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Trade Intensity, Debt Sustainability and Growth Performance in Nigeria

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Abstract **Original Research Article**

The challenges of rising burden of public debt and inadequate international trade intensity have taken a dynamic dimension on the economic growth of Nigeria over the years. This study ascertains the empirical evidence of both short run and long run causal interrelationships among trade intensity, debt sustainability and economic growth in Nigeria. The study covers a forty-year period of 1984 to 2023 with growth rate (GRT) expressed as a function of trade intensity index of Nigeria and Africa (TII), Nigeria's share of world export (NSW), trade to GDP ratio (TGR), federal government debt servicing to revenue ratio (DRR), and the total debt stock to GDP ratio (DGR). The Autoregressive Distributed Lag (ARDL) technique of cointegration was adopted having established stationarity at levels and first difference using the ADF test.

The results revealed that the effect of trade intensity on the economic growth of Nigeria is positive, while the impact of debt sustainability on economic growth is negative both in the short run and long run. Based on these findings, the study recommends the need for improved trade intensity through adequate economic diversification. With diversification, the tendency is high for Nigeria to earn more in foreign exchange, thereby limiting its quest for more debts and this may result in a more sustainable economic growth.

Keywords: Trade intensity, debt sustainability, economic growth, ARDL cointegration, Nigeria.

INTRODUCTION

A serious government is always at the forefront of promoting a high trade intensity through its trade openness policies, maintain sustainable debt level by adequately managing its debt to revenue index, and ensure steady growth of its economy. Nigeria is witnessing one of its worse economic lopsidedness in recent years. More recently, the removal of fuel subsidy and liberalization of the foreign exchange market have taken tolls on the dynamism of the trade intensity, debt sustainability and economic growth of the country.

The trade intensity of a country is measured using trade intensity index. This is a measure of the value of trade between countries. It is used to examine a country's share of world exports compared to that of a trading partner country. In practical sense, trade is said to be 'intense' if the partnering countries involved trade relatively more with each other than they trade with the rest of the world. As such, an intense trade is the one

whose trade intensity index is greater than one.

Measurement of trade intensity index could be traced to certain research efforts. Balassa (1965) popularized the Revealed Comparative Advantage index also known as the Balassa index as a measure of trade intensity between two countries. It is a ratio that measure the world export share of a country relative to that of a trading partner. The primary essence of the Balassa index is to reveal the strong sectors of a country's exports relative to its trading partners.

$$RCA_{ij} = \frac{(x_{ij}/X_{it})}{(x_{wj}/X_{wt})}$$

x_{ij} represents the values of country i's exports of product j, while x_{wj} indicates the values of world exports of product j, X_{it} is the country i's total exports, X_{wt} is the total world exports. If the RCA index surpasses 1, the country i is said to have a revealed comparative advantage in the product j. For RCA that is less than 1, the country i has a revealed comparative disadvantage in the product j. The World Bank via its World Integrated Trade Solution (WITS) software adopts this measure of trade intensity index.

In an attempt to determine the degree of economic integration of countries into the world economy, Cheng and Wall (2005) adopted a refined index for trade intensity. The authors used gravity model to capture the evolution of trade flows across various countries and build a modern benchmark for trade intensity. With this approach, economies are assessed on their overall degree of trade intensity. The formula is given as:

$$ti_h = \frac{1}{2(N-1)}\left(\sum_{i=1}^{N-1}\hat{\mu}^*_{ih} + \sum_{j=1}^{N-1}\hat{\mu}^*_{hj}\right)$$

ti_h represents the trade intensity for country h. A high ti_h reflects that a country has a strong trade relationship with the rest of the world.

The Asia-Pacific Research and Training Network on Trade (ARTNeT) employed another formula to determine trade intensity index. This is stated as:

$$\text{Trade Intensity} = \frac{\sum_{sd} X_{sd} / \sum_{sw} X_{sw}}{\sum_{wd} X_{wd} / \sum_{wy} X_{wy}}$$

Where 's' is the set of source countries, 'd' is the destination countries, 'w' and 'y' represent the countries in the world and 'X' is the flow of bilateral total exports. The numerator is the export share of the source region to the destination, whereas the denominator indicates export share of the world to the destination. Just like all other measures of trade Intensity, a coefficient or index that is greater than 1 is an indication of intense trade between the source and destination countries.

Mazlan et al (2018) provided a complex measure of trade intensity index using the Geometric Trade Intensity Space Box (GTISB). This trade intensity index is change sensitive and provides a single number that can be useful for annual and inter-country comparisons

$$TI_i = \frac{\Delta X_i - \Delta M_i}{2\{\max(|\Delta X_i|, |\Delta M_i|)\}}, -1 \le TI_i \le 1$$

It was pointed out by Mazlan et al (2018) that the focus of existing estimation of trade intensity on bilateral trade activities limits the estimation of a country's market export potentials that changes over time.

Augmenting public finance with debt is no longer a hidden agenda, it is a universal phenomenon in many countries of the world. Although, debt is more rampant among developing economies (Sadik-Zada and Gatto, 2019). Public debt sustainability (PDS) has been defined in various ways by numerous economic literatures. According to the IMF (2021), public debt is said to be sustainable when the current expenditure and tax policies can be continued without prompting an explosive debt path. A variety of researches have explored the subject of debt sustainability in Nigeria.

Hakura (2020) asserted that a debt is said to be sustainable when a debtor fulfils its present and expected debt obligations of servicing and repayment without necessarily looking for aid from the creditors and other countries or defaulting. In ensuring fiscal sustainability and ensure adequate security for developmental finances, it becomes pertinent to assess the credit worthiness of a country by evaluating its

capacity to fulfil present and future debt obligations without resulting into further debts. In this sense, sustainable growth is a consequence of sustainable public debt (Gobna et al, 2022).

It is not out of place for a government to borrow internally or externally, especially in terms of meeting its fiscal obligations. The sustainability of such debt becomes imperative in the face of macroeconomic fluctuations. Most developing countries always opt for budget deficit. The managers of these economies do have reasons to intend to spend more than they plan to receive in a fiscal year. To some, it is due to the structure of the economy that relies heavily on government interference through spending. To others, it may be a consequence of a genuine plight to drive development through spending on infrastructure and industrialization as the case may be. As such, the need to augment government revenue comes in, leading to borrowing. This explains why the Keynesian macroeconomics proposed that government borrowing is a good source of promoting economic growth through financing of government budget deficit, which have multiplier effect in boosting private investment and subsequently increasing aggregate demand in the economy (Matthew and Adetayo, 2022).

Despite Nigeria being a top economy in Africa, it is plagued by low productive capacity, dwindling revenue from crude oil, and explosive rise in government expenditure. These have triggered certain economic woes leading to regular financing of budget deficit through indebtedness (Onyel, et al., 2023). As evident in the Nigerian economy, overbearing public debt is having a damaging consequence on the economy, as it results in a reduction in the funds available to both private and public sectors of the economy in terms of investment and provision of infrastructure (Hassan and Meyer, 2021).

In recent years, growth dynamics of Nigeria have been a mixture of slow growth, rapid growth and periods of negative growth, known as economic recession. The inception of the administration of President Muhammadu Buhari was welcomed with economic recession. Efforts were then put in place through the Economic Recovery and Growth Plan to turn the tide and his tenure eventually achieved an annual GDP growth rate of 3.10% at the close of 2022 and combined with the effort of the new administration to a tune of 2.74% in 2023 (NBS, 2024). A change in administration on the 29^{th} of May 2023 has enabled a refocus in the country's fiscal and monetary policy through key reforms such as removal of fuel subsidy and liberalization of the exchange rate regime (World Bank, 2023). Be as it may, the opportunity to return the country to macroeconomic stability and sustainable growth paths through the recent change of economic course of action remains shaky. This is not far from the reality that some of the factors responsible for the single-digit growth of the Nigerian economy still remain lack of development in the non-oil sector and poor investment of the government in infrastructure.

Hence, it becomes pertinent at this period of high fiscal responsibility assumed by the present administration in its bid to ameliorate the economic effects of subsidy removal, to ascertain the relationships and effects of trade intensity and debt sustainability on the economic growth of the country. It also becomes imperative to capture an aggregate view for trade intensity of Nigeria in terms of the importance of the country's relative exports in Africa.

METHODS

3.1 Theoretical Framework

In a broader and definitive perspective, the dependency theory formed the basis for enumerating the interdependency among trade, debt and growth. The theory emphasizes that economic growth is influenced by exogenous factors rather than endogenous factors in countries that pursue higher trade openness and foreign aid through debt accumulation.

3.2 Model Specification

The model for the time series data of this research work is given by;

$$GRT = \beta_0 + \beta_1 TII_t + \beta_2 NSW_t + \beta_3 TGR_t + \beta_4 DRR_t + \beta_5 DGR_t + e_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad 1$$

Where

GRT = Economic growth rate

TII = Trade intensity index of Nigeria and Africa

NSE = Nigeria's share of Africa's export as a proxy of trade intensity

TGR = Trade to GDP ratio as a proxy for trade openness

DRR = Federal government debt service to revenue ratio as a proxy of debt sustainability

DGR = Debt to GDP ratio as a proxy of debt sustainability.

β = parameters to be estimated

e = Error term or residual.

The A priori expectation is:

$\beta_1>0$; $\beta_2> 0$; $\beta_3> 0$; $\beta_4< 0$; and $\beta_5< 0$

It is expected that at the end of the analysis, trade intensity index (β_1TII) previously measured through trade openness, Nigeria's share of World exports (β_2NSW), trade-GDP ratio (β_3TGR) will have positive effects on GDP growth rate (Oppong-Baah et al, 2022; Omojolaibi and Ogunniyi, 2014; and Omisakin et al, 2009). On the other hand, debt service to revenue ratio (β_4DRR) and debt to GDP ratio (β_5DGR) are expected to have negative effects on GDP growth rate (Omodero, 2020; Matthew and Adetayo, 2022; Gobna et al, 2022).

3.3 Data Description and Sources

Table 3.1 Data description and sources

Variable abbreviation	Description of variable	Sources
GRT	Economic growth rate. It is a measure of change in the gross domestic product of a country over time.	Nigeria Bureau of Statistics (2024)
TII	Trade intensity index of Nigeria and Africa. This is a derived data from Nigeria's export value, Africa's export value and world expoPONH L-rt value. $\frac{\text{Nig. Export to Africa}}{\text{Nigeria total export}} \div \frac{\text{World export to Africa}}{\text{World export}}$	UNCTAD (2024) World Bank Data (2024)
NSW	Nigeria's share of world export. This is the ratio of Nigeria's total exports to world exports expressed in percentage.	NBS (2024) Macrotrends (2024)
TGR	Trade to GDP ratio. It is a measure of trade openness. It is derived as the sum of exports and imports as a percentage of the GDP of a country.	World Bank Data (2024)
DRR	Debt service to revenue ratio. The debt service expenditure of the federal government of Nigeria as a percentage of the federal government total revenue.	The CBN statistical bulletin (2024)
DGR	Debt stock to GDP ratio. This is a ratio of the total public debt of Nigeria to its GDP expressed as a percentage.	World Economics (2024)

RESULTS

4.1 Descriptive Statistics

Table 4.1 shows the characteristics of the distribution of the variables under study. The average GDP growth rate (GRT) for the 40-year period under study was 4.03%, and that of the trade intensity index of Nigeria and Africa (TII) was 3.94. The Nigeria's share of world export (NSW) averaged 0.26% for the period, while the trade-GDP ratio (TGR) of Nigeria has an average of 32.74%. Meanwhile, the federal government debt service to revenue ratio (DRR) has an average of 16.4%, and that of debt to GDP ratio (DGR) was 34.02% for the period.

Also, the table shows that the Jarque-Bera statistic accepted the null hypothesis of normal distribution at 0.05 level of significance for NSW and rejected the null hypothesis of normal distribution at 5% significant level for GRT, TII, TGR, DRR and DGR. Skewness statistic shows that TGR is negatively skewed, while GRT, TII, NSW, DRR, and DGR are positively skewed, implying that these distributions have both right and left tails.

Table 4.1 Summary of descriptive statistics

	GRT	TII	NSW	TGR	DRR	DGR
Mean	4.038680	3.943472	0.268359	32.73981	16.42338	34.01500
Median	3.921550	4.158271	0.243938	33.87185	11.43023	29.60000
Maximum	15.32920	8.764026	0.638478	53.27800	44.94154	75.00000
Minimum	-2.035100	1.057208	0.084349	9.135800	3.249052	7.300000
Std.Dev.	3.813175	1.758371	0.125723	11.60580	11.70151	19.14327
Skewness	0.521801	0.606360	1.159449	-0.317313	0.912039	0.632405
Kurtosis	3.485719	3.828519	3.996862	2.436944	2.719971	2.477116
Jarque-Bera	2.208377	3.595221	10.61837	1.199638	5.676122	3.121915
Probability	0.331480	0.165694	0.004946	0.548911	0.058539	0.209935
Sum	161.5472	157.7389	10.73437	1309.592	656.9352	1360.600
SumSq.Dev.	567.0718	120.5829	0.616447	5253.085	5340.084	14292.13
Observations	40	40	40	40	40	40

4.2 Correlation statistics

It is evident from table 4.2 that there are weak and average correlations or relationships among the variables under study. The relationship between the dependent variable, GDP growth rate (GRT), and the six independent variables, trade intensity index (0.127), Nigeria's share of world export (0.456), trade-GDP ratio (0.357), debt service- FG revenue ratio (-0.404), and debt stock-GDP ratio (-0.155) is generally not strong enough. The direction of correlation shows that TII, NSW, and TGR are positively related to GRT. Whereas, DRR and DGR are negatively related to GRT.

Table 4.2 Correlation matrix

	GRT	TII	NSW	TGR	DRR	DGR
GRT	1.000000					
TII	0.127005	1.000000				
NSW	0.456459	0.099977	1.000000			
TGR	0.357302	0.351919	0.531121	1.000000		
DRR	-0.404426	0.024763	-0.548197	-0.450462	1.000000	
DGR	-0.155177	-0.034598	-0.469820	-0.007731	0.399932	1.000000

4.3 Unit Root Test

Stationary tests were carried out to know if the variables are stationary at the level or first difference or not at all. If the variables become stationary at level, then the variables are integrated of order zero i.e. I(0). However, if the variables become stationary at the first difference, then the variables are integrated of order one i.e. I(1). The decision rule is to reject the null hypothesis if the statistic value exceeds the critical value at a 1% level of significance.

Table 4.3 Results of Augmented Dickey-Fuller Unit Root Test

	Level		1st Difference		Stationarity
	ADF	Prob.	ADF	Prob	
D(GRT)	-4.476325	0.0009	-11.89956	0.0000	I(0)
D(TII)	-4.116709	0.0129	-5.788868	0.0002	I(0)
D(NSW)	-2.379212	0.1540	-8.153285	0.0000	I(1)
D(TGR)	-3.037638	0.0401	-7.674636	0.0000	I(0)
D(DRR)	-2.122489	0.2373	-5.643776	0.0000	I(1)
D(DGR)	-2.077387	0.5418	-4.912735	0.0016	I(1)

A situation whereby the (ADF) test statistics is greater than the critical values with consideration on the absolute values, the data at the tested order will be said to be stationary (Bakare-Aremu, 2019). The unit root test results presented in Table 4.3 shows that D(GRT), D(TII) and D(TGR) are all stationary at level, while D(NSW), D(DRR) and D(DGR) are stationary at first difference. Therefore, the null hypothesis which states that there is no unit root was rejected.

4.4 Autoregressive Distributed lag Model (ARDL)

Since the estimates of the unit root test indicates the order of stationarity of the variables to be at level I(0) and first difference I(1), it becomes pertinent to adopt the Autoregressive Distributed Lag Model (ARDL) to ascertain the values of the variables in the short run and long run.

4.4.1 ARDL Bound Cointegration test

Table 4.4.1 F-Bounds Test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.511073	10%	2.26	3.35
K	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

Table 4.4.1 above indicates the report of the bound test result. It is observable that the F-statistic value (6.511073) is higher than the lower bound (2.62) and the upper bound (3.79) at 5% significance level. Thus, this is a confirmation that there is a long run relationship among the variables under study. As such, the null hypothesis of no cointegration was rejected.

4.4.2 Short-run Effects of Trade Intensity and Debt Sustainability on Economic Growth

In order to ascertain the short-run impact of trade intensity and debt sustainability on economic growth in Nigeria, cointegration test that exhumes the Error Correction Term [CointEq(-1)] connected with the long-run relationship is highlighted in table 4.4.2 below.

Table 4.4.2 Short-run estimated ARDL results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25.13195	3.399631	7.392551	0.0000
D(GRT(-1))	0.198080	0.153956	1.286598	0.2225
D(GRT(-2))	0.236155	0.138254	1.708129	0.1133
D(GRT(-3))	0.328302	0.125733	2.611097	0.0228
D(TII)	-0.313452	0.270457	-1.158972	0.2690
D(TII(-1))	-1.379239	0.306987	-4.492817	0.0007
D(TII(-2))	-0.112007	0.266455	-0.420360	0.6817
D(TII(-3))	-0.911447	0.323385	-2.818455	0.0155
D(NSW)	8.148605	6.941769	1.173851	0.2632

D(NSW(-1))	9.229780	6.921202 1.333552	0.2071
D(NSW(-2))	22.20263	5.366987 4.136888	0.0014
D(NSW(-3))	26.42767	4.982066 5.304559	0.0002
D(TGR)	-0.245873	0.087004 -2.826002	0.0153
D(TGR(-1))	0.283197	0.079125 3.579122	0.0038
D(DGR)	-0.107266	0.036757 -2.918288	0.0129
D(DGR(-1))	0.060901	0.034849 1.747587	0.1061
D(DGR(-2))	0.007557	0.035469 0.213057	0.8349
D(DGR(-3))	0.198832	0.035371 5.621337	0.0001
CointEq(-1)*	-0.777124	0.104461 -7.439363	0.0000
R-squared	0.890130	Mean dependent var	-0.012781
Adjusted R-squared	0.773796	S.D. dependent var	4.307424
S.E. of regression	2.048649	Akaike info criterion	4.577488
Sum squared resid	71.34837	Schwarz criterion	5.413234
Log likelihood	-63.39479	Hannan-Quinn criter.	4.869186
F-statistic	7.651541	Durbin-Watson stat	2.447913
Prob(F-statistic)	0.000055		

The CointEq(-1) is an indicator of the speed of adjustment required to restore equilibrium in the model after a disturbance. The value is negative, less than 1 and statistically significant at 5% level of significance, thereby meeting the criteria for acceptable cointegration. The CointEq(-1) of -0.777124 indicates that economic growth shock at the current period is restorable at a speed of adjustment of about 77.71% in the next period.

From table 4.4.2, the current value of growth rate (GRT) was not significantly affected by its lagged values for 2 years. For instance, a percentage rise in year lagged value of D[GRT(-1)] shows a positive effect value of GRT and insignificant at 5% significance level, but became significant at the third lagged year. At the current level, trade intensity index (TII) is negatively insignificant at the current year but significant in the previous year.

The short-run estimated equation gives:

GRT = - 0.3135TII + 8.149NSW - 0.2459TGR - 0.2930DRR - 0.1073DGR + 25.132 ……. 3

Also, the coefficient of multiple determinations (R-squared) which is 0.890130 shows that 89.01% of variation in economic growth rate is jointly explained by the exogenous variables while the remaining 10. 99% of the variations in the growth rate is explained by variables not included in the model. By implication, the variables employed in the model are suitable for the analysis.

4.4.3 Long-run Effects of Trade Intensity and Debt Sustainability on Economic Growth

In order to ascertain the effects of trade intensity and debt sustainability on economic growth in the long run, the conditional ARDL long-run model was estimated for equation 1.

Table 4.4.3 ARDL long-run estimated result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TII	0.967056	1.076061	0.898700	0.3865
NSW	-18.05085	20.06991	-0.899399	0.3861
TGR	-0.499246	0.241216	-2.069703	0.0607
DRR	-0.377090	0.170378	-2.213247	0.0470
DGR	-0.086977	0.099174	-0.877010	0.3977

In the long run, the ARDL analysis resulted into the equation:

$$GRT = 0.967056TII - 18.05085NSW - 0.499246TGR - 0.37700DRR - 0.086977DGR \ldots 4$$

The trade intensity index of Nigeria-Africa (TII) is found to positively influence economic growth of Nigeria in the long-run (0.967056). However, Nigeria's share of world export (-18.05085NSW), trade openness in the form of trade-GDP ratio (-0.499246TGR), debt sustainability indices measured by debt service to revenue ratio (-0.377090DRR) and debt-GDP ratio (-0.086977DGR), all have negative effect on economic growth (GRT) in the long run.

4.5 Post Estimation Test

4.5.1 Stability Test

This study employed the cumulative sum of recursive residuals (CUSUM) and CUSUM Square tests to ascertain the stability of the model.

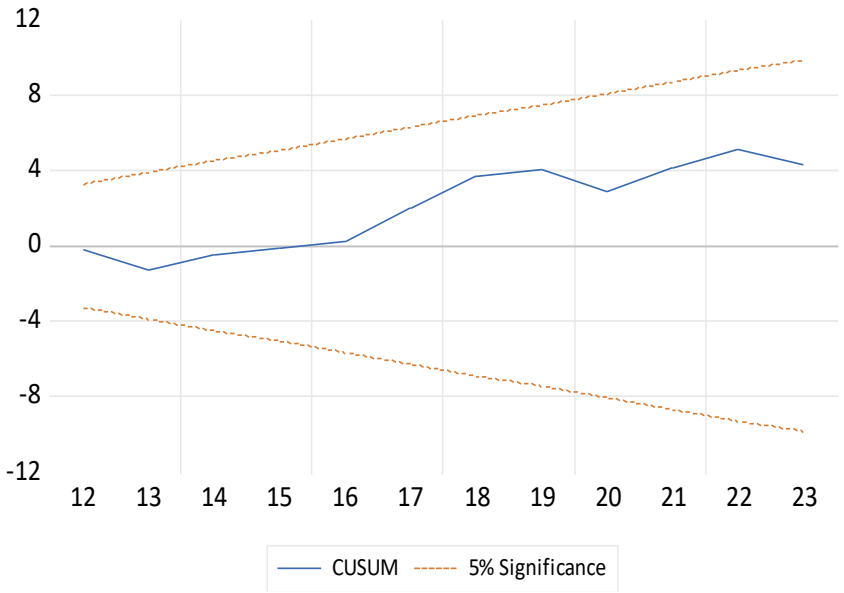

Figure 1: CUSUM stability test result

According to Figure 1, the CUSUM line, represented by the blue line, lies within the 5% critical lines (red). This proves that the residual variance is stable. In order words, the parameters of the models do not experience any structural instability over the period of study.

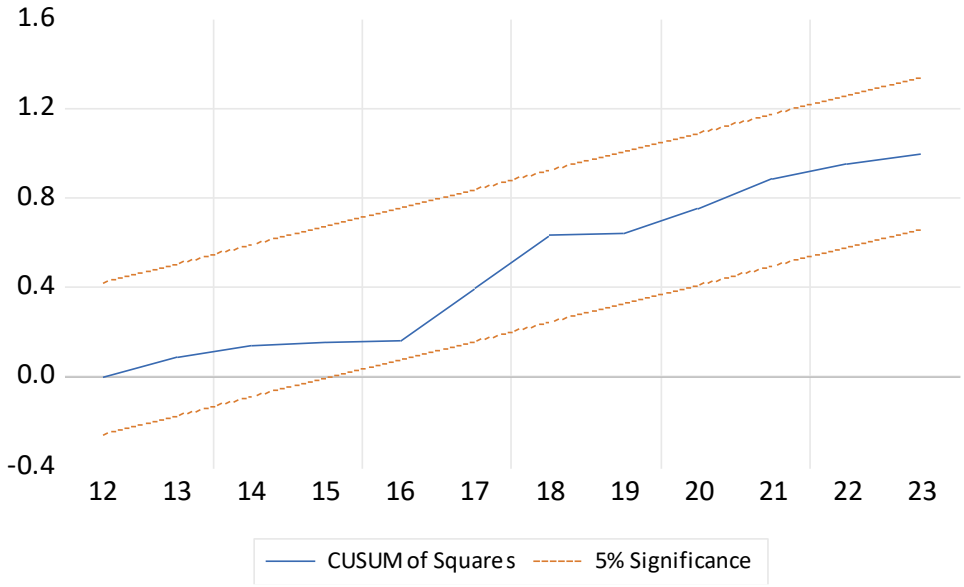

Figure 2: CUSUM of squares stability test

Figure 2 is a further affirmation that the reliability of the estimated results in useful for policy inference due to the dynamic stability of the estimated model (blue line) that falls within the critical values (red lines).

4.7.3 Normality Test

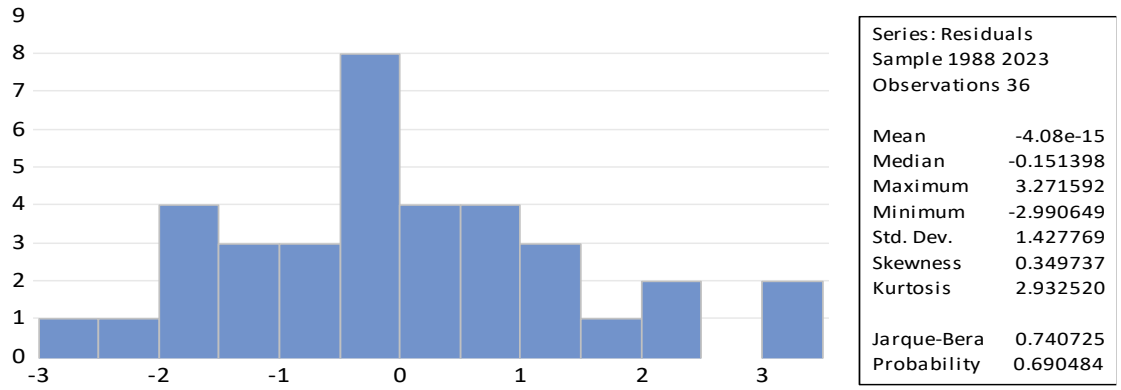

Figure 3: Jarque-Bera normality test

The null hypothesis of the existence of non-normality was rejected with the probability value of 0.690484. Hence, there is normal distribution of the data.

4.5.4 Homoscedasticity test

Autoregressive
Conditional *Heteroskedasticity (ARCH)*
was adopted to test the null hypothesis that there is no *heteroskedasticity in the model.* Data suffering from heteroscedasticity would have been corrected through use of robust standard errors in the regression.

Table 4.7.4 Heteroskedasticity Test: ARCH

F-statistic	Obs*R-squared	1.402878	Prob. F(1,33)	0.2447
		1.427228	Prob. Chi-Square (1)	0.2322

The F-statistic has a significant value that is above 0.05 (0.2447), hence, the hypothesis that there is no heteroskedasticity in the model is thereby accepted. By implication, there is homoskedasticity in the model.

4.8 Trends of the Variables under Study

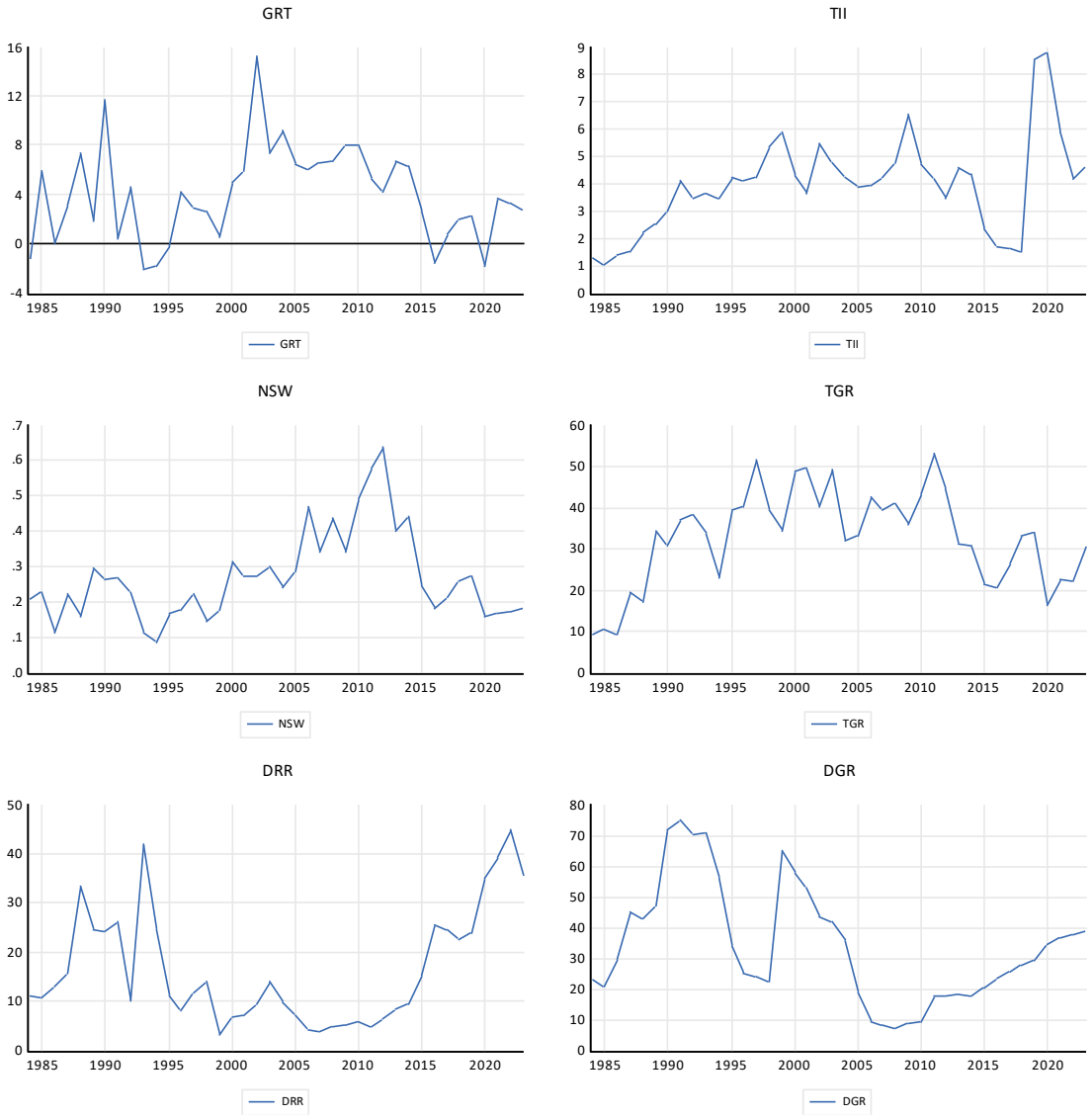

Figure 11: Graphical illustrations of the variables (1984 - 2023)

4.6 Discussion of Findings

Stationarity test was conducted on the time series data using the Augmented Dickey Fuller (ADF) and the Phillips-Perron unit root test. The null hypothesis which states that there is no unit root was rejected. The ADF and PP revealed that all the macroeconomic variables were stationary at level or at first difference. This necessitated the adoption of the ARDL model to ascertain the short-run and long-run analysis of the model under investigation. The short-run ARDL results

indicated that there exists a long-run relationship among the variables. CointEq (-1) has a negative sign (-0.777124) and it is also significant (0.0000), this implies that the long run adjustment is possible. Coefficient of the cointegration shows that the speed of adjustment towards equilibrium is 77.71% per time.

Table 4.3.3 shows the results of the ARDL estimation in the long-run. The estimation results indicated that trade intensity index (TII) has a positive and insignificant effect on economic growth (GRT) in Nigeria. This is illustrated by the coefficient (0.67056) and the p-value (0.3865). The coefficient of Nigeria's share of world export is negative (-18.05085) and insignificant (0.3861), implying an inverse relationship with the rate of economic growth. Also, the estimation indicated that trade - GDP ratio (TGR) has a negative and insignificant influence on economic growth in Nigeria. The coefficient of TGR is -0.499246, while the p-value is 0.0607, which is above 5% level of significance.

Furthermore, the result indicates that debt service to federal government revenue ratio (DRR) at this period has a negative and significant impact on economic growth rate in Nigeria. The coefficient of DRR is -0.377090, while the P-value is 0.0470 which is below 0.05 critical value. Debt to GDP ratio (DGR) influences economic growth rate negatively and insignificantly. The coefficient of DGR is -0.086977 and p.value is 0.3997.

The R-Squared of 0.890130 (89.01%) is an indication of a strong relationship between the growth rate in Nigeria and the exogenous variables (trade intensity index, Nigeria's share of world export, trade-GDP ratio, debt service – revenue ratio, debt – GDP ratio). The adjusted R. Squared = 0.773796 shows that the independent variables (TII, NSW, TGR, DRR, DGR) account for 77.38% changes in economic growth rate (GRT). This is considered good for the model.

The CUSUM and CUSUM of squares control charts indicate that parameters of the models do not experience any structural instability over the period of study. The residual chart showed no sign of a trend. This signifies that the residual is weakly stationary. The hypothesis that there is no heteroskedascity in the model was accepted, implying that there is homoskedascity in the model.

CONCLUSION

The study examined the impact of trade intensity and debt sustainability on economic growth in Nigeria from 1984 to 2023. The result of the ARDL analysis showed that trade intensity index affects economic growth negatively in the short-run but positively in the long-run. The trade intensity index employed in this study compared the intensity of trade between Nigeria and Africa. A higher intraregional trade has the tendency to deprive the economy of foreign exchange from developed economies in the short-run thereby limiting its growth rate. However, varying all factors of production in the long-run gives room for increase in productive efficiency and expansion that the country requires to achieve higher level of growth by trading with its neighbouring countries in Africa.

Although, statistically insignificant at both periods, Nigeria's share of world export has a positive effect on economic growth in the short run but a negative one in the long run. In the short-run, the level of exports has the tendency to boost growth rate through high level of productivity and the accumulation of foreign exchange. However, the unfavourable terms of trade that bedevil the export of primary products which Nigeria is predominantly characterized by and recurrent trade imbalances that result on payments on imports overshadowing receipts from exports may pose a negative threat to economic growth in the long-run.

The impact of trade openness, measured by trade to GDP ratio, on the rate of economic growth is negative both in the short-run and the long-run. This corroborated the findings of Azu (2023) and Adu-Gyamfi et al. (2020). During the period under study, trade in the forms of export and import constitute a large portion of the GDP of Nigeria. It shows an economy that is outward-dependent than inward-dependent. As such, domestic trade plays a non-significant part in contributing to the GDP of the economy and this does not affect economic growth positively.

The debt service to federal government revenue ratio is one of the measures of debt sustainability recommended by the international communities. It is found in this study to have negative impact on economic growth rate both in the short-run and long-run. Matthew and Adetayo (2022), and Gobna et al (2022) also discovered this in their findings. The debt servicing of Nigeria is high compared to the revenue of the government thereby making it unsustainable through this measure. A situation where revenue meant for providing infrastructures that boost economic activities that are components of economic growth is being channeled into servicing a non-ending high debt profile, the effect on growth will definitely be inversely overwhelming on growth.

It was also evident from the findings that the Debt to GDP ratio of Nigeria influences the economic growth of the country negatively in the short-run and in the long-run. Being another measure of debt sustainability and the most referenced by the Nigerian policy makers, the higher this ratio, the lower the growth rate of the Nigerian economy. The threshold of 40% set by the legislators if achieved or surpassed will have a devastating impact on the economic growth of the country.

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APPENDIX

Table A: Summary of Data

YEAR	GRT	TII	TGR	NSW	DRR	DGR
1984	-1.12	1.28	9.38	0.21	10.97	23
1985	5.91	1.06	10.39	0.23	10.66	21
1986	0.06	1.40	9.14	0.11	12.94	30
1987	3.20	1.49	19.50	0.22	15.47	45
1988	7.33	2.25	16.94	0.16	33.48	43
1989	1.92	2.49	34.18	0.30	24.62	47
1990	11.78	2.97	30.92	0.26	24.28	71.7
1991	0.36	4.11	37.02	0.27	26.15	75
1992	4.63	3.46	38.23	0.23	10.18	70.2
1993	-2.04	3.64	33.72	0.11	42.05	71
1994	-1.81	3.45	23.06	0.08	24.47	55.9
1995	-0.07	4.25	39.53	0.17	11.10	34
1996	4.20	4.13	40.26	0.17	8.20	25.2
1997	2.94	4.24	51.46	0.22	11.76	24.1
1998	2.58	5.37	39.28	0.14	13.89	22.3
1999	0.58	5.91	34.46	0.18	3.25	64.9
2000	5.02	4.30	49.00	0.31	6.88	57.6
2001	5.92	3.62	49.68	0.27	6.96	53.1
2002	15.33	5.50	40.04	0.27	9.46	43.3
2003	7.35	4.75	49.34	0.30	14.12	42.1
2004	9.25	4.21	31.90	0.24	9.76	35.5
2005	6.44	3.85	33.06	0.28	7.10	18.9
2006	6.06	3.95	42.57	0.47	4.18	9.4

2007	6.59	4.25	39.34	0.34	3.73	8.1
2008	6.76	4.77	40.80	0.44	4.85	7.3
2009	8.04	6.52	36.06	0.34	5.20	8.6
2010	8.01	4.70	43.32	0.49	5.69	9.4
2011	5.31	4.19	53.28	0.58	4.74	17.4
2012	4.23	3.47	44.53	0.64	6.38	17.6
2013	6.67	4.58	31.05	0.40	8.48	18.3
2014	6.31	4.33	30.89	0.44	9.35	17.5
2015	2.65	2.35	21.33	0.25	15.34	20.3
2016	-1.62	1.71	20.72	0.18	25.39	23.4
2017	0.81	1.60	26.35	0.21	24.50	25.3
2018	1.92	1.53	33.01	0.26	22.63	27.7
2019	2.21	8.58	34.02	0.27	23.91	29.2
2020	-1.79	8.76	16.35	0.16	35.20	34.5
2021	3.65	5.89	22.58	0.17	39.25	36.6
2022	3.25	4.19	22.28	0.17	44.94	37.4
2023	2.74	4.63	30.66	0.18	35.42	38.8

Table B: Derivation of Trade Intensity Index of Nigeria-Africa

	Nigeria Export to Africa ($billion) - A	Nigeria Total Export ($ billion) - B	Africa Total Import ($ billion) - C	World Export ($ billion) – D	A/B	C/D	TII (A/B ÷ C/D)
1984	0.214674202	4.666830479	82.014	2290	0.046	0.035813974	1.28
1985	0.17794275	5.233610302	74.29	2310	0.034	0.032160173	1.06
1986	0.117949158	2.876808721	74.127	2540	0.041	0.029183858	1.40
1987	0.277473127	6.767637248	83.089	3010	0.041	0.027604319	1.49
1988	0.360445194	5.545310671	99.009	3420	0.065	0.02895	2.25
1989	0.722222397	11.1111138	96.944	3710	0.065	0.026130458	2.49
1990	0.736702547	11.33388534	94.444	4320	0.065	0.021862037	2.97
1991	1.024232629	11.90968173	92.423	4420	0.086	0.020910181	4.11
1992	0.813569186	11.45872092	98.023	4770	0.071	0.020549895	3.46
1993	0.40653023	5.568907262	94.56	4720	0.073	0.020033898	3.64
1994	0.307136208	4.584122504	102.589	5290	0.067	0.019393006	3.45
1995	0.883422789	10.64364805	123.913	6340	0.083	0.019544637	4.25

1996	0.911404103	11.76005295	126.541	6740	0.0775	0.018774629	4.13
1997	1.263764909	15.60203592	132.399	6930	0.081	0.019105195	4.24
1998	1.030370415	9.907407841	133.019	6870	0.104	0.0193623	5.37
1999	1.342676997	12.66676412	128.169	7140	0.106	0.01795084	5.91
2000	1.756248459	25.01778432	129.914	7960	0.0702	0.016320854	4.30
2001	1.328060795	20.91434322	134.878	7690	0.0635	0.017539402	3.62
2002	2.058816415	22.09030488	135.968	8030	0.0932	0.016932503	5.50
2003	2.339596831	28.01912372	165.522	9420	0.0835	0.017571338	4.75
2004	2.144806444	27.49751851	212.524	11480	0.078	0.018512544	4.21
2005	2.808235121	36.95046212	256.766	13020	0.076	0.019720891	3.85
2006	5.630614253	70.38267817	303.211	14980	0.08	0.020241055	3.95
2007	5.436500975	59.0924019	377.382	17440	0.092	0.021638876	4.25
2008	9.999446424	87.14378975	481.074	19980	0.1147	0.024077778	4.77
2009	9.322774529	54.96114055	416.466	16000	0.1696	0.026029125	6.52
2010	11.20472088	94.17201291	481.487	19030	0.1190	0.025301471	4.70
2011	13.95742548	131.0416384	573.411	22550	0.1065	0.025428426	4.19
2012	13.81537381	146.3670187	623.926	22930	0.0944	0.027210031	3.47
2013	11.81553621	93.88066218	649.869	23630	0.1259	0.027501862	4.58
2014	12.52476558	105.8515121	655.149	24000	0.1183	0.027297875	4.33
2015	3.300523392	52.58776314	569.841	21350	0.0628	0.026690445	2.35
2016	1.539193473	37.3009932	503.833	20930	0.0413	0.024072289	1.71
2017	1.793298892	49.49158247	523.633	23120	0.0362	0.022648486	1.60
2018	2.318546635	65.35645803	588.797	25350	0.0355	0.023226706	1.53
2019	13.79152906	67.48078213	596.065	25010	0.2044	0.023833067	8.58
2020	6.654188512	35.08725788	489.696	22630	0.1896	0.02163924	8.76
2021	6.042310257	47.33871649	614.995	28370	0.1276	0.021677652	5.89
2022	5.235689223	52.7631	748.852	31610	0.0992	0.023690351	4.19
2023	5.846438559	56.61274	691.045	31000	0.1033	0.022291774	4.63