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Trade Liberalization, Export Diversification and Economic Growth in Nigeria

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Abstract

This study investigated the dynamic short-run and long-run effects of trade liberalization, export diversification, and economic growth on Nigeria over the period 1981 to 2024, utilizing the Autoregressive Distributed Lag (ARDL) modelling framework. The empirical analysis is structured into three interrelated models. Model 1 examined the impact of trade liberalization proxied by trade openness) and infrastructure (INFR) on export diversification (EDIV). The results revealed a positive and statistically significant relationship, indicating that increased openness to trade and improvements in infrastructure significantly enhance Nigeria's export diversification. Model 2 assessed the influence of export diversification, capital formation (CAP), labour force growth (LAB), and trade liberalization on real GDP growth (GDPG). Findings showed that these variables significantly contribute to economic development by fostering industrial diversification, stimulating innovation, creating employment opportunities, and increasing foreign exchange earnings. Model 3 synthesized the insights from the first two models, showing that export diversification, capital formation, and labour force growth jointly mediate the relationship between trade liberalization and economic growth, with statistically significant effects in both the short and long run. However, the analysis also identified negative relationships between inflation (INF), the real effective exchange rate (REER), and key economic indicators across the models. The study concluded that sustainable economic growth through trade liberalization and export diversification requires robust macroeconomic stability, quality infrastructure investment, strategic FDI targeting, and sound monetary policy.

Keywords:

Trade liberalization, export diversification, labour force growth rate, Foreign Direct Investment, infrastructure and inflation rate.

1. Introduction

Trade liberalization has been widely promoted as a catalyst for economic growth, particularly in developing economies seeking structural transformation and integration into global markets. The theoretical premise is that reducing trade barriers facilitates the reallocation of resources towards sectors with comparative advantages, promoting efficiency, technology transfer, and dynamic gains that enhance growth prospects. However, for resource-dependent economies like Nigeria, trade liberalization's success in fostering growth is not guaranteed without structural shifts in the export base towards more diversified, higher-value-added products.

Nigeria's economy remains heavily dependent on crude oil exports, which account for over 80% of its foreign exchange earnings, exposing it to external shocks from volatile commodity prices. Despite multiple trade liberalization policies—beginning with the Structural Adjustment Programme (SAP) in 1986, membership in the World Trade Organization in 1995, and recent commitments under the African Continental Free Trade Area (AfCFTA) export diversification has remained limited, and the economy remains vulnerable to oil price fluctuations.

This paper examines whether trade liberalization in Nigeria has facilitated export diversification and whether such diversification has translated into economic growth. Specifically, it investigates:

i. the impact of trade liberalization on export diversification in Nigeria.

ii. the effect of export diversification on economic growth.

iii. the mediating role of export diversification in the trade liberalization–growth nexus.

This paper contributes to the literature by providing an inclusive empirical examination of these interlinkages within the context of Nigeria's evolving trade policy and economic structure. By utilizing updated data and robust econometric methods, the paper provides evidence on the extent to which liberalization has achieved its intended outcomes and offers policy-relevant insights for sustaining growth through diversification under AfCFTA and global economic volatility.

The rest of the paper is organized as follows: Section 2 discusses the theoretical framework and literature review. Section 3 details the methodology and data. Section 4 presents and discusses the empirical results. Section 5 concludes with policy implications.

2. Theoretical Framework and Literature Review

2.1 Theoretical Framework

The relationship between trade liberalization, export diversification, and economic growth is rooted in classical and endogenous growth theories, providing a theoretical perspective to understand how openness to trade can influence the structural transformation of an economy.

This study is anchored on Classical Trade Theory, New Trade Theory, and Endogenous Growth Theory, which collectively provide a robust perspective for examining the relationship between trade liberalization, export diversification, and economic growth in Nigeria.

Classical trade theory, exemplified by Ricardo's principle of comparative advantage, posits that countries stand to gain from engaging in international trade by specializing in the production and export of goods and services in which they hold relative efficiency advantages. This specialization, facilitated by trade liberalization, allows countries to allocate resources more efficiently, leading to increased productivity and overall welfare gains. However, while specialization enhances efficiency, it may expose countries, particularly those reliant on primary commodities, to external shocks due to price volatility and demand fluctuations in global markets.

New Trade Theory (Krugman, 1981) advances classical perspectives by introducing the significance of economies of scale and product differentiation in explaining trade patterns and their implications for growth. By liberalizing trade, countries can access larger markets that

enable firms to exploit economies of scale, reduce unit costs, and improve competitiveness. Additionally, exposure to international markets fosters competition and innovation, encouraging firms to improve product quality and diversify their offerings to meet global standards. These dynamics stimulate industrial upgrading and technological advancement, creating a more robust foundation for sustainable economic growth.

Endogenous growth models (Romer, 1990) further enrich this discourse by highlighting that trade openness serves as a conduit for technology transfer and knowledge spillovers across borders. Through increased interactions with technologically advanced economies, developing countries can absorb new technologies and managerial practices, enhancing productivity and innovation capabilities within domestic industries. Moreover, trade liberalization can incentivize investments in human capital development, as the demand for skilled labour increases with technological advancements and shifts towards higher value-added production.

Nonetheless, for these theoretical benefits of trade liberalization to be fully realized, particularly in resource-dependent economies, structural transformation is imperative. The Prebisch-Singer hypothesis underscores the adverse effects of primary commodity dependence, suggesting that terms of trade tend to deteriorate for commodity-exporting countries over time, limiting their growth prospects. Furthermore, the phenomenon of Dutch Disease, where large inflows from commodity exports lead to currency appreciation and harm the competitiveness of non-resource sectors, poses additional challenges to sustained growth.

In this context, export diversification becomes a critical strategy for mitigating these vulnerabilities and unlocking the growth-enhancing potential of trade liberalization. Export diversification can be pursued both horizontally, by expanding the range of export products across different sectors, and vertically, by moving up the value chain through processing and manufacturing higher value-added products from existing resources. As noted by Hausmann and Rodrik (2003), diversification fosters economic resilience by reducing dependence on a narrow set of commodities, thereby minimizing income volatility and exposure to external shocks.

Additionally, export diversification catalyses industrial development by stimulating backward and forward linkages within the economy, creating employment opportunities, and fostering skill development across sectors. By enhancing the density and sophistication of exports, countries can transit towards a more dynamic economic structure capable of sustaining long-term growth and competitiveness in the global economy. In essence, while trade liberalization creates opportunities for growth, it is through strategic export diversification and the associated structural transformation that these opportunities translate into sustainable development outcomes, particularly in developing and resource-dependent economies.

These frameworks collectively align with the objectives of this study by offering a coherent analytical foundation to explore the complex dynamics between trade liberalization, export diversification, and economic growth in Nigeria. They provide the necessary tools to examine how trade liberalization influences the country's economic structure and growth trajectory, enabling a critical analysis of both the opportunities and challenges it presents. Additionally, they highlight the essential role of export diversification in mitigating the vulnerabilities that often accompany heavy reliance on primary commodities, such as exposure to external shocks and price volatility. By drawing on these theoretical perspectives, the study is also able to elucidate the channels through which trade openness can facilitate technology transfer, foster

industrial upgrading, and promote sustainable long-term growth. In this way, the frameworks ensure that the study's investigation is not only theoretically grounded but also practically relevant to Nigeria's development aspirations.

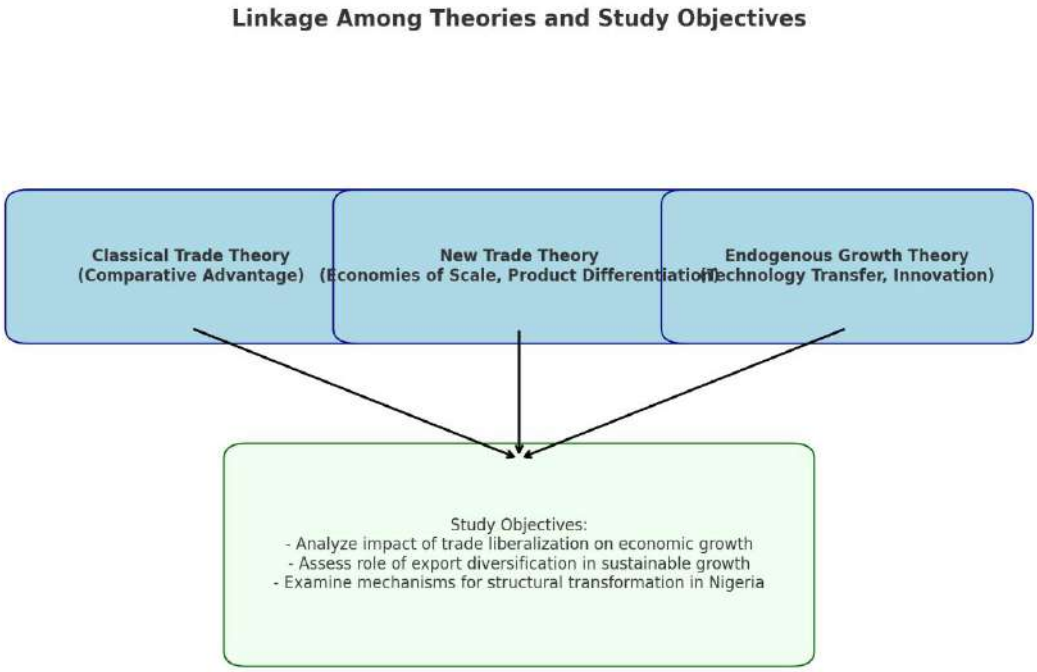

Figure 1: Linkage between Theories and Objectives
Source: Author's conceptualisation.

Figure 1 illustrates the conceptual linkage between Classical Trade Theory, New Trade Theory, and Endogenous Growth Theory and the objectives of this study. Each theoretical framework offers a distinct yet complementary perspective on how trade liberalization and export diversification can drive economic growth in Nigeria.

Arrows from each theory converge on the study's objectives, illustrating that these frameworks collectively underpin the investigation into:

i. The impact of trade liberalization on Nigeria's economic growth,

ii. The role of export diversification in achieving sustainable development,

iii. The mechanisms required for structural transformation within the context of a resource-dependent economy.

This theoretical structure ensures a robust analytical foundation for evaluating how trade policies can be leveraged for sustainable economic growth in Nigeria.

2.2 Empirical Review

The relationship among trade liberalization, export diversification, and economic growth has attracted sustained empirical attention in Nigeria, particularly given the country's historical dependence on oil exports and the policy drive toward economic openness. This review

synthesizes key findings across three interconnected strands of empirical literature: (i) trade liberalization and economic growth, (ii) trade liberalization and export diversification, and (iii) export diversification and economic growth. Each strand is critically assessed in terms of methods employed, nature of data, outcomes, and relevance to Nigeria's development trajectory.

2.2.1 Trade Liberalization and Economic Growth in Nigeria

A broad range of studies has sought to assess whether trade liberalization enhances economic growth in Nigeria. These studies largely employ econometric techniques such as Ordinary Least Squares (OLS), Error Correction Models (ECM), Autoregressive Distributed Lag (ARDL), and dynamic panel data methods.

Oyejide and Bankole (2001) provided one of the earliest evaluations, revealing that despite substantial trade policy reforms since the late 1980s, the growth payoff was modest due to limited structural transformation. This finding was echoed in Opaluwa et al. (2010), who noted that trade openness measured by trade-to-GDP ratios had an insignificant effect on real GDP over their study period, suggesting that the Nigerian economy had not yet achieved the productive capacity needed to leverage open trade policies effectively.

In contrast, Lawal and Ezeani (2013) and Okonkwo and Nwakoby (2019) found statistically significant long-run positive effects of trade openness on economic growth using ARDL and ECM frameworks. These studies introduced additional control variables such as inflation and capital formation, underscoring the importance of stable macroeconomic conditions in realizing trade benefits.

Notably, Olufayo and Akinbobola (2020) introduced a threshold effect, revealing that the growth-enhancing effects of liberalization become statistically significant only when institutional quality and infrastructure reach minimum thresholds. Their work marked a shift from simple linear interpretations to more conditional assessments of trade outcomes.

Recent work by Ajayi and Asongu (2022), using dynamic panel GMM models with interaction terms, provided further evidence that trade liberalization boosts growth more effectively when combined with high absorptive capacity, improved human capital, and policy consistency.

While the majority of studies support a positive relationship between trade liberalization and economic growth, the effect is often contingent rather than automatic. Findings suggest that without the enabling infrastructure, strong institutions, and diversified production, liberalization alone may not deliver the desired growth dividends. Moreover, the time lags in policy impact and the complex interaction with global shocks (e.g., oil price volatility) remain underexplored.

2.2.2 Trade Liberalization and Export Diversification in Nigeria

Given Nigeria's export structure, which is heavily dominated by crude oil, studies have interrogated whether trade liberalization has succeeded in fostering non-oil export diversification.

Adewuyi (2006) and Ogun (2008) found that liberalization policies, including tariff reductions and the abolition of import licensing, had limited influence on export diversification due to Nigeria's weak industrial base and infrastructure bottlenecks. Ogunkola and Jerome (2011)

emphasized that liberalization policies often benefited imports more than exports, reinforcing dependency rather than diversifying trade.

However, Alege and Osabuohien (2015) employed a more advanced system-GMM approach and found that when liberalization is accompanied by FDI inflows and macroeconomic reforms, diversification gains can materialize. Their findings highlighted the complementarity of trade openness and institutional quality in promoting structural change.

In a policy-oriented study, Akpan and Atan (2020) evaluated the effectiveness of the Export Expansion Grant Scheme (EEGS) within the liberalization context and found selective gains in agro-processing and light manufacturing exports. However, they cautioned that administrative delays and weak monitoring mechanisms limited its broader impact.

More recently, Okafor and Adeleye (2023) applied Theil and Herfindahl-Hirschman indices to track diversification trends and found a delayed but significant relationship between trade liberalization and export diversification. Their study is one of the few to empirically quantify export complexity and link it with openness.

The literature is divided, with earlier studies highlighting limited gains and later studies suggesting a more optimistic outlook, provided that complementary conditions—such as investment in trade infrastructure, exchange rate stability, and institutional support—are met. There is also increasing recognition that export diversification is not merely a function of liberalization but also depends on productive capabilities, industrial policy, and access to global value chains.

2.2.3 Export Diversification and Economic Growth in Nigeria

A growing body of empirical work has established the positive effects of export diversification on economic growth, particularly by mitigating exposure to commodity price shocks and fostering resilience.

Ibrahim and Ahmed (2009) showed that higher export diversification reduced GDP volatility and enhanced long-run growth. Ude and Agodi (2014) provided disaggregated evidence that the expansion of manufactured exports had a more consistent positive effect on GDP than traditional commodity exports.

Adediran and Okonkwo (2016) integrated a diversification index into a Solow-type growth model and concluded that a more diversified export base significantly enhances productivity and GDP growth. Their findings were corroborated by Effiom and Etim (2019), who found that diversification positively influenced total factor productivity and real output using GMM estimation.

A significant advancement was made by Eze and Obiora (2022), who focused on export *quality* and *sophistication*. They demonstrated that the structure and technological content of exports matter more than just the number of export items. Their results indicate that structural transformation towards high-value, technology-intensive exports contributes significantly to long-term economic growth. Another empirical evidence from Orebiyi and Effiong (2023) shows that export diversification exerts positvie effect on economic growth in Nigeria.

There is consistent evidence that export diversification—especially when it reflects movement toward higher value-added products—positively influences economic growth. However, the

route to diversification is complex and requires coordinated interventions in industrial policy, infrastructure development, credit access, and skills formation.

2.3 Summary and Implications for Current Research

The empirical literature offers valuable insights into the relationships among trade liberalization, export diversification, and economic growth in Nigeria. Several thematic conclusions emerge:

A careful synthesis of the empirical literature reveals that trade liberalization, though necessary, is not a sufficient condition for achieving either significant export diversification or sustained economic growth in Nigeria. The evidence consistently points to the importance of a range of complementary factors that determine the effectiveness of liberalization policies. These include sound macroeconomic management particularly low and stable inflation, prudent fiscal policy, and coherent exchange rate regimes as well as institutional quality, such as regulatory efficiency, policy consistency, and corruption control. Infrastructural development, especially in transport, energy, and logistics, also emerges as a critical enabler of competitive export sectors. Moreover, without a robust productive capacity, supported by domestic investment, human capital, and innovation, the Nigerian economy remains ill-equipped to take advantage of expanded global market access. Therefore, liberalization policies must be embedded within a broader, coordinated strategy of structural transformation and capacity-building to yield meaningful development outcomes.

In addition, the literature underscores the centrality of export diversification as a strategic pathway to achieving long-term and resilient economic growth, particularly for a commodity-dependent economy such as Nigeria. The over-reliance on crude oil exports has historically exposed the country to significant external shocks and terms-of-trade volatility, which have undermined macroeconomic stability and growth performance. Export diversification reduces such vulnerabilities by expanding the range of products and markets, thereby enhancing resilience and sustainability. However, scholars increasingly argue that it is not just the extent of diversification that matters, but the nature and quality of export diversification. A transition toward more sophisticated, technologically advanced, and value-added exports—such as processed agricultural goods, manufactured products, and services—is more likely to generate employment, stimulate industrialization, and enhance productivity growth. Thus, policy efforts must not only widen the export base but also deepen the technological and knowledge content of Nigeria's export structure.

Finally, a notable evolution is observable in the methodological approaches adopted in the empirical literature over the last two decades. Earlier studies often relied on linear models and static regression techniques, which, while useful, sometimes failed to capture the complexity and non-linearities inherent in the trade-growth-diversification relationship. Recent studies have moved toward threshold models, dynamic panel methods (such as GMM), interaction terms, and ARDL/VECM frameworks, allowing for a richer understanding of the conditionalities, lag structures, and feedback mechanisms at play. This shift reflects a growing recognition of the multi-dimensional and context-specific nature of trade and development outcomes. It also points to the need for more granular, sector-specific, and time-sensitive analyses to inform effective policymaking in Nigeria's evolving trade and industrial landscape.

Given these insights, it becomes evident that understanding the nexus between trade liberalization, export diversification, and economic growth in Nigeria requires a more context-sensitive and integrative analytical approach. While previous studies have laid important foundations, they often overlook the mediating and moderating mechanisms through which trade policy reforms translate into structural transformation and sustained growth. In particular, there is a need to explore how trade liberalization influences economic performance indirectly through export diversification, and under what conditions this pathway becomes most effective. Moreover, the dynamic and evolving nature of Nigeria's trade policy regime especially amidst shifting global trade patterns, economic disruptions (such as COVID-19), and recent policy reforms like the African Continental Free Trade Area (AfCFTA) necessitates an updated empirical evaluation spanning recent decades. By adopting a robust methodological framework that combines ARDL and VECM estimation with mediation analysis, this study seeks to fill these critical gaps. It offers a more nuanced understanding of both the direct and indirect effects of liberalization on growth, while accounting for structural, institutional, and macroeconomic conditions that may influence outcomes. This approach not only advances the empirical literature but also provides valuable policy insights for Nigeria's pursuit of inclusive and resilient economic development in a liberalized global environment.

Nevertheless, significant gaps remain. Many studies fail to capture sectoral differences in trade performance or to account for policy lags. Moreover, few studies systematically examine the mediating or moderating variables linking trade liberalization to growth via diversification channels.

This study addresses these gaps by incorporating multiple proxies of trade liberalization and export diversification, applying ARDL and VECM estimation techniques, and testing for mediation effects. It provides a dynamic and holistic view of the liberalization-diversification-growth nexus in Nigeria between 2000 and 2024.

3. Methodology

This section outlines the empirical strategy employed to examine the interaction among trade liberalization, export diversification, and economic growth in Nigeria. It details model specifications, variable justifications, estimation techniques, and robustness checks to ensure methodological rigour and analytical reliability.

3.1 Model Specification

Model 1: Impact of Trade Liberalization on Export Diversification

$$EDIV_t = \alpha_0 + \alpha_1 TRLIB_t + \alpha_2 FDI_t + \alpha_3 REER_t + \alpha_4 INF_t + \alpha_5 INFR_t + \varepsilon_t \quad (1)$$

Where:

$EDIV_t$= Export Diversification Index (Herfindahl-Hirschman Index inverse, Theil Index, or export concentration index). This measures the extent to which other export commodity competes with main export commodty in the international space. It is expressed as index of commodity of export over the total export bundle.

$TRLIB_t$= Trade Liberalization proxy (trade openness = (Exports + Imports)/GDP, or dummy for major liberalization periods)

FDI_t= Foreign Direct Investment inflows (% of GDP)

$REER_t$= Real Effective Exchange Rate

INF_t = Inflation Rate

$INFR_t$= Infrastructure proxy (electricity generation capacity, mobile penetration, or transport index). This is measured by the kilowatt/hour of electricity generated and the number of consumers, while mobile penetration measures the number of citizens with smartphone or cellular phones

ε_t=Error term

To specify an Autoregressive Distributed Lag (ARDL) model for the equation:

$EDIV_t = \alpha_0 + \alpha_1 TRLIB_t + \alpha_2 FDI_t + \alpha_3 REER_t + \alpha_4 INF_t + \alpha_5 INFR_t + \varepsilon_t$

We first transform it into a dynamic ARDL (p, q_1, q_2, q_3, q_4, q_5) specification by introducing lags of the dependent and independent variables.

General ARDL (p, q_1, q_2, q_3, q_4, q_5) Specification

$$\text{EDIVt} = \beta 0 + \sum_{i=1}^{P} \beta 1 \text{EDIVt} - 1 + \sum_{j=0}^{q1} \lambda \text{jTRLIBt} - \text{j} + \sum_{k=0}^{q2} \delta \text{kFDIt} - \text{k} + \sum \emptyset \text{iREERt} - 1 + \sum_{m=0}^{q4} \delta \text{mINFt} - \text{m} + \sum_{n=0}^{q5} \lambda \text{jINFRt} - \text{n} + \varepsilon \text{t} \quad (2)$$

Where:

p = lag length of dependent variable

q1, q2, q3, q4, q5 = lag lengths of regressors

For cointegration analysis (Pesaran, Shin & Smith bounds testing approach), the ARDL can be reparameterized into an ECM form:

$$\Delta\text{EDIVt} = \sum_{i=1}^{P} \beta 1 \Delta \text{EDIVt} - 1 + \sum_{j=0}^{q1} \lambda \text{j} \Delta \text{TRLIBt} - \text{j} + \sum_{k=0}^{q2} \delta \text{k} \Delta \text{FDIt} - \text{k} + \sum \emptyset \Delta \text{iREERt} - 1 + \quad 3$$

$$\sum_{m=0}^{q4} \delta m \Delta INFt - m + \sum_{n=0}^{q5} \lambda j \Delta INFRt - n + \varepsilon t$$

$+\lambda(EDIV_{t-1} - \alpha_1 TRLIB_{t-1} - \alpha_2 FDI_{t-1} - \alpha_3 REER_{t-1} - \alpha_4 INF_{t-1} - \alpha_5 INFR_{t-1}) + ut$

Where

Δ = first difference operator

λ\lambda$\lambda$ = speed of adjustment parameter (expected negative and significant)

The term in parentheses represents the **long-run equilibrium relationship**

Model 2: Effect of Export Diversification on Economic Growth

$$GDPG_t = \beta_0 + \beta_1 EDIV_t + \beta_2 CAP_t + \beta_3 LAB_t + \beta_4 TRLIB_t + \beta_5 FDI_t + \mu_t \quad (4)$$

Where:

$GDPG_t$= Real GDP Growth Rate

$EDIV_t$= Export Diversification Index

CAP_t= Capital Formation (% of GDP)

LAB_t= Labour Force Growth Rate

$TRLIB_t$= Trade Openness

FDI_t= Foreign Direct Investment

$\mu_t = Error\ term$

Model 3: Mediation Role of Export Diversification in Trade Liberalization–Growth Nexus

Using Baron and Kenny mediation framework:

Step 1: Effect of TRLIB on GDPG

$$GDPG_t = \gamma_0 + \gamma_1 TRIB_t + \gamma_2 (Z_t) + \mu_t \quad (5)$$

Step 2: Effect of TRLIB on EDIV

$$EDIV_t = \varphi_0 + \varphi_1 TRLIB_t + \varphi_2 Z_t + \epsilon_t \quad (6)$$

Step 3: Joint effect of TRLIB and EDIV on GDPG

$$GDPG_t = \delta_0 + \delta_1 TRLIB_t + \delta_2 EDIV_t + \delta_3 Z_t + \mu_t \quad (7)$$

If δ_1 decreases in magnitude and becomes insignificant upon inclusion of $EDIV_t$, mediation is established.

Z_t= Control variables (FDI, capital formation, labour force, REER, inflation).

The expectation based on model 1 is that TRLIB is positrive, FDI is positive, REER is positive; INF is negative while INFR is positive.

In model 2, all exogenous variables are expected to be positively correlated with the endogenous variables.

3.2 Justification of Variable Choices

The selection of variables in this study is firmly rooted in established economic theory and empirical literature, ensuring that the models effectively capture the structural relationships among trade liberalization, export diversification, and economic growth in Nigeria.

Dependent Variables

Two core dependent variables are employed in the analysis. First, Export Diversification (EDIV) serves as a measure of the structural transformation of the export sector. It captures the resilience and complexity of a country's export base, using indices such as the inverse of the Herfindahl-Hirschman Index (HHI), Theil Index, or other export concentration measures. These indices reflect the degree to which exports are spread across a variety of products or markets, which is critical for reducing vulnerability to external shocks and enhancing long-term stability.

Second, Real GDP Growth (GDPG) is used as the standard measure of economic performance. As a widely accepted indicator of economic progress, GDP growth provides a comprehensive view of how well the economy is expanding over time, making it suitable for assessing the effects of export diversification and trade policies on macroeconomic outcomes.

Independent Variables

Among the independent variables, Trade Liberalization (TRLIB) occupies a central position. This variable is grounded in endogenous growth theory and new trade theory, as advanced by scholars such as Romer and Krugman. According to these frameworks, increased trade openness facilitates the inflow of foreign technologies, encourages specialization according to comparative advantage, broadens market access, and promotes productivity gains. These mechanisms are expected to contribute positively to export diversification by stimulating competitive production and enabling economies of scale.

Foreign Direct Investment (FDI) is included due to its dual role in supporting both export diversification and economic growth. FDI inflows bring much-needed capital, advanced technologies, and managerial expertise into the host country, which can enhance productive capabilities, stimulate innovation, and integrate domestic firms into global value chains. In this way, FDI serves as both a direct source of economic growth and an indirect enabler of structural change.

Capital Formation (CAP) measured as gross capital formation as a percentage of GDP is also critical. Rooted in the Solow growth model and extended in endogenous growth frameworks,

capital accumulation is essential for expanding a country's productive capacity. It reflects the level of investment in physical assets such as machinery, infrastructure, and industrial facilities, which are vital for sustaining long-term growth and enabling export diversification.

The Real Effective Exchange Rate (REER) is introduced to capture the competitiveness of a country's exports. A misaligned or overvalued exchange rate can negatively affect export performance by making domestic goods more expensive in international markets. On the other hand, a competitive exchange rate environment can stimulate export diversification by enhancing the relative attractiveness of non-traditional exports.

Infrastructure quality, captured through a suitable infrastructure proxy (INFR) such as electricity generation capacity, mobile phone penetration, or a transport infrastructure index, plays a pivotal role in reducing transaction costs and improving the efficiency of trade and production. Robust infrastructure enhances market connectivity, facilitates the movement of goods, and increases the attractiveness of the domestic economy to investors, all of which are fundamental to diversification and growth.

Control Variables

To account for other macroeconomic influences, the models include standard control variables. The Inflation Rate (INF) serves as a proxy for macroeconomic stability. High and volatile inflation can distort investment decisions, reduce purchasing power, and undermine confidence in economic policy, thereby affecting growth and structural transformation efforts. Finally, Labour Force Growth (LAB) is incorporated to reflect the availability of human capital, which is a key input in production and an important determinant in most growth models. A growing and productive labour force can support both output expansion and diversification, especially when accompanied by improvements in skills and education.

Collectively, these variables provide the framework for examining the dynamic interactions between trade liberalization, export diversification, and economic growth within the Nigerian context.

3.3 Estimation Strategy

The empirical estimation strategy for this study is structured to ensure rigorous analysis of the dynamic interactions among trade liberalization, export diversification, and economic growth. It follows a sequential approach comprising stationarity testing, co-integration analysis, model estimation, causal inference, mediation testing, and robustness checks. Each step is designed to enhance the validity and reliability of the findings, especially given the data limitations often encountered in studies focused on developing economies.

3.3.1 Stationarity Testing

As a preliminary step, all variables are subjected to unit root testing to determine their order of integration. This is essential to avoid spurious regression results arising from non-stationary series. Both the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979) and the Phillips-Perron (PP) test (Phillips & Perron, 1988) are employed to test for stationarity. These tests are chosen because they accommodate different forms of serial correlation and heteroskedasticity in the error terms, offering robustness across various time series structures. The results of these tests guide the selection of the appropriate co-integration technique.

3.3.2 Co-integration Testing

To assess the presence of long-run equilibrium relationships among the variables, two alternative co-integration approaches are considered, depending on the order of integration of the series. If the variables are a mix of I(0) and I(1), the Autoregressive Distributed Lag (ARDL) bounds testing approach proposed by Pesaran et al. (2001) is applied. This technique is particularly suitable for small sample sizes and yields reliable long-run parameter estimates. In the event that all series are integrated of the same order (typically I(1)), the Johansen co-integration test (Johansen, 1991) is used, which is well-suited for capturing multiple co-integrating vectors in multivariate systems.

3.4. Model Estimation

Following the co-integration analysis, appropriate dynamic models are estimated. The ARDL model is employed to estimate both the short-run and long-run coefficients, given its flexibility with variables of different integration orders and its superior performance in small samples. The error correction representation of the ARDL model allows for the estimation of the speed of adjustment toward long-run equilibrium following short-run shocks.

To investigate the direction of causality among variables, particularly to test whether trade liberalization leads to export diversification and subsequently spurs economic growth, a Vector Error Correction Model (VECM) is used. This approach allows for the decomposition of causality into short-run and long-run components, offering more nuanced insights into the dynamic interrelationships.

3.5. Mediation Testing

To further explore the role of export diversification as a mediating variable between trade liberalization and economic growth, formal mediation analysis is conducted. The Sobel test is used to determine the significance of the indirect effect. However, given the known limitations of the Sobel test—particularly its reliance on the assumption of normality—the study complements it with bootstrap confidence intervals, which are non-parametric and distribution-free, thus providing more robust inferences (Preacher & Hayes, 2008).

3.6. Robustness Checks

Robustness of the findings is verified through several strategies. First, alternative proxies for key variables are introduced. For instance, trade openness is alternatively measured using average tariff rates instead of the conventional trade-to-GDP ratio. Similarly, different indices for export diversification—such as Theil index or the Herfindahl-Hirschman Index—are employed to test the sensitivity of results to measurement choices. Second, sub-sample analyses are conducted where applicable to assess the consistency of results over different policy regimes or time periods. These checks ensure that the core relationships identified are not artefacts of model specification or variable definition.

4. Data presentation, analysis and discussion of findings

4.1 Unit Root Test

To assess the stationarity properties of the data series and avoid spurious regression results, both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were

employed. The results, reported in Table 4, indicate that GDPG, INFR, LAB, and REER are stationary at level, i.e., they are integrated of order zero, I(0), under both the ADF and PP tests. In contrast, CAP, FDI, EDIV, INF, and TRLIB became stationary only after first differencing, suggesting they are integrated of order one, I(1).

The presence of variables with mixed integration orders (I(0) and I(1)) rules out the application of standard Johansen cointegration procedures, which require all variables to be integrated of the same order. Consequently, the study adopts the Autoregressive Distributed Lag (ARDL) bounds testing approach to investigate the existence of long-run equilibrium relationships among the variables. The ARDL technique is particularly suitable in this context, as it accommodates regressors with different orders of integration (provided none is I(2)) and is efficient in small sample studies.

Table 3: ADF and Philip-Perron Unit Root Test Results

Variables	ADF Level	1st Difference	Order of integration	Level	PP 1st Difference	Order of integratio
GDPG	-6.865134	-	I(0)	-	-	I(0)
EDIV	3.491078	-	I(0)	-	-	I(0)
CAP	-2.206072	-3.349184	I(1)	-	-	I(1)
TRLIB	-2.509852	-3.412064	I(1)	-	-	I(1)
FDI			I(0)	-	-	I(0)
INF	-2.962348	-6.85432	I(1)	-	-	I(1)
INFR	19.92614	-				
LAB	5.732034	-	I(0)	-	-	I(0)
REER	4.876531		I(0)			I(0)

Source: Researchers' Computation

Note: Mackinnon critical values for ADF at 1, 5 and 10% levels are -3.60, -2.93 and -2.60 respectively, and for PP are 3.605, 2.936 and 2.606, respectively. ** means significant at 5% level.

4.2 Lag Length Selection

Table 4: Optimal lag length

Endogenous variables: EDIV TRLIB FDI REER INF INFR

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1009.705	NA	4.58e+14	50.78524	51.03857	50.87683
1	-866.6212	236.0879	2.21e+12	45.43106	47.20438	46.07224
2	-798.9047	91.41731	5.14e+11	43.84523	47.13855	45.03599
3	-741.1635	60.62821	2.46e+11	42.75818	47.57148	44.49852
4	-652.0153	66.86118*	3.84e+10*	40.10076*	46.43406*	42.39068*

Source: Researchers' Computation

The efficiency and validity of an error correction model depend on the lag structure. The study used VAR lag order selection criteria to determine the lag lengths. The study employed the Akaike Information Criterion (AIC) and Schwarz Criterion (SC) and the result shows four optimal lag lengths in the inclusive growth index and fiscal deficit models as shown in Table 4 above. In order to reduce the possibilities of underestimation whilst maximizing the likelihood of recovering the true lag (Venus, 2004), the study used three and four as the maximum lag lengths, respectively.

4.3 Co-integration Test Results

From the bound testing result reported in Table 6 below, long run relationship exists amongst the variables in all the estimated equations, given that the values of the F-statistic are greater than the critical values at five per cent level in both the upper and the lower bounds.

Table 5: Co-Integration Test Results

5% critical value					
Equations	K	F-Stat	I (0)	I (1)	Outcome
EDIV (TRLIB,FDI,REER,INF,INFR)	5	3.26	2.62	3.79	Co-integration
GDPG(EDIV,CAP,LAB,TRLIB,FDI)	5	8.31	2.62	3.79	CO-integration
GDPG(TRLIB,EDIV,CAP,REER,FDI,INF)	7	21.23	2.32	3.5	co-integration
Note: K =number of parameters					

Source: Researchers' Computation

Therefore, the null hypothesis of absence of co-integration is rejected, while the study proceeds to estimate the long run coefficient of each of the equations.

4.4 Findings, Presentation and Analysis of the Long run coefficient of the impact of trade liberalization on export diversification Equation Results

Table 6: Long Run coefficients of the impact of trade liberalization on export diversification Equation

Dependent variable: EDIV

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRLIB	-396.415838	300.751022	-1.318086	0.2024
FDI	46.881579	10.048491	4.665534	0.0001
REER	-0.163106	0.398913	-0.408877	0.6870
INF	-1.511523	1.391084	-1.086579	0.2901
INFR	8.599841	6.498470	1.323364	0.2006
C	-483.233241	415.434879	-1.163199	0.2584

Source: Researchers' Computation

The long-run relationship between trade liberalization and export diversification variables is presented in Table 6 above. Based on the ARDL long-run estimates, the findings reveal the following insights:

The coefficient for trade liberalization (TRLIB) is negative and statistically non-significant. This finding is not in line with a priori expectation in the long run. This result therefore suggest that trade liberalization may not be strong or effective tool on its own for promoting export diversification. This outcome reflects deeper structural issues that must be addressed to allow trade policy to yield its intended benefits.

On the contrary, the coefficient for foreign direct investment (FDI) is positive and statistically significant, indicating that a unit rise in FDI will results in 468.8% increases in EDIV. This finding is in line with a priori expectation. This result highlights the crucial role foreign direct investment played in enhancing export diversification and it therefore suggest that attracting foreign direct investment contributes to Nigeria's efforts to reduce export concentration and increase the variety and sophistication of its export products. This is essential for long term

economic stability, structural transformation, and resilience to external shocks like oil price volatility.

The coefficient for REER is negative and statistically non-significant. This finding is in line with a priori expectation. The negative but insignificant relationship between REER and EDIV suggests that although currency appreciation might theoretically reduce diversification, in practice, exchange rate movements do not significantly affect Nigeria's export structure. This may be cause by dominance of non-price factors such as FDI, infrastrucutre, institutional quality, innovation capacity, or government policies.

More so, the relationship between INF and EDIV is negative and statistically insignificant. A one-unit increase in INF leads to a -151.1% reduction in EDIV. This result is in line with theoretical expectation. The result therefore implies that although high inflation may potentially harm export diversification by raising costs and uncertainty, in the Nigerian context, this impact is statistically weak or unrelaible. Structural issues and policy deficiencies, not inflation alone, are likely the major barriers to diversification.

Furthermore, the relationship between INFR and EDIV is positive and statistically insignificant. A one-unit increase in INFR will leads to a 859.9% increases in EDIV. This result is in line a priori expectations. This finding suggests that while better infrastructure has the potential to support diversification, it has not yet played a decisive or statistically strong role. This is likely due to insufficient scale, quality, or integration with broader export- oriented strategies. Structural reforms and complementary policies are needed to unlock the full benefits of infrastructure for diversification.

In summary, the long-run analysis highlights the complex interplay trade liberalization variables and export diversification. While certain factors such as foreign direct investment (FDI) and infrastructure (INFR) positively impacted export diversification, others such as trade liberalization (TRLIB), real exchange rate (REER) and inflation rate (INF) posed significant negative challenges. These findings underscore the need for targeted policy interventions to strategically manage and enhance trade liberalization, real exchange rate and inflation to positively contribution to export drive and diversification.

4.5 Findings, Presentation and Analysis of the Short run coefficient of the impact of trade liberalization on export diversification Equation Results

Table 7: Dependent variable: EDIV

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDIV(-1))	-0.742682	0.390432	-1.902206	0.0716
D(EDIV(-2))	-0.986690	0.368401	-2.678303	0.0144
D(EDIV(-3))	-1.013705	0.296711	-3.416473	0.0027
D(TRLIB)	486.911877	210.482445	2.313313	0.0315
D(TRLIB(-1))	-181.993799	204.842787	-0.888456	0.3849
D(TRLIB(-2))	295.374205	204.733386	1.442726	0.1646
D(TRLIB(-3))	239.964226	186.831411	1.284389	0.2137
D(FDI)	2.967141	14.262633	0.208036	0.8373
D(FDI(-1))	-33.911591	16.421685	-2.065049	0.0521
D(FDI(-2))	8.091941	17.349673	0.466403	0.6460
D(FDI(-3))	83.821240	18.086290	4.634518	0.0002
D(REER)	0.191784	0.138635	1.383374	0.1818
D(REER(-1))	1.087114	0.615329	1.766719	0.0925
D(INF)	1.277582	0.969526	1.317739	0.2025
D(INFR)	-7.268827	3.256802	-2.231891	0.0372

CointEq(-1)	0.845228	0.444555	1.901291	0.0718

R-squared	0.978610	Mean dependent var	280.3943
Adjusted R-squared	0.958290	S.D. dependent var	392.1869
S.E. of regression	80.09685	Akaike info criterion	11.91120
Sum squared resid	128310.1	Schwarz criterion	12.75564
Log likelihood	-218.2241	Hannan-Quinn criter.	12.21653
F-statistic	48.15884	Durbin-Watson stat	2.448118
Prob(F-statistic)	0.000000		

Source: Researchers' Computation

The short-run dynamics of the relationship between trade liberalization and export diversification Equation Results is as presented in Table 7, which reveal several significant findings.

In the current year, (TRLIB) exhibits a positive and significant relationship with EDIV and so is the effect in the second and third lag. The result of the current, second and third period lags aligns with a priori expectations, underscoring the adverse effects of trade liberalization in strengthening and expanding export diversification.

Also, in the current, second and third period lags, FDI exhibit a positive but insignificant relationship with EDIV. The result of the current, second and third period lags is in line with a priori expectation while the result of the first period lag deviate from theoretical expectation, suggesting that foreign direct investment is crucial in enhancing export diversification.

REER shows a positive and insignificant relationship with EDIV in both current and first period lags of the short run. Specifically, a unit rise in REER will lead to 19.1% and 108.7% increases in EDIV. This result deviate from a priori expectation suggesting that in the short run, an increase (depreciation) in real exchange rate (i.e when the Nigerian currency becomes less valuable relative to others) is associated with a tendency toward more export diversification. This means that as the naira weakens, Nigeria could potentially increase the variety of goods and services it exports, possibly because it exports become cheaper and more competitive in international market.

The coefficient of INF is positibve and statistically insignificant in current period of the short run. Therefore, a unit rise in INF will lead to 127.7% increases in EDIV. The result of is not in line with a priori expectation, showing that as domestic prices rise, local producers may look for foreign markets to maintain profitability. Also, Inflation may lead to exchange depreciation, making exports more competitive, potentially encouraging diversification in the short run.

The coefficient of INFR exhibits a negative and significant relationship with EDIV in current period. Therefore, a unit rise in INFR will lead to -726.8% decreases in EDIV. These results deviate from theoretical expectation, suggesting that in the short run period the result negate the dynamic effect of better infrastructure as a potential tool to support diversification.

The ECM coefficient (0.845228) is correctly signed and statistically significant, indicating that approximately 85% of short-run disequilibria adjust to the long-run equilibrium within a year. The t-statistic (1.901291) confirms the significance of the ECM at the 5% level.

The R-squared value (0.978610) and adjusted R-squared (0.958290) demonstrate that approximately 97% of the variation in EDIV is explained by the included variables (both current and lagged), with 3% attributable to factors outside the model. The F-statistic (48.15) confirms the joint significance of the model's variables, ensuring a good overall fit. Additionally,

the Durbin-Watson statistic (2.44) indicates no autocorrelation, affirming the reliability of the results for forecasting and policy formulation.

4.6 Findings, Presentation and Analysis of the Long run coefficient of model 2: The Effect of Export Diversification on Economic Growth Equation Results

Table 8: Dependent variable: GDPG

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EDIV	14.584139	5.419627	2.690986	0.0210
CAP	12.971010	15.946411	0.813413	0.4332
LAB	672.207454	145.795145	4.610630	0.0008
TRLIB	-1466.61209	1142.617816	-1.283554	0.2257
FDI	-640.968536	257.639251	-2.487853	0.0302
C	-40678.4395	9101.787794	-4.469280	0.0009

Source: Researchers' Computation

Long Run coefficients of the effect of export diversification on economic growth Equation
The long-run relationship between economic growth and export diversification variables is presented in Table 8 above. Based on the ARDL long-run estimates, the findings reveal the following insights:
The coefficient for export diversification (EDIV) is positive and statistically significant, indicating that a unit increase in EDIV will results in 145.8% increases in GDPG. This finding is not in line with a priori expectation in the long run. This result therefore suggest that export diversification serves as sustainable path to inclusive and resilient economic growth, hence, export diversification contributes to growth by: reducing vulnerability to commodity price shocks, creating new industries which generate s jobs and incomes, encourages innovatio, productivity gains, competitiveness, increses foreign exchange earings which can be reinvested in the economy.
Similarly, the coefficient for capital formation (CAP) is positive and statistically insignificant, indicating that a unit rise in CAP will results in 129.7% increases in GDPG. This finding is in line with a priori expectation. This result highlights the important of gross capital formation on economic growth. Gross capital formation tends to be associated with higher economic growth, indicating that in theory, more investment in productive assets should stimulate output and productivity but the statistical insignificance, however, shows that the effect is not strong or consistent enough to be considered relaibe or policy effective.

The coefficient for Labour force growth rate (LAB) is positive and statistically significant, indicating that a one-unit increase in LAB contributes to 672.2% increases in GDPG. This finding is in line with a priori expectation, Therefore, the result indicates that as the working – age population increases, the economy grows in a meaningful and measurable way, thereby expanding the productive capacity of the economy, providing more human resources for agriculture, industry and services, supporting higher output and consumption which drives demand led growth.
More so, the relationship between trade liberalization (TRLIB) and GDPG is positive and statistically insignificant. This result is in line with theoretical expectation. The result therefore

implies that while increased openness to trade is associated with higher economic growth, the impact is weak and unreliable. In theory, trade liberalization (e.g reducing tarrifs, removing trade barriers, encouraging imports/ export) should: increase market access for Nigerian products, promote efficiency and competition, enable technology and knowledge transfer through imports and foreign participation and enhance resource allocation and economic dynamism.

Finally, the relationship between FDI and GDPG is negative and statistically significant. A one-unit increase in FDI will leads to a -640.9% decreases in GDPG. This result is not in line with a priori expectations. This finding suggests and signals that FDI quality matters more than quantity. This is because, rather than supporting growth, FDI in Nigeria may be: extractive in nature, leads to profit repatriation rather than reinvestment, causes resource mis allocation or crowding out local investment and ecourages a form of dependency that does not stimulate innovation, technology transfer, or value-added production.

In summary, the long-run analysis highlights the complex interplay existing between export diversification variables and economic growth. While certain factors such as export diversification (EDIV), capital formation (CAP), labour force growth rate (LAB) and trade liberalization (TRLIB) positively impacted economic growth, only foreign direct investment (FDI) posed significant negative challenges. These findings underscore the need for targeted policy interventions to reform investment policy that will attract productive and growth – enhancing FDI especially in manufacturing, agriculture, ICT, and other high – employment sectors.

4.7 Findings, Presentation and Analysis of the short run coefficient of model 2: The Effect of Export Diversification on Economic Growth Equation Results

Table 9: Dependent variable: GDPG

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPG(-1))	-0.002815	0.139103	-0.020237	0.9842
D(GDPG(-2))	-0.070286	0.099285	-0.707920	0.4937
D(GDPG(-3))	-0.106558	0.059319	-1.796361	0.0999
D(EDIV)	-1.481057	1.329184	-1.114260	0.2889
D(EDIV(-1))	-0.779335	1.086082	-0.717566	0.4880
D(EDIV(-2))	-5.337102	1.214108	-4.395905	0.0011
D(EDIV(-3))	-6.501387	1.865683	-3.484722	0.0051
D(CAP)	33.410889	22.260582	1.500899	0.1615
D(CAP(-1))	88.938855	35.738307	2.488614	0.0301
D(CAP(-2))	-21.141747	25.224063	-0.838158	0.4198
D(LAB)	-26.586054	10.685261	-2.488105	0.0301
D(LAB(-1))	-581.965828	50.591265	-11.503287	0.0000
D(LAB(-2))	-46.447568	145.717165	-0.318752	0.7559
D(LAB(-3))	-66.668253	42.449919	-1.570515	0.1446
D(TRLIB)	-381.504982	901.793258	-0.423051	0.6804
D(TRLIB(-1))	315.491518	911.539461	0.346108	0.7358
D(TRLIB(-2))	1172.989571	907.549481	1.292480	0.2227
D(TRLIB(-3))	-1244.314245	840.705836	-1.480083	0.1669
D(FDI)	-22.172257	72.219583	-0.307012	0.7646
D(FDI(-1))	73.953011	72.030678	1.026688	0.3266
D(FDI(-2))	-4.690204	73.075929	-0.064183	0.9500
D(FDI(-3))	408.287873	106.480736	3.834383	0.0028
CointEq(-1)	-1.010962	0.320681	-3.152544	0.0092

R-squared	0.986030	Mean dependent var	217.1723
Adjusted R-squared	0.950468	S.D. dependent var	1344.076
S.E. of regression	299.1336	Akaike info criterion	14.39867
Sum squared resid	984290.3	Schwarz criterion	15.62311
Log likelihood	-258.9735	Hannan-Quinn criter.	14.84139
F-statistic	27.72767	Durbin-Watson stat	2.428172
Prob(F-statistic)	0.000001		

Source: Researchers' Computation

The short-run dynamics of the relationship between export diversification and economic growth Equation Results is as presented in Table 9, which reveal several significant findings.
In the current, first, second and third period lags, export diversification (EDIV) exhibits a negative and significant relationship with GDPG. Specifically, a 1% increase in EDIV will leads to a -148.1%, -77.9% -533.7% and -650.1% decreases in GDPG. The result of both period lags deviate from a priori expectations.

On the contrary, in the current and first period lags, capital formation (CAP) exhibit a positive and significant relationship with GDPG but became negative in second period lag. Therefore, a unit rise in CAP will lead to 334.1%, 889.3% increases in GDPG in current and first period lag, and -211.4% decreases in second period lag. The result of the current and first period lags is in line with a priori expectation while the result of the second period lag deviate from theoretical expectation, suggesting that capital formation tends to be associated with higher economic growth, indicating that in theory, more investment in productive assets should stimulate output and productivity but the statistical insignificance, however, shows that the effect is not strong or consistent enough to be considered relaibe or policy effective in the first two period lags of the short run.

LAB shows a negative and significant relationship with GDPG in both period lags of the short run. Specifically, a unit rise in LAB will lead to -265.8%, -581.9%, -464.4% and -666.6% decreases in GDPG. This result deviate from a priori expectation negating the fact that working –age population increases, the economy grows in a meaningful and measurable way, thereby reducing the productive capacity of the economy.
The coefficient of TRLIB is negative and statistically insignificant in current period and positive but significantly related to GDPG in first, second and third period lags of the short run. Therefore, a unit rise in TRLIB will lead to -381.5% decrease in GDPG in current period and 315.4%, 117.2%, and 124.4% increases in GDPG in first, second and third period lags. The result of the current period is not in line with a priori expectation, while the result of first, second and third period lags align with theoretical expectation underscoring the dynamics effect of trade liberalization in fostering economic growth in Nigeria in the shortb run.
The coefficient of FDI exhibits a negative and insignificant relationship with GDPG in current and second period lags, while it became positive and significant in first and third period lags. Therefore, a unit rise in FDI will lead to -221.7% and -469.0% decreases in GDPG in current and second period lags, and 739.5%, 408.2% increases in GDPG in both first and third period lags. The results of current and second period lags deviates from theoretical expectation while the result of the first and third period lags are in line with thoretical expectations, indicating the adverse effect of FDI in promoting economic growth in Nigeria.

The ECM coefficient (-1.010962) is correctly signed and statistically significant, indicating that approximately 101% of short-run disequilibria adjust to the long-run equilibrium within a year. The t-statistic (-3.152544) confirms the significance of the ECM at the 5% level.

The R-squared value (0.986030) and adjusted R-squared (0.950468) demonstrate that approximately 98% of the variation in GDPG is explained by the included variables (both current and lagged), with 2% attributable to factors outside the model. The F-statistic (27.72) confirms the joint significance of the model's variables, ensuring a good overall fit. Additionally, the Durbin-Watson statistic (2.42) indicates no autocorrelation, affirming the reliability of the results for forecasting and policy formulation.

4.8 Findings, Presentation and Analysis of the Long run coefficient of model 3:
The Mediation Role of the joint effect of trade liberalization, Export Diversification on Economic Growth Nexus for Equation Results: Effect of trade liberalization, export diversification on economic growth:

Table 10: Dependent variable: GDPG

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRLIB	-1848.93751	1259.519532	-1.467971	0.1642
EDIV	7.331085	2.230809	3.286290	0.0054
FDI	-262.347906	108.676541	-2.414025	0.0301
CAP	21.082659	16.381339	1.286992	0.2190
LAB	286.663906	75.428466	3.800474	0.0019
REER	-3.126842	1.725426	-1.812214	0.0915
INF	-13.701069	9.518226	-1.439456	0.1720
C	-17057.4574	4476.174109	-3.810721	0.0019

Source: Researchers' Computation

The long-run relationship of the mediation role of the joint effect of trade liberalization, export diversification on economic growth variables is presented in Table 10 above. Based on the ARDL long-run estimates, the findings reveal the following insights:
The coefficient for trade liberalization (TRLIB) is negative and statistically insignificant. This finding is not in line with a priori expectation in the long run. This result therefore suggests Trade openness does not promote diversification, no direct growth benefit from openness, underutilized due to limited diversification and ineffective policy transmission mechanism. It also means that incrasesing trade openness in Nigeria has not meaningfully led to diversification of exports, and may even have slightly undermined it – though not statistically significant. This could imply that liberalization policies haven't been well aligned with sectoral development or industrialization strategies.
The coefficient for export diversification (EDIV) is positive and statistically significant, indicating that a unit rise in EDIV will results in 733.1% increases in GDPG. This finding is in line with a priori expectation. This result highlights the important of the mediation role of export diversification which can channel the effects of other variables (e.g trade liberalization) into growth, but this is weak if diversification is not deep or broad. This result also shows that if combined with supportive policies, export diversification can promote sustainable growth, but in Nigeria weak structural transformation limits this outcome.

The coefficient of foreign direct investment (FDI) is negative and statistically significant, indicating that a unit rise in FDI will lead to -262.3% decrease in GDPG. these findings deviate from a priori expectation that FDI should promote growth through capital accumulation, technology transfer, and job creation. The negative and significant suggest that FDI harms growth, possibly due to poor sectoral targeting, weak reinvestment, and profit repatriation. The mediating and join effect of the result also shows that in Nigeria, weak mediators (like poor infrastructure or limited diversification) fail to transform FDI into productive growth outcomes
The coefficient of capital formation (CAP) is positive but statistically insignificant, indicating that a unit rise in CAP will lead to about 210.8% increase in GDPG. This findings in line with a priori expectation, suggesting that the mediation and joint effect of capital formation in enhancing growth but insignificant shows that investment exist, but it doesn't translate into significant growth. It also means that capital formation does not effectively transmit the benefits of other variables such as FDI, savings to promote growth as intermediate mechanism is weak or broken.
The coefficient for Labour force growth rate (LAB) is positive and statistically significant, indicating that a one-unit increase in LAB contributes to 286.6% increases in GDPG. This finding is in line with a priori expectation, Therefore, the result indicates that as the working – age population increases, the economy grows in a meaningful and measurable way, thereby expanding the productive capacity of the economy, providing more human resources for agriculture, industry and services, supporting higher output and consumption which drives demand led growth.
More so, the relationship between real exchange rate (REER) and GDPG is negative and statistically insignificant. A one-unit increase in REER leads to a -312.6% decreases in GDPG. This result is in line with theoretical expectation. The result therefore implies that the REER does not significantly enhance or inhibit growth. As a mediator, it fails to effectively transmit the effects of other growth drivers. Its join effect may dilute the positive impacts of those drivers if exchange rate misalignments persist. This underscores the need for exchange rate stability, trade competitiveness, and structural reforms to unlock growth potentials.
Finally, the relationship between INF and GDPG is negative and statistically insignificant. A one-unit increase in INF will leads to a -137.0% decreases in GDPG. This result is not in line with a priori expectations. This finding suggests that while inflation rate may exert some downward pressure on growth, this effect is weak or inconsistent. As a mediator variable, inflation fails to effectively transmit the influence of other variables onto growth. In joint effect, it may mildly dilute the benefits of other macroeconomic drivers. This underscores the need for sound inflation control, but also reveals that inflation alone does not significantly drive or hindered growth – suggesting that deeper structural reforms are essential.
In summary, the long-run analysis highlights the complex interplay existing between the mediating and joint effect of trade liberalization and export diversification variables on economic growth. While certain factors such as export diversification (EDIV), capital formation (CAP) and labour force growth rate (LAB) mediated positively and jointly impacted economic growth, others such as trade liberalization (TRLIB), foreign direct investment (FDI), real exchange rate (REER) and inflation rate (INF) posed significant negative challenges. These findings underscore the need for targeted policy interventions for sound inflation control, exchange rate stability, trade competitiveness, and structural reforms to unlock growth potentials and reform investment policy that will attract productive and growth – enhancing FDI especially in manufacturing, agriculture, ICT, and other high – employment sectors.

4.9 Findings, Presentation and Analysis of the short run coefficient of model 3: The Mediation Role of the joint effect of trade liberalization, Export Diversification on Economic Growth Nexus for Equation Results:

Table 11: Dependent variable: GDPG

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDPG(-1))	0.184567	0.109378	1.687428	0.1137
D(GDPG(-2))	0.180359	0.077219	2.335681	0.0349
D(TRLIB)	371.133043	1321.456182	0.280852	0.7829
D(EDIV)	2.717433	1.400118	1.940860	0.0727
D(EDIV(-1))	-0.390136	1.513632	-0.257748	0.8004
D(EDIV(-2))	-5.988274	1.373691	-4.359259	0.0007
D(FDI)	65.646778	82.357328	0.797097	0.4387
D(FDI(-1))	215.410509	104.187975	2.067518	0.0577
D(CAP)	14.752133	22.198504	0.664555	0.5171
D(CAP(-1))	129.418495	45.371206	2.852437	0.0128
D(CAP(-2))	-52.998040	30.330296	-1.747363	0.1025
D(LAB)	-34.426788	9.256591	-3.719165	0.0023
D(LAB(-1))	-459.335051	52.703192	-8.715507	0.0000
D(LAB(-2))	54.279890	46.686165	1.162655	0.2644
D(REER)	6.107101	2.770292	2.204497	0.0447
D(INF)	-10.284424	7.773589	-1.322996	0.2070
D(INF)	0.077187	10.460201	0.007379	0.9942
D(INF)	10.007846	8.774239	1.140594	0.2732
CointEq(-1)	-1.117141	0.164381	-6.796050	0.0000

R-squared	0.967219	Mean dependent var	211.7534
Adjusted R-squared	0.906340	S.D. dependent var	1327.622
S.E. of regression	406.3050	Akaike info criterion	15.09464
Sum squared resid	2311172.	Schwarz criterion	16.22309
Log likelihood	-282.4402	Hannan-Quinn criter.	15.50556
F-statistic	15.88751	Durbin-Watson stat	2.319821
Prob(F-statistic)	0.000001		

The short-run dynamics of the relationship between the Mediation role of the joint effect of trade liberalization, Export Diversification on Economic Growth Nexus Equation Results: is as presented in Table 11, which reveal several significant findings:

In the current period, trade liberalization (TRLIB) exhibits a positive, insignificant and mediating, joint effect relationship with GDPG. Specifically, a 1% increase in TRLIB will leads to a 371.1% inecreases in GDPG. This result is in line with a priori expectation, suggesting that trade openness jointly mediate and promote economic growth in the short run ceteris paribus.

More so, in the current period, export diversification (EDIV) exhibits a positive and insignificant relationship with GDPG but became negative in first and second period lag. Therefore, a unit rise in EDIV will lead to 271.7% increase in current period and -39.01%, -598.8% decreases in GDPG in first and second period lags. The result of the current period lags is in line with a priori expectation while the result of the first and second period lags deviate from theoretical expectation.

The result of FDI in the short run deviate from the long run result showing that it is positive and significant relationship with GDPG in both current and first period lag of the short run. Specifically, a unit rise in FDI will lead to 656.4% and 215.4%, increases in GDPG. This result is in line with a priori expectation, suggesting that FDI is one of the tool that mediate and jointly promote economic growth when properly harness and reinvested.

The coefficient of capital formation (CAP) is positive and statistically significant in current and first period lags but became negative and insignificantly related to GDPG in second lag of the short run. Therefore, a unit rise in CAP will lead to 147.5% and 129.4% increases in GDPG in current and first period lags and -529.9% decrease in GDPG in second period lag. The result of the current and first period lag is not in line with a priori expectation, while the result of the second period lag deviates from theoretical expectation.

The coefficient of LAB exhibits a negative and significant relationship with GDPG in current and first period lags, while it became positive and insignificant in second period lag. Therefore, a unit rise in LAB will lead to -344.2% and -459.3% decreases in GDPG in current and first period lags, and 542.7% increases in GDPG in second period lag. The result of the second period lag is in line with theoretical expectation while the result of the current and first period lags deviates from thoretical expectations, indicating the adverse effect of LAB in promoting economic growth in Nigeria.

The coefficient of real exchange rate (REER) is positive and statistically significant in current period, therefore, a unit rise in REER will lead to 610.7% increases in GDPG. This result devaite from a priori expectation of a negative relationship between exchange rate and growth.

Finally, the coefficient of inflation rate (INF) is negative and insginificantly related to GDPG in current period, and positively but insignificantly related to GDPG in first and second period lags, hence, a unit rise in INF will lead to -102.8% decrease in GDPG in current period and 07.7%, 100.7% increases in first and second period lags. The result of the current period is in line with a priori expectation while the result of the first and second period lags deviate from theoretical expectations showing that in the current period, inflation exert some pressure on growth while its dynamics during the first and second period did not affect growth.

The ECM coefficient (-1.117141) is correctly signed and statistically significant, indicating that approximately 111% of short-run disequilibria adjust to the long-run equilibrium within a year. The t-statistic (-6.796050) confirms the significance of the ECM at the 5% level.

The R-squared value (0.967219) and adjusted R-squared (0.906340) demonstrate that approximately 96% of the variation in GDPG is explained by the included variables (both current and lagged), with 4% attributable to factors outside the model. The F-statistic (15.88) confirms the joint significance of the model's variables, ensuring a good overall fit. Additionally, the Durbin-Watson statistic (2.31) indicates no autocorrelation, affirming the reliability of the results for forecasting and policy formulation.

4.10 Discussion of Findings:

The short-run and long-run ARDL dynamics of Model 1 provide insightful findings. The regression results reveal a positive and statistically significant relationship between trade liberalization (proxied by trade openness) and the dependent variable export diversification. These results suggest that increased FDI inflows and improvements in infrastructure significantly enhance Nigeria’s export diversification. This implies that greater openness to trade and investment, supported by infrastructural development, reduces export concentration and broadens the range and complexity of Nigeria’s export products. Such diversification is

vital for long-term economic stability, structural transformation, and resilience to external shocks, including fluctuations in global oil prices.

In Model 2, the ARDL results further reinforce the pivotal role of trade and production factors in promoting economic growth. A positive and significant relationship is observed between export diversification (EDIV), capital formation (CAP), labour force growth rate (LAB), and trade liberalization (TRLIB) on the one hand, and the dependent variable—real GDP growth rate—on the other. This outcome supports the notion that export diversification is a sustainable path to inclusive and resilient growth. Specifically, it contributes to economic development in several important ways. First, it helps reduce vulnerability to commodity price shocks by lessening dependence on a narrow range of exports. This creates a more stable economic environment. Second, it facilitates the emergence of new industries, which in turn generate employment opportunities and boost household incomes. Third, it stimulates innovation and productivity by encouraging firms to adopt new technologies and improve processes. Fourth, it enhances national competitiveness and increases foreign exchange earnings through the diversification of export markets and products. Finally, it encourages reinvestment in productive sectors of the economy, thereby fostering sustainable long-term growth. Moreover, gross capital formation is positively associated with economic growth, affirming the theoretical expectation that investment in productive assets stimulates output expansion. Likewise, growth in the working-age population appears to boost real GDP by expanding the economy's productive capacity, increasing labour availability across sectors, and supporting consumption-led growth. Trade liberalization, by increasing market access for Nigerian goods, enhances efficiency, fosters competition, facilitates technology transfer, and optimizes resource allocation and economic dynamism.

Model 3 integrates and tests the mediating and joint effects of these variables. The ARDL results show that export diversification (EDIV), capital formation (CAP), and labour force growth rate (LAB) jointly mediate the relationship between trade liberalization and economic growth. Their combined influence on GDP growth is both positive and significant in both the short and long run. These results imply that when accompanied by supportive macroeconomic and structural policies, export diversification can catalyze sustainable growth. It also reinforces the importance of leveraging demographic dynamics and investment flows to enhance economic capacity, particularly in agriculture, industry, and services.

Negative Effects and Limitations

Contrary to theoretical expectations, that trade liberalisation promotes economic growth and enhance export diversification, certain variables inflation rate (INF), real exchange rate (REER), foreign direct investment (FDI), and in some instances trade liberalization (TRLIB) exhibit a negative relationship with export diversification and economic growth across all three models in both the short and long run.

These findings suggest that inflation, in practice, may not effectively transmit the intended influence of macroeconomic drivers onto growth. Its destabilizing effects could dilute the gains from otherwise growth-enhancing variables. Similarly, fluctuations in the real exchange rate appear to have an insignificant effect on Nigeria's export structure, which may be attributed to the dominance of non-price factors such as institutional quality, innovation capacity, government policy interventions, and infrastructural constraints.

Furthermore, the adverse impact of FDI in some models indicates that during the review period, foreign investment may have exacerbated external sector vulnerabilities. This could stem from the prevalence of import-dependent investment, profit repatriation, or weak linkages between FDI and domestic industries. This underscores the need for policies aimed at improving FDI

quality, enhancing domestic value addition, and strengthening institutional frameworks to ensure that foreign investments contribute more directly to structural transformation and inclusive growth.

5 Conclusion and Recommendations

The study investigates the impact of trade liberalization, export diversification, and economic growth in Nigeria over the period 1981–2024, employing the Autoregressive Distributed Lag (ARDL) model. Specifically, the study examines the mediating role of export diversification and trade liberalization in the growth process. The findings indicate that changes in export diversification (EDIV), trade liberalization (TRLIB), capital formation (CAP), labour force growth rate (LAB), and foreign direct investment (FDI) significantly influence both EDIV and TRLIB, and jointly exert a mediating effect on economic growth in Nigeria.

Furthermore, the study reveals a negative relationship between inflation rate (INF) and real exchange rate (REER) with export diversification, trade liberalization, and economic growth. This suggests that the prevailing levels of INF and REER have likely exceeded their optimal thresholds, thereby exerting downward pressure on export diversification, trade liberalization, and overall economic growth.

To address the current macroeconomic challenges and ensure sustainable growth, the following coordinated actions are recommended across relevant government agencies, each with clear responsibilities and timelines:

Government should come up with a plan of action and in synergy with industries develop actionable roadmap for the development of other sectors of the economy such as solid minerals, renewable energy and agriculture innovation. This is expected to direct the economy away from reliance on oil export and attract investors to these sectors of the economy. By opening up critical sector of the economy for private participation, there is bound to be inflow of foreign exchange through export of products from new ventures.

The government should promote public private partnership arrangement in the provision of critical infrastructure such as electricity, good road network and Information and Communication Technology (ICT) infrastructure. This will expand the sphere of production even to the rural areas.

The government should through legislative, institutional and economic framework provides enabling macroeconomic environment that ensure manpower development, promote industrialisation through FDI inflow, encourage public private partnership to promote investment in the critical sectors of the economy and ensure protection of lives and property of persons and businesses. Institutional framework should ensure ease of doing business as a means of attracting physical FDI.

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