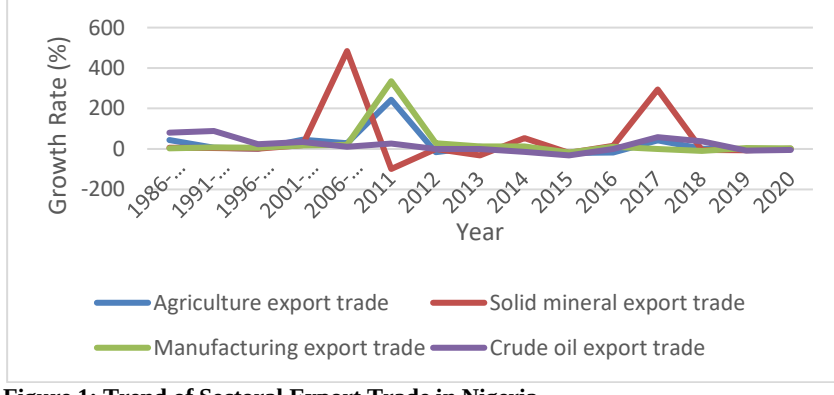

Figure 1: Trend of Sectoral Export Trade in Nigeria
Source: CBN Annual Report and Statement of Account (various issues)

Generally, the performance of the country's exports has been poor and which can be attributed to a number factors. For instance, the solid mineral sub-sector is notorious for illegal mining as is the case in Zamfara State where illegal mining of gold has become a normal routine thereby causing the government substantial loss of revenue. This same illegal mining applies to other solid minerals such as Talc, gypsum, iron ore, coal, bitumen, Lead/Zinc among others across several States including Niger, Kogi, Edo, Kaduna, Osun and Enugu States. Similarly, the situation in the petroleum subsector is even more worrisome in that the Nigerian economy depends on it. There are daily reported cases of pipeline vandalisms and illegal refineries of crude oil products across the Niger Delta. The activities of these criminally minded elements tend to undermine government revenue thereby hindering the growth prospects of the economy.

3. Methodology

The study is quantitative in nature in that it employed historical data and econometric analysis. The stochastic properties of the data were checked so that only integration of order 1 and 0 variables are included in the ARDL model utilized for the study. Annual time series data such as gross domestic product at 2010 constant price, manufacturing export, crude oil export, solid mineral export as well as agricultural export were used for the study. All five variables were culled from the various issues of the Central Bank of Nigeria annual report and statement of accounts.

The study adopts the modified version of the Solow model which considers how changes in the output level of an economy is occasioned by a combination of factor inputs and technological know-how. Using the Cobb-Douglas production function the Solow model is stated as follows:

$$Y = AL^{\beta}K^{\alpha} \quad \text{.....(1)}$$

Where: Y = total production, K = capital input, L = labour input while A = total factor productivity and α and β are the output elasticities of capital and labour respectively. Cobb and Douglass (1928) averred that the output elasticities are constant values determined by the availability of technology.

However, the choice of the application of this model is the total factor productivity (TFP) included among the explanatory variables which account for contribution to growth other than labour and capital. In a typical Cobb-Douglass production function, A is a key factor influencing the economy level of output and for this reason it is often referred to as TFP. Accordingly, K and L in the model were dropped in line with the objective of the study and A takes the form:

$Yt = f(\varpi)$.....(2)

Where ϖ is the vector of the explanatory variables expanded to accommodate the variables chosen for the study. Thus, the model is specified using annual time series data from 1986-2020.

3.1 Model Specification

In this section, economic growth is specified as a function of trade openness as follows:

$Yt = f(AEXt, SMEt, MEXt, OEXt)$.....(3)

Where: Y = real gross domestic product, AEX = agriculture exports, SME = solid mineral exports, MEX = manufacturing exports, OEX = crude oil exports.

In log stochastic term, equation 3 becomes:

$InY_t = \beta_0 + \beta_1 InAEX_t + \beta_2 InSME_t + \beta_3 InMEX_t + \beta_4 InOEX_t + \mu_t$.....(4.)

Here, the coefficients, β_0, $\beta_1 - \beta_4$ are constant and parameters to be estimated respectively. Finally, μ is white noise error term.

The study employs the Autoregressive Distributed Lag model usually considered flexible but superior to other techniques of co-integration in the extant literature. The model possesses some advantages such as inclusion of uneven lag orders which avoids the classification of variables that must be I(1) or I(0) by developing bands of critical values which identifies the variables as being stationary or non-stationary processes. Likewise, the model permits the inclusion of different lag structure for each of the explanatory variables. This is against the rules in the Johansen's vector ECM which allows for only integration of order 1. As a corollary of the above, the unrestricted model of ECM take satisfactory lags that captures the data generating process in a general-to-specific manner. Lastly, the model is ideal for a small sample size of less than 50 years as used in the current study unlike the Engle and Granger (1987) and Johansen and Juselius (1990) methods of co-integration.

Initially developed by Pesaran and Pesaran (1997), the model was later expanded by Pesaran et al, (2001) and Narayan (2005). The choice of this model followed a preliminary studies and also in line with several previous studies in the development literature (Adedoyin *et al*., 2016; Yaya, 2017; Malefane & Odhiambo, 2018; Malefane, 2020).

$$\Delta InY_t = \alpha_0 + \sum_{i=1}^{K} \alpha 1i \Delta InY_{t-1} + \sum_{i-1}^{K} \alpha 2i \Delta InAEX_{t-1} + \sum_{i=1}^{K} \alpha 3i \Delta InSME_{t-1} + \sum_{i=1}^{k} \alpha 4i \Delta InMEX_{t-1}$$

$$+ \sum_{t-1}^{k} \alpha 5i \Delta InOEX_{t-1} + \beta_1 InY_{t-1} + \beta_2 InAEX_{t-1} + \beta_3 InSME_{t-1} + In\beta_4 InMEX_{t-1} +$$

$$\beta_4 InOEX_{t-1} + \varepsilon_t \quad \text{.....(5)}$$

In conducting this test, upper and lower critical bounds have been developed to test the null hypothesis of no cointegration between variables. Accordingly, a computed F-statistic from equation (5) is compared to the critical bounds and the null hypothesis is rejected when the F-statistic exceeds the upper critical bound. On the contrary, the null hypothesis is accepted when the F-statistic is less than the lower bound while the test will be considered inconclusive when the calculated F-statistic lies between the lower and upper critical bounds (Narayan, 2005; Pesaran, Shin & Smith, 2001). In the finally analysis, the error correction model for the estimation of the short-run relationships is estimated as follows:

$$\Delta InY_t = \sigma_0 + \sum_{i=1}^{K} \sigma 1i \Delta InY_{t-1} + \sum_{i-1}^{K} \sigma 2i \Delta InAEX_{t-1} + \sum_{i=1}^{K} \sigma 3i \Delta InSME_{t-1} + \sum_{i=1}^{k} \sigma 4i \Delta InMEX_{t-1}$$

$$+ \sum_{t-1}^{k} \sigma 5i \Delta OEX_{t-1} + \lambda ECT_t \quad \text{.....(6)}$$

Where δ_0 and α_0 are the constant; δ_i *and* α_i are the coefficient, Δ is the difference operator, K and p are the optimal lag lenght, t represents the time trend, ECT captures the error correction term, and γ represents the speed of adjustment of the model. The stability of this model is ascertained using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of square of recursive residuals (CUSUMSQ) whose equations were developed by Brown, Durbin and Evans (1975).

4. Results and Discussion

4.1 Descriptive Statistics

Table 2 shows a summary of the basic statistics for the dependent variable namely the gross domestic product and the explanatory variables which includes crude oil export earnings, manufacturing export earnings, agriculture export earnings and solid mineral export earnings. Each variable has 35 observations which represent data from 1986 to 2020.

Table 2: Data Description

	GDP	AEX	SME	MEX	COE
Mean	39619.7	141898.7	18612.8	45561.9	58678.8
Median	33004.8	38211.9	2345.9	5633.3	29931.1
Max	71387.8	485748.5	443944.2	163082.0	178458.7
Min	17007.8	5631.8	1241.9	2699.5	83.7
Std Dev	19628.6	165261.0	7429.6	60743.3	59498.9
Skewness	0.46	0.95	5.59	0.97	0.58
Kurtosis	1.60	2.15	32.53	2.06	1.88
Jarqe-Bera	4.09	6.34	1454.1	6.78	3.81
Probability	0.13	0.04	0.00	0.03	0.15
Obs	35	35	35	35	35

Source: Author's computation using E-views 12.0

The Table 2 reveals that the Nigerian GDP during the reviewed period averaged ₦39619.7 million which ranges from ₦17007.8 to ₦71387.8 million with a standard deviation of ₦19628.6 million. Also, export earnings for agricultural sector averaged ₦141898.7 million with its minimum value of ₦5631.8 million and a maximum of ₦485748.5 million as well as a standard deviation of ₦165261.0 million. Likewise, solid mineral export earnings averaged ₦18612.8 million which ranges from a minimum of ₦1241.9 million to a maximum of ₦443944.2 million. It has a standard deviation of ₦7429.6 million. Furthermore, the mean of export earnings of the manufacturing sector stood at ₦45561.9 million which varies from a minimum of ₦2699.5 million to a maximum of ₦163082.0 million. It recorded a standard deviation of ₦60743.3 million. For export earnings for crude oil sector, it averaged ₦58678.8 million which has a minimum of ₦83.7 million and a maximum of ₦178458.7 million.

Generally, the series displayed high standard deviation which is an indication that the data has a wider spread and therefore look less precise in nature. Notably, Table 2 further reveals that the series are positively skewed around their mean. This implies that the tail of the distribution curve is closer to the mean on the lift but further away towards the right suggesting that small but frequent losses were incurred on the country's export earnings while at the same time few large gains were made in the period under review. In the case of Kurtosis, solid mineral export distribution exhibited peakedness whilst the rest of the variables including the dependent variable had flat distributions. Finally, the Jarque-Bera indicated that only GDP and crude oil export assumed the characteristics of a normal distribution as the alternative hypotheses for agricultural, manufacturing and solid mineral exports could not be rejected.

4.2 Test for Stationarity

The unit root test in Table 3 was conducted with intercept and no trend using 5% level of significance. Accordingly, the test indicates that the dependent variable alongside three of the sectoral exports namely, agriculture, solid mineral and manufacturing exports were stationary at first differencing while crude oil export achieved stationarity at level.

Table 3: Unit Root Test Results

ADF Test with Intercept			
Variables	Level	First Diff	Order
LRGDP	-0.54	-3.45	1
LAEX	-1.12	-7.72	1
LSME	-2.52	-8.47	1
LMEX	-0.08	-5.22	1
LOEX	-3.07	-	0
Mackinnon Critical Value = 5%	-2.96	-2,95	

Source: Author's computation using E-views 12.0

Specifically, crude oil export achieved stationarity at level in that the ADF value of -3.07 exceeds the critical value of -2.96. However, real GDP, manufacturing export earnings, agricultural export earnings and solid mineral export earnings were not stationary at level but rather at first differencing.

4.2 ARDL Bounds Test for Co-integration

Following the confirmation that the series were made up of both integration of orders 0 and 1, a necessary condition for ARDL model estimation, the long run bound test based on the ARDL technique is presented in Table 4. From the results it can be seen that the upper bounds are less than the F-statistics at all confidence levels signifying the presence of long run equilibrium relationship among the variables.

Table 4: ARDL Bounds Test for Co-integration Results

Critical Values = 5%	Case 2: Restricted Constant and No Trend	
	K=4	
	Lower Bound I(0)	Upper Bound I(I)
10%	2.20	3.09
5%	2.56	3.49
1%	3.29	4.37
Computed F-Statistics = 5.25		

Source: Author's computation using E-views 12.0

As a result of long run relationship between the variables the long run model is therefore estimated using the fully modified ordinary least square (FMOLS) regression. The choice of FMOLS was predicated on the fact that further experimentation using the technique of least square and dynamics least square were counterproductive. Accordingly, Table 5 presents the long run results where the explanatory variables account for 95% variation in economic growth in the period of review.

Table 5: Long run Estimation of Trade Openness
Method: FMOLS
Dependent Variable: LGDP

Variable	Coefficient	Std error	t-statistics	Probability
Constant	0.50	0.66	0.75	0.46
LAEX	0.37	0.12	3.04	0.01
LSME	-0.38	0.12	-3.13	0.00
LMEX	0.08	0.02	3.93	0.00
LOEX	-0.84	0.17	-4.99	0.00
$R^2 = 0.95$				

Source: Author's computation using E-views 12.0

The results therefore indicate that all four indicators of trade openness exerted significant impact on growth. However, while the effect of agricultural export earnings and manufacturing export earnings on growth is positive, the impact of solid mineral export earnings and crude oil export earnings on growth is negative. For instance, in the long run a unit increase in agricultural export earnings increases growth performance by 0.37% but a similar 1% increase in solid mineral export earnings resulted in 0.38% reduction in growth in the period of analysis. The positive effect from agriculture and manufacturing on growth is similar to several other findings such as Yaya (2017) in Cote d Ivoire, Puruweti (2017) in Zimbabwe, Malefane and Odhiambo (2018) in South Africa and Omoke and Opuala-Charles (2021) in Nigeria.

Table 6: ARDL Error Correction Model
Dependent Variable: ΔLGDP

Variable	Coefficient	Standard error	t-statistic	Probability
ΔLGDP(-1)	0.19	0.13	1.45	0.19
ΔLGDP(-2)	1.08	0.12	8.85	0.00
ΔLGDP(-3)	0.48	0.21	2.25	0.05
ΔLAEX	-0.09	0.01	-7.55	0.00
ΔLAEX(-1)	0.06	0.01	4.39	0.00
ΔLAEX(-2)	0.05	0.01	3.82	0.01
ΔLSME	0.01	0.00	1.97	0.08
ΔLSME(-1)	-0.03	0.01	-4.37	0.00
ΔLSME(-2)	-0.03	0.01	-4.97	0.00
ΔLSME(-3)	-0.03	0.01	-4.72	0.00
ΔLMEX	0.02	0.02	1.12	0.29
ΔLMEX(-1)	-0.11	0.03	-4.10	0.00
ΔLMEX(-2)	-0.07	0.02	-2.91	0.02
ΔLMEX(-3)	-0.03	0.02	-1.91	0.09
ΔLOEX	0.04	0.01	4.79	0.00
ΔLOEX(-1)	0.04	0.01	4.72	0.00
ΔLOEX(-2)	0.02	0.01	1.52	0.16
ECM(-1)	-0.64	0.09	-7.15	0.00

Wald F-Test/(P-value)				
ΔLGDP	ΔLAEX	ΔLSME	ΔLMEX	ΔLOEX
48.05 (0.00)	9.22 (0.01)	6.38 (0.01)	3.05 (0.05)	5.54 (0.02

Diagnostic Test	
R^2	0.93
DW	2.32
F-stat	2.70
Serial correlation LM Test (F-Stat	0.90(0.45) No serial correlation
ARCH LM Test (F-Stat)	3.75(0.06) No heteroskedasticity
Ramsy Reset	4.22(0.12) No misspecification

Source: Author's computation using E-views 12.0

In Table 6 the error correction mechanism predicated on ARDL bound test is presented after a battery of diagnostic test was conducted to ensure model stability. There are three panels in which panel 1 contains the variable coefficients while panel 2 is made up of the variable (Wald) joint tests to determine the level of significance of the predetermined lags suggested by AIC. The diagnostic test for model stability is presented in panel 3. A critical look at panel 3 of the Table indicates that the model has a good fit as the R^2 is highly robust. It shows that the independent variables explained 93% variation in economic growth while the Breusch-Godfrey

serial correlation and ARCH LM tests rejected the null hypotheses of no autocorrelation. Likewise, the Ramsey reset indicates no misspecification bias. Also, the F-statistic reveals that the model is statistically significant.

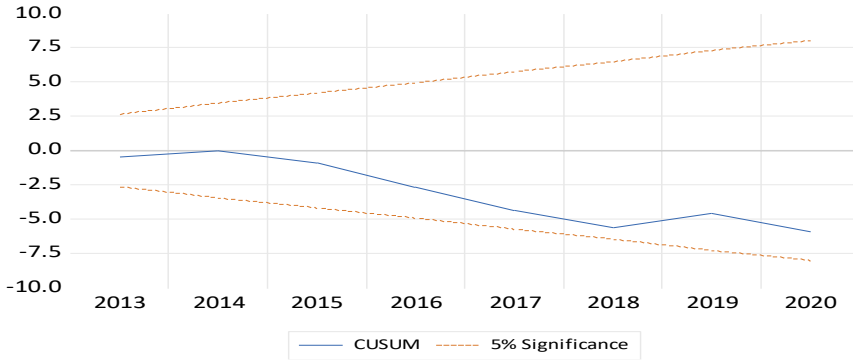

Figure 2: Stability Test (CUSUM)
Source: Author's computation using E-views 12.0

Finally, the CUSUM test in Figure 2 lies within the two critical bounds indicating evidence of stability for the model. Thus, the model passes the diagnostic tests and is satisfactory. In panel 1 therefore, the results show that only lags 2 and 3 of previous GDP were positive and significant in affecting GDP in the current period during the short run. This implies that a unit increase in GDP lag 2 led to 1.08% increase in current GDP while a 100% increase in GDP lag 3 resulted in an increase of 48% in current GDP in the short run. The Wald joint test in panel 2 reveals that all three lag variables are statistically significant. Looking at the level relation for agriculture export, it can be seen that both the level, lag 1 and 2 equations are statistically significant in affecting economic growth in the short run. However, whilst the equation at level is negative, lag 1 and 2 exerted positive relationships with economic growth. This means that a 1% increase in agriculture export at level relation decreases economic growth by 0.09% while a corresponding increase in agriculture export at lag 1 and 2 periods brought about positive increase in economic growth by approximately 0.06 and 0.05% respectively. This is similar to the findings of Solomon and Tukur (2019) and Mallick and Behera (2020). Also, the finding is supported by the Wald test which shows that all-three lag variables are statistically significant in affecting economic growth in the short run.

In the case of solid mineral export, the results show that apart from the level relationship equation that is positive but statistically insignificant at 5% level, all three lag variables were negative and statistically significant in affecting economic growth during the review period. Accordingly, a

percentage increase in previous lags 1, 2 and 3 in solid mineral export brought about a respective 0.3% decrease in growth rate in the short run in Nigeria. Nwadike *et al.,* (2020) had earlier reached a similar finding. Similarly, evidence from the Wald test indicates that the variable is statistically jointly significant in the short run.

Also, the coefficients of manufacturing export at level and lag 3 are statistically insignificant at 5% level but lags 1 and 2 had significant negative impact on economic growth in the short run. For instance, an increase in lag 1 of manufacturing export by 10% led to a decrease in economic growth by 1.1% while an increase of the same 10% in lag 2 of manufacturing export decreases economic growth by 0.7%. This finding gave credence to the findings of Omoke and Opuala-Charles (2021). However, the joint test reveals that this variable is statistically insignificant at 5% level in the short run. What this insinuates is that the impact of all-three lags including the level relation of manufacturing export on economic growth in the short run is relatively weak in that the level of significance is at 10%.

Furthermore, it was observed by the model that the level relation and lag 1 variables in the case of crude oil export are statistically significant in impacting on economic growth during the period under review. For instance, a 100% increase in crude oil export at level and lag 1 led to an increase of 4% respectively in economic growth in the period under consideration. At lag 2 the variable is statistically insignificant and therefore no impact on growth. This finding is similar to that of Oloyede, *et al.*, (2021). The variable joint test also supported the 5% significant level in the short run. Finally, the ECM which is correctly signed and statistically significant is what is expected if there is cointegration between the dependent and the explanatory variables. Observably, the model shows that it takes approximately a speed of 64% for any disequilibrium to be corrected. Adedoyin *et al*., (2016) in Nigeria, Malefane and Odhiambo (2018) in South Africa and Malefane (2020) in Botwsana had earlier reached similar findings.

5. Conclusion and Recommendations

The study focuses on the impact of trade openness on economic growth in Nigeria covering the periods, 1986-2020. The study argues that despite the over bearing influence of crude oil exports over non-oil exports, economy performance has been less than satisfactory. The study uses descriptive and econometric approaches. The results in the short run show that while oil exports exhibit significant positive influence on the economy, the long run effect is negative. This account for the reason while the performance of the economy is still less than satisfactory as government

revenue is on a declining trend which explains presence of abandoned projects over the country.

Among other things, the issue of earnings from oil exports by the Nigerian government has been likened to that of Dutch Disease syndrome with the result that poor governance and official corruption in government have become a normal phenomenon. This led to frustration for the youth leading to insecurity such as terrorism, banditry and kidnapping. For the agriculture sector, it has been generally agreed that the sector holds the key to the economy as it provides food for the teeming population as well as provides raw materials for industries. However, these critical role of the sector have been lacking since most of the food requirements are currently being imported and several industries are shut down for lack of raw materials. Although, the findings in the long run reveal significant positive impact of agriculture export earnings on growth performance, but that the estimation at level of agriculture export in the short run is negative is therefore not surprising.

In the case of solid mineral and manufacturing exports, the short run level equations are positive but statistically insignificant while the corresponding lags are negative and statistically significant. The situation in the long run is not different as solid mineral exports exerted negative influence on growth as against the positive effect of the manufacturing sector. This is also not surprising as the qualities of solid minerals extracted are poor and the sector is also largely underdeveloped. The mining sectors being legally undertaken by government are isolated cases. Most mining are done illegally thereby reaping government of large sums of money and making the economy poor for it. Hence, the statistical significant negative result associated with the solid mineral sector is not surprising because of the constant neglect the sector has suffered over the years. For the manufacturing sector, the level of infrastructure deficit, especially electricity supply which serves as a major input is responsible for high cost of production thereby making manufacturing exports uncompetitive. This makes firms to produce below capacity, inferior and low quality relative to other products from developed countries at the global market.

It is recommended therefore that for the agriculture sector to play its key roles on the economy, government should modify the quality of the country's exports through value added via export processing zones thereby creating demand and enhancing export revenue. Similarly, findings reveal that the solid mineral and the manufacturing exports had crowing out effect most especially in the short run which is detrimental to the economic growth of Nigeria. For this, government may consider a strategy of exporting only raw materials and semi manufactured products that pass through export

processing zones and possesses high value so as to attract more demand at the global market. Finally, in the case of oil exports we recommend that government should diversify the economy away from oil to non-oil such as agriculture as revenue accrual therefore is highly volatile due to unstable international oil price.

As good as this paper may appear, it is likely to suffer from some limitations. A notable setback is the limitation of country specific data. The study uses Nigeria-based data which cannot be generalized to include other economies even among the SSA countries. There may also be a limitation of omitted variable bias occasioned by the technique of estimation as predetermined by the so-called E-views 12.

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