Trade Openness and Economic Growth in Nigeria: An Autoregressive Distributed Lagged (ARDL) Model Approach

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ABSTRACT

The rationale behind undertaking this study stems from the observation that prior studies have failed to establish a consensus regarding the impact of trade openness on economic growth, largely due to research methodological deficiencies. Thus, this study investigated the impact of trade openness on Nigeria's economic growth from 1980 to 2022. The Autoregressive Distributed Lagged (ARDL) Model was used to determine the long-run and short-run effects of these variables. The results show that trade openness positively impacts Nigeria's long-term economic growth, that is increased trade liberalization leads to increased long-run growth. The study recommends Nigeria's government to promote trade liberalization, reduce barriers, and enhance trade terms by diversifying exports and adding value.

Keywords: Trade Openness, Terms of Trade, Real Effective Exchange Rate, ARDL, RGDP, Nigeria

JEL Classification Codes: F1, O4

INTRODUCTION

Nigeria, a significant participant in the African economy, is vigorously engaging in global commercial strategies in order to stimulate its economic growth paths. Nevertheless, there exists a lack of agreement regarding the ramifications of international trade on Nigeria's economic expansion. The correlation between trade openness and economic growth has been extensively examined and discussed in the field of economics. Research has demonstrated that over a long period of time trade openness has the potential to enhance economic growth by facilitating access to goods and services, improving resource allocation efficiency, and increasing total factor productivity through the diffusion of technology and dissemination of knowledge (Barro & Sala-i-Martin, 1997; Rivera-Batiz & Romer, 1991). Consequently, it is anticipated that countries with higher levels of trade openness will exhibit relatively stronger economic performance compared to those with lower levels of openness.

In light of this perspective, developing countries stand to benefit significantly from engaging in trade with more advanced nations. It is primarily due to these anticipated advantages that international institutions and donor governments consistently advocate for trade liberalization policies in developing countries, with the aim of integrating them into the global market. These policies were prompted by the shortcomings of import-substitution industrialization strategies, as well as empirical studies demonstrating that economies oriented towards trade tend to achieve higher rates of economic growth. Additionally, the remarkable success of East

Asian economies can be partly attributed to their early embrace of trade (Stiglitz, 1996; Logan & Mengisteab, 1993). It is unsurprising, therefore, that in the late 1970s, many developing countries implemented trade liberalization reforms that involved reducing import and export tariffs, as well as non-tariff barriers.

However, an alternative line of inquiry argues that an increase in trade openness may have adverse effects on economic growth due to the inflationary pressures it generates and the subsequent depreciation of exchange rates (Andersen & Babula, 2009; Oloyede, Osabuohien, & Ejemeyovwi, 2021). Trade openness might negatively impact economic growth, particularly for countries specializing in the production of low-quality goods (Haussmann, Hwang, & Rodrik, 2007). For example, countries heavily reliant on the export of primary commodities are susceptible to trade shocks and fluctuations. Despite these divergent perspectives, the prevailing notion is that embracing international trade is advantageous for economic development, particularly in the context of developing nations. Several studies emphasize the positive growth effects associated with trade openness (e.g., Chang, Kaltani, & Loayza, 2009; Dollar & Kraay, 2004; Frankel & Romer, 1999; Freund & Bolaky, 2008). The positive relationship between trade and economic growth has been challenged by various studies (for example, Musila and Yiheyis, 2015; Polat, Shahbaz, Rehman, and Satti, 2015; Ulaşan, 2015; Vlastou, 2010). The empirical literature presents mixed findings, which can be attributed to economic mechanisms, national norms, and the choice of indicators that serve as measures of trade openness.

Most of existing studies employ panel data regression approaches that impose cross-sectional homogeneity on coefficients, with the hope that the results could be applied to all countries. The cross-sectional homogeneity assumption is likely to be violated given the heterogeneity of economies with respect to trade policy, economic conditions and technological and institutional developments.

Therefore, this study endeavours to address the question: do trade openness, terms of trade, and real effective exchange rate influence the long-term process of economic growth in Nigeria? Consequently, the specific aims of this study are to: assess the long-run impact of trade openness on Nigeria's economic growth; determine the long-run effects of terms of trade on economic growth in Nigeria and analyze the long-run impact of real effective exchange rate on Nigeria's economic growth. The remaining sections of this paper are organized as follows. Section 2 presents a comprehensive examination of the literature concerning the relationship between trade and growth. Section 3 delves into the materials and methods employed in this study. Section 4 treats the empirical findings. Lastly, Section 5 encompasses the conclusion and policy recommendations.

LITERATURE REVIEW

Trade openness refers to the extent to which a country participates in international trade, with high levels indicating extensive engagement and low levels suggesting a restricted approach (Bajwa & Siddiqi, 2011). Factors such as trade policies, regulations, and the economic environment influence trade openness, which has implications for economic growth, competitiveness, and integration into the global market (Squalli and Wilson, 2011). High trade openness allows countries to access a wider range of goods and services, promote technology transfer, and increase economic efficiency, but also presents challenges related to competition and market fluctuations. On the other hand, Economic growth refers to a positive change in a country's production of goods and services over a specific period, rising GDP. It provides insight into a country's prosperity and serves as a guiding light for policymakers. Economic growth encompasses the growth of GDP, GNP, and NI, as well as structural changes in the economy. It is a progression of expanding national economies and macroeconomic indicators, particularly GDP per capita, with positive implications for the socio-economic sector (Haller, 2012).

The relationship between trade openness and economic growth has received a great deal of attention both in the theoretical and empirical literature during the last three decades. Theoretically, Adam Smith and David Ricardo are the pioneers in highlighting the positive effects of trade openness on economic growth. They argued that trade openness can promote economic growth through either absolute or comparative advantages (see Dollar,1992; Sachs and Warner, 1995; Barro & Sala-i-Martin, 1997; Edwards, 1998; Frankel and Romer, 1999; Dollar and Kraay, 2003; Vedia-Jerez & Chasco, 2016; Keho 2017; Kabuga, & Ismail, 2018; Malefane and Odhiambo 2018; Huchet-Bourdo, Mouël & Vijil, 2018; Udeagha & Ngepah, 2021, amongst others).

The theory of comparative advantage posits that, when two countries engage in trade, the country with the advantage will focus on producing goods in which it excels. This involves specializing in sectors where it has superior resources and producing goods on a larger scale. As a result, the productivity and exports of this sector will increase, thereby promoting overall economic growth. Other economists have built upon this theory. Krueger (1978) and Bhagwati (1978) argue that trade liberalization encourages specialization in sectors that benefit from economies of scale, leading to long-term efficiency and productivity gains. New endogenous growth models highlight a positive relationship between trade openness and economic growth, attributing it to the international diffusion of advanced technologies (Coe & Helpman, 1995; Grossman & Helpman, 1991; Romer, 1994). A country with greater openness is better positioned to adopt technologies developed by advanced economies, thus fostering faster growth compared to less open countries. Edwards (1998) suggests that the cost of imitation also influences the trade-growth relationship. If poorer countries have lower costs for imitating innovation compared to advanced economies, they will experience faster growth and move towards convergence. All of these arguments suggest that developing economies can derive significant benefits from engaging in international trade with technologically advanced nations.

On the empirical front, numerous studies have been conducted to examine the correlation between trade openness and economic growth, and the findings have been conflicting or, at best, a mixture of positive and negative results. Several studies have reported strong evidence supporting the notion that trade openness is advantageous for economic growth (Malefane and Odhiambo, 2018; Kabuga and Ismail, 2018; Keho, 2017; Kabuga and Hussaini, 2017; Vedia-Jerez and Chasco, 2016; Musila and Yiheyis, 2015; Zarra-Nezhad, Hosseinpour & Arman, 2016; Nowbutsing, 2014; Ademola, Olusuyi, Ibiyemi & Babatunde, 2013; Falvey Foster, Greenaway, 2012; Das and Paul, 2011). However, other studies have reached a contrasting conclusion, suggesting that trade openness may actually hinder economic growth (Zahonogo, 2017; Goh, Ranjanee & Lin, 2020; Lawal, Nwanji, Asaleye & Ahmed, 2016; Vlastou, 2010; Adhikary, 2010; Eris and Ulasan, 2013; Hye and Lau, 2015; Rigobon and Rodrik, 2005).

The discrepancy in the outcomes observed throughout this corpus of research becomes evident, thereby giving rise to inquiries regarding the extent to which the existing findings can be generalized and applied to the specific circumstances of Nigeria. It is crucial to emphasize the significance of the present study as it aims to bridge this research gap by offering a more intricate and context-dependent comprehension of the intricate connection between trade openness and economic advancement within the Nigerian landscape.

MATERIALS AND METHODS

The data required for this study was collected on trade indices in Nigeria for a period of 1980 to 2022, that is a period of 43 years. The period of the study covered the post structural adjustment programme era, a period of time the country embarked on policy overhaul and trade liberalization policies were also adopted. Thus, the starting date is justified by the availability of data. The analysis is done using seven variables, one of which being used to measure economic growth (the dependent variable) and a set of exogenous variables – trade openness, terms of trade, export, import, foreign direct investment and real effective exchange rate. The variable sources and measurement are also presented in Table 1.

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Table 1: Definition and Measurement of Variables

Variable	Measurement	Source
Real Gross Domestic Product (RGDP)	This is the value of final goods and services produced in a given year when valued at constant prices.	National Bureau of Statistics (NBS)
Trade Openness Ratio (TOPN)	TOPN is the ratio of actual exports plus imports to GDP.	UN Comtrade
Terms of Trade (TOT)	The terms of trade measured as the ratio of exports to import prices – an index of the relative price shocks to which the economy must adjust.	UN Comtrade
Exports	Exports are typically measured in monetary terms, such as the total value of goods and services sold to foreign countries over a specific period, measured in billion naira.	Central Bank of Nigeria Statistical Bulletin
Imports	The measurement of imports is similar to that of exports, typically done in monetary terms to assess the total value of goods and services brought into the country from foreign sources over a specific period.	Central Bank of Nigeria Statistical Bulletin
Foreign Direct Investment (FDI)	FDI is typically measured in terms of the flow of capital from one other countries to Nigeria, in billion United States Dollars (USD).	The Global Economy
Real Effective Exchange Rate (REER)	This is computed as a geometrical average of real exchange rates indices between Nigeria and her major trade partners, weighted by trade volume. Also, it is measured as the ratio of the price of non-tradable goods over the price of trade-weighted tradable goods, therefore an upward movement of real effective exchange rate index represents a real appreciation as suggested by Jin and Zang (2003).	UN Comtrade

Source: Researcher's Compilation

The connection between trade openness, FDI and economic growth quality in Nigeria can be analyzed using the analytical framework set up by Emery (1967), Balassa (1978) and Hendry (1987), Barro and Sala-i-Martin (1997), Keho (2017), Huchet-Bourdo, Mouel, and Vijil (2018), Udeagha and Ngepah (2021) and Adetokunbo and Iddey (2022). Following the works of Emery (1967) and Kong, Peng, Ni, Jiang, and Wang (2021) and employing the degree of openness of trade as a measure for assessing the process of trade openings, the foundational regression model is formulated as depicted below.

$$RGDP_t = f(TOPN_t, TOT_t, EXPO_t, IMPO_t, FDI_t, REER_t) \dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where is $RGDP_t$ real gross domestic product, $TOPN_t$ is trade openness, TOT_t is terms of trade, $EXPO_t$ is export, $IMPOt$ is import, FDI_t is foreign direct investment, $REER_t$ is real effective exchange rate, the lag values of the variables are expressed as:

$TOPN_{t-i}, TOT_{t-i}, EXPO_{t-i}, IMPO_{t-i}, FDI_{t-i}$ and $REER_{t-i}$, respectively.

In light of the time lagging in enhancing economic growth, this study opted for an Autoregressive Distributed Lagged (ARDL) model to examine the impact of the level of trade openness on the economic growth in Nigeria. The ARDL model was regressed in a two-step process.

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Step 1 involved applying the co-integration test ARDL model to determine the presence of a long-term causal relationship among the variables. Consequently, the model for the cointegration is built as:

$$\Delta lnRGDP_t = \delta_0 + \delta_1 lnRGDP_{t-i} + \delta_2 lnTOPN_{t-i} + \delta_3 lnTOT_{t-i} + \delta_4 lnEXPO_{t-i} + \delta_5 lnIMPO_{t-i} + \delta_6 lnFDI_{t-i} + \delta_7 lnREER_{t-i} + \sum_{i=1}^{a} \delta_8 \Delta lnRGDP_{t-i} + \sum_{i=1}^{b} \delta_9 \Delta lnTOPN_{t-i} + \sum_{i=1}^{c} \delta_{10} \Delta lnTOT_{t-i} + \sum_{i=1}^{d} \delta_{11} \Delta lnEXP_{t-i} + \sum_{i=1}^{e} \delta_{12} \Delta lnIMP_{t-i} + \sum_{i=1}^{f} \delta_{13} \Delta lnFDI_{t-i} + \sum_{i=1}^{g} \delta_{14} \Delta lnREER_{t-i} + \mu_t \dots\dots (2)$$

Where Δ is the first-order differential operator, is the white noise and a, b, c, d, e, f, g are the maximum lag orders as determined by Akaike Information Criterion (AIC). The presence of a long-term equilibrium relationship between horizontal variables was examined through the use of the F-statistic, with the null hypothesis positing the absence of such a relationship.

Step 2 is the estimation ARDL model, which was used to analyze the long- and short-term relationships between the variables. The long-term relationship can be estimated using the ARDL ($\rho_1, \rho_2, \rho_3, \rho_4, \rho_5, \rho_6, \rho_7$) model:

$$\Delta lnRGDP_t = \lambda_0 + \sum_{i=1}^{\rho_1} \lambda_1 lnRGDP_{t-i} + \sum_{i=1}^{\rho_2} \lambda_2 lnTOPN_{t-i} + \sum_{i=1}^{\rho_3} \lambda_3 lnTOT_{t-i} + \sum_{i=1}^{\rho_4} \lambda_4 lnEXPO_{t-i} + \sum_{i=1}^{\rho_5} \lambda_5 lnIMPO_{t-i} + \sum_{i=1}^{\rho_6} \lambda_6 lnFDI_{t-i} + \sum_{i=1}^{\rho_7} \lambda_7 lnREER_{t-i} + \varepsilon_t \dots\dots (3)$$

Whereas the short-run relationship was estimated using the ARDL-ECM model specified hereunder:

$$\Delta lnRGDP_t = \lambda_0 + \sum_{i=1}^{\rho_1} \lambda_1 lnRGDP_{t-i} + \sum_{i=1}^{\rho_2} \lambda_2 lnTOPN_{t-i} + \sum_{i=1}^{\rho_3} \lambda_3 lnTOT_{t-i} + \sum_{i=1}^{\rho_4} \lambda_4 lnEXPO_{t-i} + \sum_{i=1}^{\rho_5} \lambda_5 lnIMPO_{t-i} + \sum_{i=1}^{\rho_6} \lambda_6 lnFDI_{t-i} + \sum_{i=1}^{\rho_7} \lambda_7 lnREER_{t-i} + \gamma_8 ECM_{t-i} + \varepsilon_t \dots\dots (4)$$

The use of the ARDL model in this study is justified on the premised that the model stands out as a versatile tool for analyzing long-run relationships in time series data, notably due to its exemption from the need for unit root testing. The ARDL model accommodates variables with different orders of integration (I(0) or I(1)) and avoids inconclusive results that may arise with small sample sizes. By sidestepping the unit root testing requirement, the ARDL model proves computationally efficient and minimizes the risk of being hampered by power limitations or excessive computational demands. Additionally, the model addresses issues related to structural breaks, providing a robust framework for analyzing economic and financial time series that may exhibit shifts in underlying trends.

RESULTS AND DISCUSSIONS

Summary Statistics

The descriptive statistics of the series used in this study were computed and the results are presented in Table 2.

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Table 2: Summary Statistics

Statistic	RGDP	TOPN	TOT	EXPO	IMPO	FDI	REER
Mean	40513.59	5.47	2678.00	6083349.0	5017049.0	2.53E+09	150.66
Maximum	202365.0	23.26	7681.32	2725152	2115109	8.84E+09	541.46
Minimum	131.98	0.58	89.78	7502.50	5983.60	1.89E+08	50.17
Std. Dev.	55620.62	5.53	2611.14	7218883.	7042495.	2.51E+09	116.28
Skewness	1.37	1.67	0.25	1.02	1.59	1.14	1.86
Kurtosis	3.78	5.16	1.49	3.11	4.74	3.18	5.74

Source: Researcher's Computations from Eviews 12

From the summary statistics presented in Table 2, it is evident that the standard deviations of EXPO and IMPO indicate a wide dispersion of data points in their respective datasets. This suggests a higher level of volatility and a decreased level of precision when traditional mean-based estimation techniques are utilized to estimate parameter values. This observation is further supported by the notable difference between the minimum and maximum values of both variables. It is worth noting that all the series exhibit positive skewness. In terms of kurtosis, the RGDP, TOPN, EXPO, IMPO, FDI, and REER series demonstrate leptokurtic distributions (where $k > 3$), characterized by a prominent peak and "fat tails". On the contrary, the TOT series displays platykurtic distributions (where $k < 3$), which are characterized by thinner tails and relatively flat-topped curves.

ARDL Optimal Lag Selection

Similar to almost all time series data estimation methods, an important preliminary step in ARDL model estimation is the selection of the ARDL optimal lag order. We used some commonly used Lag-order selection criteria to choose the optimal lag length. The results of the lag order selection for the ARDL model are presented in Table 3.

Table 3: ARDL Lag order selection Criteria

Lag	AIC	SC	HQ
0	2.081214	2.370826	2.187368
1	-8.673451*	-6.356558*	-7.824218*

*Indicates lag order selected by the criterion

AIC: Akaike Information Criterion

SC: Schwarz criterion

HQ: Hannan-Quinn information criterion

Source: Researcher's Computation from Eviews 12

The results in Table 3 shows that the lag length of 1 is selected as the optimal for the best performance of the ARDL model estimates in line with the suggestions of Pesaran and Shin (1999). The criteria AIC, SC and HQ – were at their minimum levels in each case during the first lag.

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After the lag selection, it is required that the model be checked using relevant economic diagnostics. To this end, the residual and stability tests were computed and the results are presented in Table 4

Table 4: Residual and Stability Analysis Tests Results

Test	**Probability**
Breusch-Godfrey Serial Correlation LM Test	0.6376*
Breusch-Pagan-Godfrey Heteroscedasticity Test	0.4162*
Jarque-Bera Normality Test	0.9083*

Source: Researcher's Computations from Eviews 12 (see Appendix I)

* denotes acceptance of the null hypothesis

Table 4 shows that, the residuals based on the Breusch-Godfrey Serial Correlation LM Test results, are not affected by autocorrelation (that is, there is no serial correlation among the residuals). Again, the Breusch-Pagan-Godfrey Heteroscedasticity Test and Jaque-Berra Normality Test results, show that the residuals are homoscedastic or have a constant variance and so do not drift so dispersedly away from their expected mean values, and they also follow the normal distribution (that is, the residuals are multivariate normal) (See Residual's Histogram in Appendix I).

On stability testing, the cumulative sum based on recursive residuals were used to test for the models' long-run constancy. These were undertaken and the results show that the error correction equations are stable. The CUSUM test calculates the W-statistic (represented by the blue line), under the hypothesis of parameters stability, the w-statistic is situated inside the critical boundaries of the confidence interval (the red lines) at 5% level of significance. The results in Appendix I show that the models and their parameter estimation are stable.

ARDL Long-run Relationship (Bound Testing)

In order to test the hypothesis that no long-run relationships exist among the variables in the model, the ARDL Bounds Testing was conducted and the results in Table 5.

Table 5: ARDL Bounds Test Results

Test Statistic	**Value**	**k**
F-statistic	21.82989	6
	Critical value bound	
Significance	I(0)	I(1)
10%	1.99	2.94
5%	2.27	3.28
2.5%	2.55	3.61
1%	2.88	3.99

Source: Researcher's Computation from EViews 12

Table 5 shows that the F-statistic value of 21.82989 is greater than the Pesaran critical upper bound value of 3.28 at 5% level of significance. The null hypothesis that no long-run relationship exist among the variables

is hereby rejected. This implies that a long-run relationship has been established among the variables; which suggests that the long-run coefficients of the variables and their short-run dynamic parameters be estimated. The long-run ARDL coefficients were then estimated and the results are presented in Table 6.

Table 6: Results of Long-run coefficients of the ARDL Model

Dependent variable: RGDP

Variable	Coefficient	Std. error	t-statistic	Prob.
TOPN	0.1168	0.0105	3.0843	0.0165
TOT	0.1665	0.1373	2.2129	0.0243
EXPO	0.0993	0.2593	0.3831	0.7045
IMPO	0.6639	0.2611	2.5430	0.0168
FDI	-0.0543	0.5601	-0.3483	0.7302
REER	-0.4850	0.0143	-3.4867	0.0043
C	0.6995	1.8534	0.3774	0.7087

Source: Researcher's Computation from EViews 12

Table 6 shows that a positive long-run relationship exists between trade openness (TOPN) and the Real Gross Domestic Product (RGDP) in Nigeria. This relationship is also considered to be significant indicating that trade openness exerts positive long-run influence on the growth of the Nigerian economy. The results show that a one percent increase in trade openness will significantly lead to 0.1168% increase in RGDP. This implies that RGDP appreciation is associated with the degree of openness of the nation's economy in the long-run – that is as Nigeria becomes more involved in global trade (by increasing its trade openness), its real GDP tends to expand. This signifies that trade openness has a positive effect on the nation's economic output in the long run. It suggests that as Nigeria embraces international trade, it undergoes economic growth, potentially through amplified exports, access to novel markets, and the advantages of specialization and comparative advantage. The finding of this paper may hold significant implications for Nigeria's economic policies and its approach to international trade. This finding aligns with the conclusions drawn by Kong, Peng, Ni, Jiang, and Wang (2021), who discovered that trade openness has a significant positive impact on the quality of economic growth in both the short and long term. These findings are also consistent with those of Zarra Nezhad, Hosseinpour, and Arman (2014), Udeagha and Ngepah (2021), and Adetokunbo and Iddey (2022), who likewise observed a positive association between trade openness and economic growth. Conversely, Musila and Yiheyis (2015), Polat, Shahbaz, Rehman, and Satti (2015), Ulaşan (2015), and Vlastou (2010) found evidence suggesting that trade openness exerts a negative influence on economic growth. This might have been so on the bases of scope and method of analysis.

The results presented in Table 4 further demonstrate that the terms of trade (TOT) possess a positive and significant impact on the long-term course of economic growth in Nigeria. Specifically, a one percent enhancement in TOT brings about a 0.1665% upsurge in the growth of RGDP in Nigeria, over the long term. This finding implies that advantageous terms of trade may result in augmented income derived from exports, which can subsequently be reinvested into the economy, potentially leading to heightened productivity, enhanced infrastructure, and overall economic advancement. Moreover, it implies that external factors, such as global commodity prices and demand for Nigeria's exports, play a significant role in shaping the nation's trajectory of long-term economic growth.

In Table 6, exports (EXPO), in line with expectations exerted positive influence on the growth of the Nigerian economy. However, this positive influence is statistically insignificant. This means that while on

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theoretical ground, a strong export base drives growth of the reporting economy, in Nigeria, the results showed that the growth process in the country has not been significantly influenced by the country's export base. This may have occurred due to the fact that Nigeria's range of exports is not as varied as it ought to be, as it heavily depends on a small number of primary commodities or products (namely, oil and agricultural output that has not undergone processing), which are susceptible to fluctuations in price or constrained by global demand.

Contrary to expectations as presented in Table 6, imports (IMPO) exerted positive and significant effect on the economy of Nigeria. The results show that a one percent increase in imports is accompanied by 0.6639% increase in RGDP of Nigeria in the long-run. It is plausible, based on this finding, that imported inputs play a crucial role in domestic production and investment, thus making a substantial contribution to the overall expansion of the economy. Moreover, the presence of a diverse array of imported goods and services might be conducive to stimulating domestic consumption and investment, consequently resulting in favorable economic outcomes.

The results show that both foreign direct investment (FDI) and real effective exchange rate (REER) exerted negative influences on growth of the Nigerian economy in the long-run. While FDI's influence has been found to be statistically insignificant, that of REER is significant and contradicts with a priori expectations.

The short-run dynamic parameters of the ARDL model were estimated and the results presented in Table 7.

Table 7: Results of Short-run ARDL Model

Dependent variable: RGDP

Variable	**Coefficient**	**Std. error**	**t-statistic**	**Prob.**
D(TOPN)	0.1149	0.0178	2.8334	0.0411*
D(TOT)	-0.1097	0.0194	-2.5011	0.0301*
D(EXPO)	0.1433	0.0326	4.3911	0.0001*
D(IMPO)	0.0325	0.0400	0.8117	0.4238
D(FDI)	-0.0039	0.0152	-0.2586	0.7978
D(REER)	0.0310	0.0370	0.8393	0.4084
CointEq(-1)	-0.1514	0.0102	-14.775	0.0000*
R-Squared = 0.7754		Akaike information criterion = -4.3737		
Adj.R-Squared = 0.7369		Schwarz Criterion = -4.0840		
Durbin-Watson stat. = 2.0011		Hannan-Quinn Criterion = -4.2675		

Source: Researcher's Computation from EViews 12

*indicates significance at 5% level

The results of the short-run model shows that TOPN and EXPO exerted significant influence on RGDP in Nigeria in the short-run. The results showed that while TOPN and EXPO exerted positive influence on RGDP in the short-run, TOT exerted negative effect on RGDP. The results also showed that IMPO exerted positive but insignificant influence on RGDP while the effect of FDI on RGDP was found to be negative and insignificant in the short-run. It was also found that RGDP appreciation (depreciation) is positively but insignificantly influenced by REER of Nigeria in the short-run. The ECM(-1) value of -0.1514 with the

standard error of 0.12637 and t-statistic value of -14.775 as well as the probability value of 0.0000 shows that the speed of adjustment is significant. This demonstrates that variables included in the model have the ability of returning to their long-run equilibrium values after experiencing short-run perturbations at a speed of adjustment of 15.14%.

The adjusted R-squared value of 0.7369 shows that even with adjustments, 73.69% of changes in RGDP in Nigeria are accounted for TOPN, TOT, EXPO, IMPO, FDI and REER, in the short-run. The Durbin-Watson statistic of 2.0011 indicates the lack of autocorrelation among the independent variables in the model. The values of the Akaike Information Criterion, Schwartz Criterion, and Hannan-Quinn Criterion (-4.3737, -4.08840, and -4.2675 respectively) demonstrate a favourable trade-off and suggest that the model fits the data well without excessive complexity.

CONCLUSION AND POLICY RECOMMENDATIONS

Based on the results obtained, it can be established that trade openness exhibits a positive and significant long-run influence on the economic growth process in Nigeria; suggesting that as Nigeria engages in more international trade, its real GDP tends to increase over the long term. Additionally, the terms of trade have been discovered to wield a favourable and substantial influence on the prolonged trajectory of economic progress in Nigeria – indicating that when the prices of Nigeria's exports compared to its imports are lofty, propitious terms of trade facilitate sustained economic advancement within the nation. Lastly, the real effective exchange rate (REER) has been found to exert negative influences on the growth of the Nigerian economy in the long run, which suggests that an overvalued currency, as indicated by a high REER, may hinder Nigeria's economic growth over time.

Based on the findings, the following policy recommendations can be made Based on the findings, the following policy recommendations can be made. First, the government should persist in promoting trade liberalization by decreasing trade barriers and facilitating international trade agreements. The implementation strategies require tariff reductions, streamlining customs procedures, and investing in infrastructure to facilitate smoother trade flows. While this is feasible, it might encounter resistance from domestic industries concerned about increased competition and potential job losses. To succeed, it requires strong political will and effective diplomatic negotiations to navigate the complexities of global trade dynamics.

Second, efforts should be exerted to manage and enhance Nigeria's terms of trade. Managing and enhancing Nigeria's terms of trade entails diversifying the export base and adding value to exports. This necessitates support for non-oil sectors such as agriculture and manufacturing through incentives, infrastructure development, and capacity building. Although feasible with long-term commitment and investment, the transition away from heavy reliance on oil revenues may pose challenges. Diversification efforts may initially require substantial investment and may take time to yield significant results. Moreover, the country's historical dependence on oil revenue could present resistance to diversification initiatives, requiring careful implementation by policymakers.

Finally, policymakers should diligently manage the real effective exchange rate (REER) to ensure competitiveness. Feasibility of this strategy depends on the government's ability to effectively regulate currency valuation and maintain competitiveness in global markets. However, challenges may arise, such as potential depletion of foreign exchange reserves and impacts on export competitiveness if interventions are not carefully managed. Additionally, policymakers should concentrate on policies that enhance productivity and competitiveness in crucial sectors of the economy through investments in infrastructure, education, and technology to improve overall economic efficiency. Investing in these areas could help counterbalance the negative impacts of an overvalued exchange rate and contribute to sustainable economic development in the long term.

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APPENDIX I: RESIDUAL AND STABILITY ANALYSIS TESTS RESULTS

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	0.227027	Prob. F(1,27)	0.6376
Obs*R-squared	0.350208	Prob. Chi-Square(1)	0.5540

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 12/02/23 Time: 08:34
Sample: 1981 2022
Included observations: 42
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP(-1)	-0.002617	0.058436	-0.044787	0.9646
TOPN	-0.000186	0.025500	-0.007296	0.9942
TOPN(-1)	0.000242	0.029708	0.008150	0.9936
TOT	-0.000618	0.032714	-0.018886	0.9851
TOT(-1)	0.001277	0.025454	0.050186	0.9603
EXPO	-0.004483	0.042995	-0.104259	0.9177
EXPO(-1)	0.004020	0.045219	0.088901	0.9298
IMPO	0.000693	0.052670	0.013161	0.9896
IMPO(-1)	0.001672	0.063564	0.026309	0.9792
FDI	-0.000660	0.021856	-0.030198	0.9761
FDI(-1)	0.000285	0.020736	0.013728	0.9891
REER	-0.001074	0.053674	-0.020017	0.9842
REER(-1)	5.94E-05	0.054944	0.001081	0.9991
C	0.002793	0.258188	0.010819	0.9914
RESID(-1)	0.097901	0.205470	0.476474	0.6376

R-squared	0.008338	Mean dependent var	-1.17E-15
Adjusted R-squared	-0.505857	S.D. dependent var	0.023275
S.E. of regression	0.028561	Akaike info criterion	-4.001079
Sum squared resid	0.022025	Schwarz criterion	-3.380483
Log likelihood	99.02266	Hannan-Quinn criter.	-3.773606
F-statistic	0.016216	Durbin-Watson stat	1.932411
Prob(F-statistic)	1.000000		

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.076113	Prob. F(13,28)	0.4162
Obs*R-squared	13.99297	Prob. Chi-Square(13)	0.3743
Scaled explained SS	7.004588	Prob. Chi-Square(13)	0.9019

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 12/02/23 Time: 08:35
Sample: 1981 2022
Included observations: 42

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000625	0.007174	-0.087093	0.9312
RGDP(-1)	-0.001968	0.001617	-1.217285	0.2337
TOPN	0.000230	0.000709	0.323947	0.7484
TOPN(-1)	4.51E-05	0.000826	0.054604	0.9568
TOT	0.000366	0.000908	0.402395	0.6904
TOT(-1)	0.000469	0.000703	0.666510	0.5105
EXPO	0.000700	0.001166	0.599943	0.5534
EXPO(-1)	0.000369	0.001235	0.298890	0.7672
IMPO	0.000781	0.001463	0.533454	0.5979
IMPO(-1)	-0.000626	0.001764	-0.354783	0.7254
FDI	-0.001100	0.000606	-1.814339	0.0804
FDI(-1)	0.000954	0.000576	1.656118	0.1089
REER	-0.000364	0.001490	-0.244364	0.8087
REER(-1)	0.000339	0.001527	0.221897	0.8260

R-squared	0.333166	Mean dependent var	0.000529
Adjusted R-squared	0.023565	S.D. dependent var	0.000803
S.E. of regression	0.000794	Akaike info criterion	-11.17832
Sum squared resid	1.76E-05	Schwarz criterion	-10.59910
Log likelihood	248.7447	Hannan-Quinn criter.	-10.96601
F-statistic	1.076113	Durbin-Watson stat	1.945028
Prob(F-statistic)	0.416235