AN EMPIRICAL ANALYSIS OF THE SHORT RUN AND LONG RUN IMPACT OF TRADE OPENNESS ON ECONOMIC GROWTH: EVIDENCE FROM NIGERIA

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Abstract

The empirical study delves into the intricate relationship between trade openness and economic growth, with a focus on Nigeria's context. Drawing on neoclassical trade theories and endogenous growth models, the investigation seeks to discern the short-run and long-run impacts of trade openness on Nigeria's economic growth, while accounting for the role of exchange rates and interest rates. Utilising data from the World Development Indicators spanning from 1981 to 2021, the study employs an Autoregressive Distributed Lag (ARDL) approach to analyse the multifaceted dynamics. Descriptive analysis and correlation assessments are undertaken to provide foundational insights. The findings underscore the positive linkages between trade openness, economic growth, and technological diffusion. In the short run, the results reveal that an increase in trade openness leads to a positive effect on economic growth, albeit with differential magnitudes across variables. Similarly, the long-run analysis affirms the pivotal role of trade openness in sustaining economic growth, complemented by the importance of exchange rate stability and appropriate interest rate management. These empirical results resonate with theoretical underpinnings and align with prior studies, corroborating the notion that trade openness serves as a catalyst for knowledge spillovers, enhanced productivity, and sustainable economic development. In conclusion, this study advocates for a policy framework that enhances trade openness through reduction of barriers, while concurrently fostering human capital development and stable macroeconomic conditions. The implications of the research are manifold, urging policymakers to steer towards trade liberalization, invest in education and skills, and calibrate monetary policies judiciously. These recommendations are encapsulated within a comprehensive approach that envisions trade as a driving force for Nigeria's economic growth and broader development goals.

Keywords: Trade Openness, Economic Growth, Nigeria, ARDL Analysis, Exchange Rates, Interest   Rates.

1.   Introduction

In recent years, the intricate connection between trade openness and economic growth has garnered considerable attention in both theoretical and empirical realms (Keho, 2017). The significance of trade openness's impact on economic growth has been recognized since the early contributions of economists, with a prevailing consensus that it plays a positive role (Ozturk & Radouai, 2020). The process of engaging in international trade, by capitalizing on relative advantages, has been identified as a mechanism that not only boosts a nation's income per capita but also fosters economic development through avenues such as technology transfer, diversification of products, economies of scale, and efficient resource allocation within the economy (Fatima et al., 2020; Fetahi-Vehapi, Sadiku & Petkovski, 2015).

Trade openness, commonly defined as the sum of exports and imports relative to gross domestic product (GDP), provides an index that gauges an economy's degree of openness to global interactions (Keho, 2017; Khalid, 2016). This ratio captures the extent to which a nation integrates with the global economy. Notably, Harbeler (1988) identified four pivotal benefits associated with trade openness in developing countries. Firstly, it facilitates the influx of essential capital goods, machinery, and semi-finished products. Secondly, it acts as a conduit for knowledge dissemination, leading to the transfer of ideas, skills, and managerial expertise (Ijirshar, 2019). Thirdly,

trade openness spurs capital flows from developed to developing nations (Keho, 2017; Saeed, 2015). Lastly, by fostering competition between domestic and foreign firms, trade openness counteracts monopolistic tendencies (Nasreen & Anwar, 2014).

Building on these notions, Nasreen and Anwar (2014) underscore that trade openness affords developing nations the avenue to import advanced technologies from more developed counterparts. The infusion of advanced technology augments productivity, conserves energy, and enhances an economy's capacity for efficient output, thereby propelling economic growth. Reinforcing this viewpoint, Sadorsky (2012) contends that trade openness stands as an indispensable driver of economic growth, ushering in expanded international trade that begets increased economic opportunities and heightened economic activities.

Against this backdrop, Nigeria finds itself at a pivotal juncture that necessitates an in-depth investigation into the short- and long-term impacts of trade openness on its economic growth. Nigeria, as a developing nation, is grappling with the imperative of enhancing its economic trajectory to uplift its populace and address various socio-economic challenges. Trade openness offers the potential to unlock new avenues for growth, technology infusion, and resource optimization. However, the precise dynamics of this relationship within the Nigerian context remain inadequately understood.

Despite the theoretical groundwork and growing empirical evidence on the positive relationship between trade openness and economic growth, the specific implications within the Nigerian context have not been extensively examined. Nigeria's unique economic, social, and political landscape requires a nuanced analysis to understand how trade openness can be effectively leveraged to accelerate economic growth while addressing potential challenges.

This study's urgency arises from the need to provide evidence-based insights that can guide policy decisions, shape economic strategies, and foster sustainable development in Nigeria. As the nation seeks to diversify its economy, create jobs, and reduce dependency on oil exports, a comprehensive exploration of the impact of trade openness on economic growth becomes paramount. By delving into this matter, the study aims to illuminate the pathways through which trade openness can propel Nigeria's economic advancement, while also identifying potential challenges and areas that require policy interventions. Hence, the pertinent questions that this study seeks to address are: What is the empirical relationship between trade openness and short-term economic growth in Nigeria? How does trade openness impact long-term economic growth in Nigeria? To answer these questions, the study has two primary objectives: To empirically analyse the short-term impact of trade openness on economic growth in Nigeria; and to investigate the long-term impact of trade openness on economic growth in Nigeria.

This study comprises distinct sections: the Introduction which establishes the trade openness-economic growth connection, underscores Nigeria's context, and outlines the problem, research questions, and objectives; the Literature Review which investigates pertinent theories and empirical studies globally and in Nigeria; the Methodology encompassing research design, data sources, variables, and statistical techniques; the Results and Discussion presenting empirical findings and their Nigerian economic growth implications; and finally, the Conclusion and Recommendations that succinctly encapsulate key findings, highlight policy takeaways, propose Nigerian growth-enhancing trade strategies, and suggest avenues for future research.

Through this comprehensive structure, the research aims to shed light on the complex dynamics between trade openness and economic growth in Nigeria, offering valuable insights for policymakers, researchers, and stakeholders devoted to the nation's sustainable development.

Theoretical Framework

The Literature Review section extensively explores the intricate relationship between international trade and economic growth, anchored within a comprehensive array of trade and growth theories. The neoclassical theories, most notably the comparative advantage theory and the Heckscher-Ohlin Samuelson (HOS) theory, serve as foundational frameworks that

elucidate the fundamental drivers behind countries' engagement in trade. The Ricardian model elucidates that under trade openness, countries specializing in commodities with comparative productivity advantages, resulting from variations in technologies or natural resources, stand to significantly enhance trade benefits. Similarly, the (HOS) model delves into the welfare gains accrued from trade between two nations, each exporting commodities that maximize its resources, whether labour or capital, thereby promoting mutual prosperity.

Within the domain of growth theories, the Harrod-Domar model highlights the positive influence of trade liberalization on growth, particularly when capital is the sole production factor. This is based on the premise that the marginal product of capital (MPK) maintains a positive value. In the context of neoclassical models, such as the Solow model for closed economies, growth is predominantly exogenously determined. The distinctiveness of the Solow model lies in its concept of a steady-state level of per capita GDP within the framework of diminishing returns to scale, enabling convergence of developing economies towards similar living standards. This assertion, articulated by Ray (1998), resonates with Harrison's (1994) perspective on how trade openness, based on the Solow model, fosters capital equipment inflows and technology dissemination, subsequently invigorating industrial and manufacturing sectors and augmenting overall economic growth.

These theoretical foundations are further fortified by the classical trade theories, which encompass Adam Smith's theory of absolute advantage and David Ricardo's concept of comparative advantage. The latter underscores the mutual benefits of trade based on comparative, rather than absolute, advantage, while Heckscher-Ohlin advances this notion by elucidating the role of factor endowments in shaping the patterns of global trade. Modern economists, including Krugman (1984) and Grossman & Helpman (1990), expand on and refine these theories to accommodate the role of technological diffusion and innovations in the trade-growth relationship.

The literature transitions towards endogenous technological change models that offer a compelling

rationale for the enduring link between trade openness and long-term economic growth. These models, including Chen and Gupta's (2006) perspective on increasing returns to scale, emphasize the role of trade openness in fostering knowledge spillovers, supplementing productivity, and expanding human capital. Romer (1990) further contends that trade openness amplifies productive knowledge by providing access to a broader range of capital and intermediate goods, consequently fuelling rapid productivity growth. Grossman and Helpman (1990) contribute to this discourse by illuminating how trade openness and foreign direct investments (FDI) inflows engender technological diffusion, ultimately precipitating technological breakthroughs and propelling economic growth.

The multifaceted pathways through which trade openness catalyses economic growth are underscored by various channels elucidated by scholars. Rivera-Batiz (1995) identifies the re-allocation effect, which augments human capital, and the spillover effect, facilitated by knowledge and technology diffusion across nations. Furthermore, competition effect fosters reverse technology adoption through imitation, particularly pertinent in developing countries' emulation of advanced technology and innovations (Keho, 2017). The absorptive capacity of trading partners plays a pivotal role in technology transfer, while upgrading export products to international standards bolsters innovation capacity (Fatima et al., 2020).

Amidst the theoretical diversity, the discourse navigates towards a balanced evaluation of trade openness's influence on economic growth. While classical trade theories envisage a positive sum game promoting growth, modern growth theorists, represented by Grossman and Helpman (1990), acknowledge the nuanced impact of competition on firms' profitability and innovation. In this context, government interventions, such as protective measures favouring research for economies with international competitive advantage, can play a pivotal role in sustaining long-term economic growth.

Barro and Sala-i-Martin (1997) contribute a valuable dimension by demonstrating how trade openness enhances long-term economic growth through

streamlined access to goods and services, efficient resource allocation, and productivity enhancements via technology and knowledge diffusion. In line with this notion, the prevailing consensus is that economies open to international trade tend to outperform their closed counterparts. Developing nations, particularly, stand to gain significantly from the exchange of knowledge and technology with advanced economies, advocating for continuous trade liberalization as a key policy agenda.

The significance of an enabling environment characterized by robust institutions cannot be overemphasized. (Fatima et al., 2020) and (Dollar and Kraay, 2003) underscore the positive correlation between trade openness, economic growth, and quality institutions, emphasizing the need to capture the indirect effect of institutional qualities in examining this relationship.

Empirical evidence consolidates the theoretical discussions by documenting the pivotal role of trade openness in spurring economic growth. Numerous studies, including those by Fatima et al. (2020) and Keho (2017), indicate that open economies witness accelerated economic growth, with export-oriented firms experiencing enhanced growth trajectories. Trade openness's facilitation of goods and services import-export dynamics furthers technological improvements, effectively bolstering productivity (Oppong-Baar et al., 2022). This productivity surge contributes to the phenomenon where open economies tend to develop at a faster pace than their closed counterparts (Ben-David and Loewy, 1998).

Nonetheless, the relationship between trade openness and economic growth is not without complexities. Some studies, such as Adhikary (2011), present a contrasting view, asserting that liberalized trade regimes could lead to a higher depreciation of exchange rates, resulting in imported production input cost increases and reduced local output, ultimately dampening market competition.

Empirical findings on the correlation between trade openness and economic growth have yielded mixed and sometimes conflicting results. Certain studies, including those conducted by Ademola et al. (2013), Saeed (2015), and Ugbor (2014), establish a robust

and statistically significant relationship between trade openness and economic growth. For instance, Saeed (2015) explores the causal relationship between trade openness and economic growth using Kuwaiti data, accounting for financial development, and deduces that trade openness causally fosters economic growth.

Similarly, Keho (2017) scrutinizes the relationship between trade openness and economic growth in Cote d'Ivoire, employing data from 1965 to 2014 and incorporating labor and capital stock considerations. The findings underscore that trade openness serves as a catalyst for economic growth. This aligns with Tang et al.'s (2019) exploration of the association between trade openness and economic growth using Mauritian

Within the existing literature on the relationship between trade openness and economic growth, a significant gap arises from the inadequate exploration of the distinct short-term and long-term impacts of trade openness, particularly within the specific context of Nigeria. While numerous studies have demonstrated a positive association between trade openness and economic growth, they often overlook the temporal dimension of this relationship. The varying effects of trade openness on economic growth in the short term, characterized by immediate adjustments and potential disruptions, and the longer term, marked by cumulative benefits and structural changes, have not been sufficiently disentangled. This temporal aspect is particularly relevant for Nigeria, a developing economy with a diverse set of challenges, including infrastructural limitations, institutional inefficiencies, and reliance on primary commodity exports. The current literature's failure to differentiate between short-term and long-term effects obscures the nuanced dynamics that could be at play in Nigeria's unique economic landscape. By scrutinizing the differential impacts over time, this study could uncover valuable insights into how trade openness interacts with Nigeria's distinct economic conditions, providing a more comprehensive understanding of the trade-growth relationship and guiding tailored policy recommendations for both short-term adjustments and long-term development strategies.

3. Methodology

This section presents the techniques of analysis used to empirically examine the relationship between trade openness and economic growth in Nigeria. The study employs an Autoregressive Distributed Lag (ARDL) approach, which is well-suited for investigating variables with mixed-order integration, addressing endogeneity concerns, and accommodating potential cointegration relationships.

3.1 Data and Sources

Data for the study were sourced from the World Development Indicators database and cover the period from 1981 to 2021. This comprehensive dataset allows for a robust analysis of the relationship between trade openness, economic growth, and relevant control variables.

3.2 Model Specification

The primary ARDL model specification is as follows:

Δ(Annual GDP growth rate)$_t$ = $\beta_0 + \beta_1 \Delta$(Trade openness)$_{t-i}$ $+ \beta_2 \Delta$(Exchange rate)$_{t-I}$ $+ \beta_3 \Delta$(Interest rate)$_{t-i}$ $+ \varphi$ECM$_{t-i}$ $+ \varepsilon_t$

Where:

Δ(Annual GDP growth rate) represents the first difference of the annual GDP growth rate.

Δ(Trade openness) represents the first difference of the trade openness variable.

Δ(Exchange rate) represents the first difference of the exchange rate variable.

Δ(Interest rate) represents the first difference of the interest rate variable.

ECMECM is the error correction mechanism term

ε represents the error term.

3.3 Control Variables: Exchange Rate and Interest Rate

The exchange rate and interest rate are included as control variables in the model due to their potential impacts on the trade openness and economic growth relationship. The exchange rate's role in influencing trade competitiveness and the interest rate's impact on

investment decisions make them essential variables to consider in the analysis.

3.4 Descriptive Analysis

The initial stage of analysis involves conducting descriptive analysis on the dataset. This includes calculating summary statistics such as means, medians, maximum and minimum values, standard deviations, skewness, and kurtosis for the key variables—annual GDP growth rate, trade openness, exchange rate, and interest rate. Descriptive analysis offers an initial understanding of the variables' characteristics and distributions.

3.5 Correlation Analysis

To further explore relationships among the variables, correlation analysis is performed. This technique assesses the strength and direction of linear associations between pairs of variables. In this study, the Pearson correlation coefficient is calculated to determine the degree of linear correlation between the annual GDP growth rate, trade openness, exchange rate, and interest rate. Correlation analysis provides insights into potential connections that guide subsequent analyses.

3.6 Unit Root Tests

Unit root tests are then conducted to evaluate the stationarity properties of the variables. The Augmented Dickey-Fuller (ADF) test is applied to ascertain the order of integration for each variable. Determining whether the variables require differencing to achieve stationarity is crucial for accurate regression analysis.

3.7 ARDL Approach

The ARDL approach is chosen because it accommodates variables with different orders of integration, thereby addressing potential spurious regression issues. This method also allows for the examination of both short-run and long-run relationships between the variables, providing insights into the dynamics of the relationship over time. The inclusion of the error correction mechanism captures the adjustment process back to the long-run equilibrium, offering insights into the speed of

adjustment following short-term deviations. The analysis involves the following steps:

i. Conducting unit root tests to determine the order of integration of the variables.

ii. Utilizing the ARDL bounds testing approach to test for cointegration among the variables.

iii. Estimating both the short-run and long-run ARDL models to assess the impacts of trade openness, exchange rate, and interest rate on economic growth.

iv. Performing residual diagnostic tests to ensure the validity of the estimated models.

4. Results and Discussion

4.1 Summary Statistics of the Study Variables

Table 1 presents summary statistics related to key variables, shedding light on important aspects of the study's dataset. The annual GDP growth rate for Nigeria exhibits a mean of 3.04% with considerable variation, ranging from a minimum of -13.13% to a maximum of 15.33%. Trade openness, quantified by the ratio of exports and imports to GDP, holds a mean of 0.40, indicating a moderate level of economic openness. However, this metric exhibits substantial skewness with a positive value of 1.60, indicating an asymmetrical distribution skewed towards higher values, reflecting the wide disparity in trade openness across the observed years.

Table 1: Summary Statistics

	Annual GDP growth rate	Trade openness	Interest rate	Exchange rate
Mean	3.041468	0.404839	11.03131	108.0868
Median	3.647187	0.364938	10.10833	111.2313
Maximum	15.32916	1.067601	23.24167	401.1520
Minimum	-13.12788	0.162482	4.206848	0.617708
Std. Dev.	5.385440	0.181654	4.082286	109.9700
Skewness	-0.819168	1.600965	0.757742	0.978891
Kurtosis	4.620614	6.214836	3.630509	3.189257
Jarque-Bera	9.072163	35.17036	4.602652	6.609079
Probability	0.010715	0.000000	0.100126	0.036716
Sum	124.7002	16.59841	452.2836	4431.558
Sum Sq. Dev.	1160.118	1.319930	666.6025	483736.1
Observations	41	41	41	41

Source: Author's computation using Eviews 10.

Additionally, the mean interest rate stands at 11.03%, revealing the prevailing borrowing and lending conditions. The exchange rate, crucial for Nigeria's trade dynamics, exhibits substantial volatility, evident from its high standard deviation of 109.97. The observation count is uniform at 41 for each variable, suggesting consistency in the dataset's time span.

Notably, the Jarque-Bera tests for normality reveal that while GDP growth rate and interest rate pass the test at a 1% significance level, indicating relatively normal distributions, both trade openness and exchange rate fail the test with low p-values, indicating potential departure from normality. These statistical insights provide an initial understanding of the dataset's characteristics, emphasizing the necessity for a nuanced analysis of short-term and long-term impacts of trade openness on Nigeria's economic growth, considering the country's unique economic landscape and the dynamic interplay between these variables.

4.2 Correlation Analysis

Table 4.2 presents the results of the correlation analysis among the key variables, shedding light on their interrelationships and providing insights into their potential linkages in the context of Nigeria's economic growth. The strong positive correlation of 0.79 between annual GDP growth rate and trade

openness reinforces the theoretical foundations discussed earlier. This positive association aligns with the neoclassical theories of trade, particularly the comparative advantage principle and Heckscher-Ohlin model, wherein an economy's specialization in producing goods with comparative productivity

advantage contributes to economic growth through trade. This finding resonates with previous studies (Saeed, 2015; Keho, 2017) that highlighted the positive relationship between trade openness and economic growth.

Table 2: Result of Correlation Analysis between the variables

Covariance Analysis: Ordinary					
Sample: 1981 2021					
Included observations: 41					
Correlation	Annual GDP growth rate	Trade openness	Interest rate	Exchange rate	
Annual GDP growth rate	1.000000				
Trade openness	0.789163	1.000000			
Interest rate	-0.336672	-0.106436	1.000000		
Exchange rate	0.157914	-0.463159	-0.428217	1.000000	

Conversely, the negative correlation of -0.34 between interest rate and annual GDP growth rate is consistent with the theoretical notion that higher interest rates can hinder economic growth due to increased borrowing costs for businesses and reduced consumer spending. This aligns with Harrod-Domar model predictions and is also corroborated by prior research (Srinivansan, 1999). The negative correlation between trade openness and interest rate (-0.11) suggests that more open economies might have slightly lower interest rates, reflecting potential implications of global economic integration on domestic monetary policies.

Furthermore, the negative correlation between interest rate and exchange rate (-0.43) is indicative of the well-established interest rate-parity theory, wherein higher domestic interest rates tend to lead to currency appreciation. This can impact trade dynamics and potentially influence trade openness. The relatively weak positive correlation (0.16) between exchange rate and annual GDP growth rate underscores the complex interaction between exchange rate movements and economic growth,

which can be shaped by various external and internal factors.

In summary, the correlation analysis offers preliminary insights into the relationships between these variables, aligning with theoretical frameworks and previous studies. However, these associations are complex and can be influenced by a multitude of factors that necessitate further examination through regression analysis to uncover the nuanced impacts of trade openness on Nigeria's economic growth over the short and long term.

4.3   Unit Root Test

Table 4.3 provides the results of the unit root test for the study variables, offering valuable insights into the stationarity properties of each variable and their first differences. The Augmented Dickey-Fuller (ADF) test statistics are compared with critical values to determine stationarity or nonstationarity, with the 5% significance level employed.

Table 3: Unit Root Test Result for the Study Variables

Variables	ADF Test Statistics	5% Critical Values	P-values	Stationarity Status
Annual GDP growth rate	-3.142	-2.939	0.032	Stationary
Trade openness	-4.134	-2.937	0.002	Stationary
Exchange rate	0.103	-3.537	0.086	Nonstationary
Δ(Exchange rate)	-4.748	-3.540	0.019	Stationary
Interest rate	-3.277	-3.527	0.996	Nonstationary
Δ(Interest rate)	-3.964	-3.530	0.003	Stationary

Source: Author's summary of Eviews output. Note: Δ denote first difference.

The annual GDP growth rate demonstrates an ADF test statistic of -3.142, exceeding the critical value of -2.939, and corresponding to a p-value of 0.032. This indicates stationarity, suggesting that the GDP growth rate series is characterized by a stable mean, aligning with theoretical expectations and rendering it suitable for time-series analysis.

Similarly, trade openness presents an ADF test statistic of -4.134, substantially lower than the critical value of -2.937, leading to a very low p-value of 0.002. This robustly points to the stationarity of the trade openness series, indicating that fluctuations around the mean are consistent over time and implying its suitability for analysis.

Exchange rate, however, exhibits an ADF test statistic of 0.103, which is above the critical value of -3.537, and a p-value of 0.086. As both these indicators fail to establish stationarity, the exchange rate variable is considered nonstationary in its current form.

Nonetheless, the first difference of the exchange rate variable (ΔExchange rate) yields an ADF test statistic of -4.748, comfortably surpassing the critical value of -3.540, and a p-value of 0.019. This confirms the stationarity of the first difference, indicating that the fluctuations in the exchange rate are stable and devoid of a unit root, making it amenable to analysis.

Regarding interest rate, the ADF test statistic stands at -3.277, exceeding the critical value of -3.527, but yielding a high p-value of 0.996. As neither the test statistic nor the p-value strongly supports stationarity, the interest rate variable is considered nonstationary.

However, upon differencing (ΔInterest rate), the ADF test statistic becomes -3.964, comfortably surpassing the critical value of -3.530, and yielding a p-value of

0.003. Consequently, the first difference of the interest rate variable is established as stationary.

The unit root test results presented in Table 4.3 hold pivotal implications for the subsequent ARDL (Autoregressive Distributed Lag) analysis, which offers a suitable framework for combining variables with mixed orders of integration. ARDL analysis is particularly advantageous in cases where the variables under consideration exhibit differing degrees of stationarity.

In this context, the ARDL model becomes a powerful tool to investigate the short-run and long-run relationships between trade openness, economic growth, exchange rate, and interest rate, while accommodating their distinct stationarity properties. Specifically, variables that are stationary in their original form, such as annual GDP growth rate and trade openness, can be directly included in the ARDL model without the need for differencing. On the other hand, the exchange rate and interest rate variables, which exhibit nonstationarity in their original form but become stationary after first differencing, can also be integrated into the model to capture their dynamics.

The ARDL approach effectively addresses the challenge of variables with mixed orders of integration, allowing for robust analysis of their relationships across different time horizons. By considering both the short-term dynamics and long-term equilibrium relationships, the ARDL model will provide insights into how trade openness, exchange rate fluctuations, and interest rate changes collectively influence economic growth in Nigeria. This holistic analysis is particularly relevant in the context of Nigeria's unique economic challenges and dynamic interactions between these variables. Therefore, the

ARDL framework serves as a powerful tool to unveil nuanced relationships that account for the mixed stationarity characteristics of the variables, leading to a more comprehensive understanding of the impact of trade openness on economic growth in Nigeria.

4.4   Short Run Impact of Trade Openness on Economic Growth in Nigeria

Table 4.4 presents the ARDL analysis results, focusing on the short-run impact of trade openness on economic growth in Nigeria. This comprehensive approach aligns with the theoretical underpinnings of trade openness theories and builds upon previous studies to illuminate the intricate relationships within Nigeria's economic context. The dependent variable, annual GDP growth rate, is regressed against the first differences of trade openness, exchange rate, and interest rate. The error correction mechanism term, reflecting the long-run equilibrium adjustments, is also included in the model.

Table 4: ARDL Result of Short Run Impact of Trade Openness on Economic Growth in Nigeria

Dependent Variable: Annual GDP Growth Rate	Short Run Coefficients
Δ(Trade Openness)	0.8251 (2.5658)
Δ(Exchange Rate)	-0.0667 (-2.4242)
Δ(Interest Rate)	-0.3617 (-2.0019)
Error Correction Mechanism	-0.4529 (-3.7525)
Observations (After adjustments)	39
R-squared	0.5008

Source: Extracted from Eviews output. T-values are provided in parenthesis.

The coefficient estimate for Δ(Trade Openness) is 0.8251, suggesting that a one-unit increase in the first difference of trade openness is associated with a 0.8251-unit increase in the annual GDP growth rate. This finding is in line with the predictions of trade theories, including comparative advantage and Heckscher-Ohlin models, where increased trade openness fosters economic growth. This positive short-run relationship echoes the outcomes of earlier studies (Saeed, 2015; Keho, 2017), reinforcing the notion that trade openness plays a pivotal role in stimulating economic expansion.

The coefficient estimate for Δ(Exchange Rate) is -0.0667, indicating that a one-unit increase in the first difference of exchange rate corresponds to a decrease of 0.0667 units in the annual GDP growth rate. This result underscores the potential adverse impact of exchange rate fluctuations on economic growth, resonating with the complexities highlighted in the literature. It is important to note that this finding is consistent with the broader discussions on the interactions between exchange rates and economic growth, reflecting both theoretical implications and empirical observations.

Similarly, the coefficient estimate for Δ(Interest Rate) is -0.3617, signifying that a one-unit increase in the first difference of interest rate results in a reduction of 0.3617 units in the annual GDP growth rate. This outcome supports the theory that higher interest rates can hinder economic growth due to increased borrowing costs for businesses and reduced consumer spending, corroborating the dynamics highlighted in prior research (Srinivansan, 1999).

The error correction mechanism coefficient of -0.4529 emphasizes the adjustment towards the long-run equilibrium relationship. This coefficient signifies that around 45% of any deviations from the long-run equilibrium are corrected in the short run, suggesting the presence of a stable and persistent relationship between trade openness and economic growth.

In conclusion, the ARDL analysis offers insightful evidence of the short-run impact of trade openness on economic growth in Nigeria. The results are coherent with established theoretical frameworks and prior studies, thereby providing nuanced policy implications. Policymakers can draw from these findings to design strategies that harness the potential of trade openness while addressing the challenges posed by exchange rate fluctuations and interest rate dynamics, thereby fostering sustainable economic growth in Nigeria.

4.5 Long Run Impact of Trade Openness on Economic Growth in Nigeria

Table 4.5 presents the ARDL analysis outcomes concerning the long-run impact of trade openness on economic growth in Nigeria, allowing for a comparative assessment with the short-run impact discussed earlier. These results offer a deeper understanding of the intricate relationships among the variables within the theoretical and empirical frameworks, while also providing insights that hold valuable policy implications for sustainable economic development. The dependent variable, annual GDP growth rate, is examined in relation to trade openness, exchange rate, interest rate, and a constant term, which collectively shed light on the long-term dynamics of economic growth.

Table 5: ARDL Result of Long Run Impact of Trade Openness on Economic Growth in Nigeria

Dependent Variable: Annual GDP Growth Rate	Long Run Coefficients
Trade Openness	0.9216 (4.0725)
Exchange Rate	-0.0158 (-2.9173)
Interest Rate	-0.1645 (-3.3697)
Constant	1.9759 (2.2226)

Source: Extracted from Eviews output. T-values are provided in parenthesis.

The coefficient estimate for Trade Openness is 0.9216, which indicates that a one-unit increase in trade openness leads to a 0.9216-unit increase in the long-run GDP growth rate. This positive relationship echoes the findings in the short-run analysis, strengthening the argument derived from classical trade theories that emphasize the role of trade openness in driving economic growth. Importantly, the magnitude of the coefficient in the long-run suggests that the impact of trade openness on economic growth remains robust over extended periods, underscoring the enduring nature of this association.

Comparatively, the short-run coefficient for Δ(Trade Openness) in the earlier analysis was 0.8251. This comparative analysis reveals that while the short-run impact of trade openness is significant, the long-run impact is even more substantial. This aligns with the theoretical arguments and empirical trends highlighted in prior studies (Saeed, 2015; Keho, 2017), which emphasize that the positive effects of trade openness

tend to accumulate and magnify over time, resulting in more pronounced economic growth in the long run.

Turning to the other variables, the coefficient estimate for Exchange Rate is -0.0158, demonstrating that a one-unit increase in the exchange rate corresponds to a decrease of 0.0158 units in the long-run GDP growth rate. This finding parallels the short-run impact, reaffirming the persistent challenges posed by exchange rate fluctuations on economic growth. The long-run effect, as with the short-run, highlights the need for effective exchange rate management strategies to ensure stability and mitigate adverse impacts on economic growth.

Similarly, the coefficient estimate for Interest Rate is -0.1645, suggesting that a one-unit increase in the interest rate leads to a reduction of 0.1645 units in the long-run GDP growth rate. This result mirrors the short-run impact, underlining the consistent negative relationship between interest rates and economic growth. The implications drawn from the short-run

analysis concerning the need for careful interest rate policies and the fostering of a conducive investment environment hold true in the long run as well.

In conclusion, the comparative analysis of the long-run impact of trade openness on economic growth, as depicted in Table 4.5, illuminates the enduring nature of the relationships established in the short run. These findings resonate with theoretical frameworks, extend the insights from previous studies, and provide policymakers with valuable guidance for designing strategies that capitalize on trade openness while mitigating challenges posed by exchange rate fluctuations and interest rate dynamics. The cumulative effects observed in the long run reinforce the imperative of promoting trade openness as a pathway to sustained economic growth in Nigeria.

4.6   F-Bounds Test for Long Run Equilibrium Relationship

Table 6 presents the F-Bounds Test results, which serve to investigate the existence of a long-run equilibrium relationship among the variables under examination. This assessment is vital for understanding the sustainability and stability of the relationships, making connections with theoretical foundations and prior research, and offering valuable policy insights that foster a balanced economic environment in Nigeria.

Table 6: F-Bounds Test for Long Run Equilibrium

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	6.494346	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

The F-statistic in the test is 6.494346, which is compared against critical values at different significance levels (10%, 5%, 2.5%, and 1%). The test assesses the null hypothesis that no levels relationship exists among the variables. In the context of this study, the presence of a significant F-statistic provides evidence in favor of a long-run equilibrium relationship, indicating that the variables' interplay contributes to a stable and persistent equilibrium state. This interpretation aligns with theoretical underpinnings emphasizing the importance of equilibrium dynamics in trade-growth relationships and echoes findings from previous studies (Chen & Gupta, 2006; Romer, 1990).

The calculated F-statistic surpasses the critical values at all significance levels, including the most stringent 1% level. This outcome implies that the null hypothesis of no levels relationship can be rejected, substantiating the presence of a long-run equilibrium connection among the variables. This aligns with empirical findings from other research that suggest the persistence and significance of trade-growth relationships over time (Keho, 2017; Nwadike et al., 2020).

The F-Bounds Test results have crucial policy implications. The established long-run equilibrium relationship underscores the need for policy measures that foster trade openness, stability in exchange rates, and conducive interest rate environments. These measures become even more pertinent considering the sustained impacts observed in the long run, as discussed in the ARDL analysis. This aligns with the arguments in prior studies, which emphasize the importance of maintaining an enabling environment to maximize the benefits of trade openness while managing exchange rate fluctuations and interest rate dynamics (Fatima et al., 2020; Barro & Sala-i-Martin, 1997). Policymakers can use these insights to develop strategies that promote sustainable economic growth through trade openness and effective macroeconomic policies.

4.7   Residual Diagnostic Tests

The results of the residual diagnostic tests presented in Table 7 serve as a crucial evaluation of the adequacy

of the estimated ARDL model. These diagnostic tests provide insights into the model's robustness, reliability, and potential issues that could impact the validity of the results. Interpreting these results within the context of the ARDL analysis, prior theoretical frameworks, and existing research is essential to validate the findings and guide policy implications.

Table 7: Residual Diagnostic Test Result for the Estimated ARDL Model

Normality Test	Jarque-Bera	3.5771
	Probability	0.1672
Serial Correlation	LM (Obs*R-Squared)	2.6193
	Probability	0.2819
Heteroskedasticity	LM (Obs*R-Squared)	0.2541
	Probability	0.8807

Source: Author's extract of Eviews output.

The Normality Test, represented by the Jarque-Bera statistic, yields a value of 3.5771 with a corresponding probability of 0.1672. This test assesses whether the residuals of the model follow a normal distribution, which is a fundamental assumption in many statistical analyses. In this case, the probability value of 0.1672 suggests that there is no significant departure from normality. While the exact normal distribution assumption might not hold perfectly, the reasonably high p-value implies that the normality assumption is likely met. This aligns with previous studies that emphasize the robustness of the ARDL approach and the validity of the results derived from it (Pesaran et al., 2001).

The Serial Correlation test, indicated by the LM (Obs*R-Squared) statistic, reports a value of 2.6193 with a corresponding probability of 0.2819. This test investigates the presence of serial correlation or the autocorrelation of residuals. A high p-value suggests that the residuals do not exhibit significant serial correlation, indicating that the model has effectively captured the temporal relationships between the variables. This outcome validates the reliability of the ARDL model's estimated coefficients and reinforces the conclusions drawn from the analysis. Similar findings from other studies that employed ARDL models underscore the methodology's ability to handle potential serial correlation issues effectively (Duodu et al., 2020; Keho, 2017).

The Heteroskedasticity test, represented by the LM (Obs*R-Squared) statistic, returns a value of 0.2541 with a corresponding probability of 0.8807. This test evaluates whether the residuals display heteroskedasticity, which implies that the variability of residuals changes across different levels of the independent variables. The high p-value in this test suggests that there is no significant evidence of heteroskedasticity in the residuals. This strengthens the credibility of the model's results, as it implies that the variance of residuals remains relatively constant across the range of independent variables. This aligns with the assumptions of the ARDL model and supports the meaningfulness of the estimated coefficients.

In conclusion, the results of the residual diagnostic tests in Table 4.7 affirm the robustness and reliability of the estimated ARDL model. These tests validate the assumptions underlying the ARDL analysis, providing confidence in the results and their interpretation. These findings, combined with theoretical foundations and the consistency with previous research, contribute to a comprehensive and solid understanding of the impact of trade openness on economic growth in Nigeria, offering valuable insights for policy formulation and decision-making.

5. Conclusion and Recommendations

In conclusion, this empirical analysis investigated the short run and long run impact of trade openness on economic growth in Nigeria using an ARDL approach. The findings of the study shed light on the intricate relationship between trade openness, economic growth, and other relevant variables. The analysis incorporated an array of theoretical perspectives, ranging from classical trade theories such as comparative advantage and factor endowments to modern endogenous growth models. The study also delved into a comprehensive review of existing literature, reinforcing the theoretical

foundation and contextualizing the research within the Nigerian economic landscape.

The empirical results derived from the ARDL model revealed both short run and long run impacts of trade openness on economic growth. In the short run, the results indicated that an increase in trade openness positively influences economic growth. Similarly, in the long run, trade openness demonstrated a significant positive impact on economic growth, underlining the persistent benefits of engaging in international trade. These findings align with the theoretical propositions of comparative advantage, technological diffusion, and knowledge spillovers, which highlight the potential for trade openness to stimulate economic growth through various channels.

The empirical findings of this study offer valuable insights for policy recommendations that can foster economic growth through trade openness in Nigeria. Firstly, there is a need to prioritize trade-friendly policies that encourage openness and remove barriers. Governments should focus on reducing trade restrictions, simplifying customs procedures, and investing in trade-related infrastructure to facilitate smoother cross-border transactions and stimulate trade volumes.

Secondly, recognizing the pivotal role of technology and human capital in maximizing the benefits of trade openness, policymakers should invest in education, skills training, and research and development. This will not only enhance the absorptive capacity of the economy but also ensure that the knowledge and innovations stemming from international trade are effectively utilized to drive productivity and sustainable economic growth. Simultaneously, prudent exchange rate management and interest rate policies should be adopted to create a stable economic environment that supports investment and economic activities.

In a nutshell, these recommendations emphasize a holistic approach that encompasses trade facilitation, human capital development, and sound macroeconomic policies. By implementing these measures, Nigeria can leverage its trade openness to spur economic growth, improve its global competitiveness, and achieve sustainable development goals.

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