



DRIVERS OF ECONOMIC DIVERSIFICATION IN NIGERIA: DO FINANCIAL DEVELOPMENT, OIL RENTS, FOREIGN DIRECT INVESTMENT AND EDUCATION MATTER?

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ABSTRACT

This study empirically investigates the determinants of economic diversification in Nigeria, examining both domestic production and export structures from 1980 to 2023. Economic diversification is operationalized through two proxies: the proportion of non-oil GDP and the UNCTAD Export Diversification Index. The Autoregressive Distributed Lag (ARDL) modelling technique is employed to estimate both short-run dynamics and long-run equilibrium relationships, accounting for the mixed order of integration of the variables. The analysis explicitly incorporates structural breaks identified by the Bai-Perron test, which correspond to major economic and political events, to ensure robust parameter estimation. The bound test results confirm stable long-run cointegrating relationships for both diversification measures. The findings indicate that oil rents and foreign direct investment (FDI) inflows exhibit a negative long-run impact on economic diversification, corroborating the resource curse hypothesis. In contrast, domestic credit availability is identified as a significant positive determinant of non-oil GDP contribution. Technology adoption demonstrates a dual effect: a short-run negative impact transitions into a positive long-run influence on diversification. Human capital development, proxied by expected years of schooling, is a consistent positive driver, whereas physical capital formation shows a significant negative relationship with diversification. A key divergence is observed between the determinants of domestic economic diversification and export diversification. The results show the structural impediments posed by hydrocarbon dependence and highlight the critical roles of financial sector development, technological advancement, and human capital accumulation in facilitating a structural transformation of the Nigerian economy.

Keywords: Economic Diversification, Oil Rents, Financial Development, Foreign Direct Investment, Education, ARDL

JEL Classification: O11, O16, F21, Q33, I25

1.0 INTRODUCTION

Globally, economies striving for macroeconomic stability and resilience against external shocks have broadened their productive base to secure sustained growth. Several once-developing economies among them the United Arab Emirates, Malaysia, Taiwan, Singapore, and Indonesia have successfully transitioned toward diversified and industrialized structures through strategic investment in tourism, manufacturing, education, finance, and technology. These countries



reduced their dependence on natural resources and are now classified as high-income or upper-middle-income by international benchmarks (World Bank, 2022).

Economic diversification denotes a shift from heavy dependence on a narrow set of industries toward a wider range of economic activities, thereby lessening vulnerability to internal and external shocks (World Bank, 2023). Such a spread of activities can spur innovation across sectors, raise global competitiveness, and lift growth (Doe, 2022; Usman, 2022). Historically, developing economies have depended on a limited array of primary products, which exposed them to global price swings and macroeconomic instability (IMF, 2023; World Bank, 2023; African Development Bank [AfDB], 2023).

Both scholars and policymakers recognize that broadening the productive base is vital for economic progress, particularly in developing economies (International Monetary Fund [IMF], 2014). Diversification involves enlarging the range of productive activities to stimulate growth and raise living standards. Economies that achieve such breadth tend to record lower unemployment, inequality, and poverty, along with greater resilience and stronger growth prospects (Hvidt, 2022). By contrast, resource-rich countries that remain undiversified often enjoy spurts of early growth but then face persistent vulnerability and instability that endanger long-term sustainability (Hvidt, 2022; Riti et al., 2015).

However, with the realization of the benefit of broadening the productive base of their economies, governments, economists and policymakers across the globe have focused on implementing economic diversification strategies to address macroeconomic challenges in their countries (Nguyen & Adeyemi, 2024). Some of the measures includes boosting investments in key growth sectors and enhancing integration into global value chains. These efforts are essential for fostering innovation and achieving sustainable economic growth (Osei & Mensah, 2023). This is in addition to promising steps taken to reduce reliance on primary goods and enhance economic resilience through investment in technology, agriculture, and service sectors (African Development Bank, 2022).

Nigeria possesses abundant natural resources and for decades has depended heavily on its oil sector for foreign exchange and public revenue. Although oil makes up less than 10 per cent of GDP, it supplies more than 75 per cent of export earnings and close to half of government income (National Bureau of Statistics [NBS], 2024). Consequently, disruptions in the global oil market directly unsettle Nigeria's macroeconomic conditions (African Development Bank, 2022). Before commercial petroleum production began, agriculture and solid minerals provided about 85 per cent of foreign exchange and roughly 68 per cent of GDP (World Bank, 2022). The economy at that time was largely self-sufficient in food, sustained low unemployment, maintained price stability, and was a net exporter of agricultural commodities (Abang & Oweng, 2022).

The discovery of petroleum in commercial quantity in Nigeria in the 1960s indeed shifted the country's focus toward the expanding oil industry, it is important to recognize that this transition does not necessarily imply a complete neglect of agriculture and other sectors. Instead, the growth of the oil sector has provided opportunities for diversification and investment in various industries (Adeleke, 2021). However, the overdependence on oil has posed challenges for



economic stability, making it crucial for Nigeria to find a balance between leveraging its oil resources and revitalizing agriculture and manufacturing to ensure sustainable development across all sectors of the economy (Ogunleye & Eze, 2023). As at 2022, petroleum accounts for 79.77 percent of the total export according to National Bureau of Statistics (2022). Furthermore, most of these revenues were allegedly mismanaged and spent unproductively.

Fiscal dependence on oil has not been actively reduced, as oil proceeds still supply more than half of total government revenue and the bulk of export earnings. Although oil revenue as a share of federal government revenue fell from above 80 per cent in 2005 to about 50 per cent in 2019 (International Monetary Fund [IMF], 2020), this shift indicates only limited progress in insulating the economy from oil price and macroeconomic shocks. Petroleum still represents roughly 5.5 per cent of GDP and about 92 per cent of the value of exports (National Bureau of Statistics, 2022), pointing to the country's persistent heavy reliance. This over-dependence has constrained the expansion of non-oil sectors, limiting their capacity to generate significant revenue and broaden the production base.

The resulting structural imbalance leaves Nigeria's fiscal position acutely exposed to external shocks, such as the sharp oil price declines of recent years. For example, despite ambitious targets, crude oil output averaged only 1.55 million barrels per day in 2024, short of the budgeted 1.78 million barrels per day, generating crude oil revenue of about ₦50.88 trillion (\$32.91 billion) (Nigerian Upstream Petroleum Regulatory Commission [NUPRC], 2025). While the revenue surge relative to earlier years reflects higher prices and some capacity gains, it also underlines the economy's continued oil dependence. The apparent diversification in revenue sources is deceptive; non-oil revenue remains weak, and fiscal policies have not built adequate savings or investment to nurture non-oil activities (World Bank, 2020). As a result, persistent fiscal deficits have emerged, eroding economic stability and limiting the government's ability to fund infrastructure and social services.

Nigeria's pursuit of economic diversification is closely linked to oil rents, financial development, education, and foreign direct investment. Oil rents have long shaped Nigeria's fiscal and external revenue base, as crude oil remains a major source of government income and export earnings. This dependence has exposed the economy to oil price shocks and has limited the growth of non-oil sectors, especially agriculture, manufacturing, and services. The World Bank (2022) reported that oil dominance, weak investment, and slow movement into higher-productivity activities have held back Nigeria's economic diversification. Similarly, Suberu et al. (2015) argued that Nigeria's reliance on oil revenue has weakened the productive base of the economy, while Esu and Udonwa (2015) showed that diversification is linked with economic growth in Nigeria. These studies suggest that oil revenue can support development only when it is directed toward productive non-oil activities rather than recurrent spending and further expansion of the extractive sector.

Financial development is also central to diversification because non-oil sectors require steady access to credit, investment finance, and payment systems that support production and trade. Adeola and Evans (2017) found that financial inclusion had a positive and statistically meaningful effect on economic diversification in Nigeria, while financial development had a positive but weaker effect. This shows that the availability of finance alone is not enough; the



financial system must also reach households, firms, and small businesses that operate outside the oil sector. In this sense, domestic credit to the private sector can support diversification when it is directed toward agriculture, agro-processing, manufacturing, services, and small and medium-sized enterprises.

Education remains an important factor because diversification requires workers with the skills needed for modern production, technology use, business management, and service delivery. Hanushek and Woessmann (2020) linked education quality and knowledge capital with long-run growth, stressing that skills matter more than school attendance alone. For Nigeria, this is important because the World Bank's Human Capital Index report shows a gap between expected years of schooling and learning-adjusted years of schooling, meaning that many years spent in school do not always translate into strong learning outcomes (World Bank, 2020). As a result, education can support diversification when it improves skills that are useful in non-oil sectors such as manufacturing, finance, digital services, agribusiness, and entrepreneurship.

Foreign direct investment can also shape Nigeria's diversification path, depending on the sectors that receive it. If FDI remains concentrated in oil and gas, it may reinforce dependence on the extractive sector. However, when foreign investment flows into manufacturing, agriculture, technology, transport, and services, it can provide capital, new production methods, managerial skills, and access to foreign markets. Alugbuo (2023) found that FDI and non-oil exports are important to Nigeria's economy, while Manasseh et al. (2023) linked FDI and oil revenue with economic growth in Nigeria. These findings show that FDI should not only be measured by volume, but also by its sectoral direction. Therefore, policies that guide FDI toward non-oil activities are more likely to support export diversification and reduce Nigeria's exposure to oil market instability. Therefore, this study aims to examine the collective effects of oil rents, financial development, education, and foreign direct investment as key drivers of economic diversification in Nigeria.

Nigeria's own policy record sharpens the puzzle. Successive programmes, from the National Economic Empowerment and Development Strategy (NEEDS) to the Economic Recovery and Growth Plan, have named diversification as a foremost goal, yet the results have stayed limited. This study therefore sets out to determine how oil rents, financial development, education, and foreign direct investment each shape economic diversification in Nigeria between 1980 and 2023. Its main addition is to treat the four drivers together within a single empirical study, rather than one at a time, so as to show how each works on diversification.

By showing how oil rents, financial development, education, and foreign direct investment shape economic diversification, the study aims to inform evidence-based policy that directs resources toward productive non-oil sectors and reduces Nigeria's exposure to oil. The remainder of the paper is organised as follows. Section 2 reviews the literature on economic diversification and its drivers, Section 3 outlines the methodology, including the data sources and estimation technique, Section 4 presents and discusses the results, and Section 5 concludes and provides the policy recommendations.



2.0 LITERATURE REVIEW

2.1 Conceptual Review

Economic diversification refers to the movement of an economy away from dependence on a narrow set of sectors toward a broader and more resilient productive base. The IMF (2014) frames it as a transition that lowers volatility and widens employment across sectors, while the World Bank (2023) describes a shift from heavy reliance on one or two industries to a wider spread of activity that reduces exposure to external shocks. Anyaehie and Areji (2015) put the same idea in more practical terms, treating diversification as the broadening of economic activity through the production and distribution of a wider range of goods and services, which steadies an economy against commodity-price swings. For oil-exporting economies such as Nigeria, the term carries a sharper meaning: cutting the weight of crude oil in output, revenue, and exports so that long-neglected sectors such as agriculture, manufacturing, and services can carry more of the load (Mbaegbu, 2016; Ugwu et al., 2021).

Several authors are careful to note that the process is not only about spreading risk. Owan et al. (2020) treats diversification as a way of lifting annual output by investing across sectors, so that a shock in any one of them does no lasting damage to the whole. Gulesh et al. (2023) push the point further, arguing that the aim is not merely to escape the fragility of a monoculture but to raise the standard of living. The United Nations (2016) holds both ideas together, defining diversification as a move from a single resource base to multiple income sources across the primary, secondary, and tertiary sectors, with the explicit goals of creating jobs and reducing poverty.

Four structural factors recur throughout this literature as drivers or constraints of diversification, and they form the core of the present study. The first is financial development, understood as the deepening and growing efficiency of financial institutions and markets. By lowering the costs of information, transactions, and enforcement, a developed financial system mobilises savings and channels them toward productive investment, improving the allocation of capital in ways that both growth and diversification require (Levine, 2005; Beck, Demirgüç-Kunt, & Levine, 2007; World Bank, 2016). The second is education, the foundation of human capital. Becker (1962) and Schultz (1961) cast it as an investment that raises productivity and adaptability, and later work ties it to innovation and to the structural change that diversification depends on (Romer, 1990; Hanushek & Woessmann, 2021). The third factor, oil rents, is the most ambiguous of the four. Defined as the surplus of production value over extraction cost (World Bank, 2024), oil rents sit at the heart of the resource-curse debate: Sachs and Warner (2001) and Auty (1993) link resource wealth to weaker diversification and governance, yet Matallah and Matallah (2020) counter that sound institutions can redirect the same rents into productive investment. Foreign direct investment is the fourth. Its value lies less in capital as such than in the technology and managerial knowledge it carries (Borensztein, De Gregorio, & Lee, 1998) and in its contribution to export competitiveness and to integration into global value chains (Markusen, 1995; UNCTAD, 2014), though these gains depend heavily on the quality of domestic institutions (Harding & Javorcik, 2007).

2.2 Theoretical Framework

The theoretical debate begins with the structuralist account of Prebisch (1950) and Singer (1950), who argued that countries exporting primary commodities to industrial economies face a long-



run deterioration in their terms of trade. Because the demand for raw materials grows more slowly than income, commodity-dependent economies were thought to be locked into slow and unstable growth unless they built up domestic manufacturing (Bleaney & Greenaway, 2001). The policy conclusion was diversification toward industry. Later evidence has largely been read as consistent with this view; Cadot et al. (2007), for instance, find that low-income countries actively widen their export base as they develop. The experiences of Malaysia, Singapore, and the United Arab Emirates complicate the picture, showing that specialisation need not be a trap when it is paired with deliberate industrial upgrading.

If the structuralists explain why diversification matters, the staples theory explains why it is so hard to achieve. Innis (1954) described how an economy built on the export of unprocessed resources can become trapped, with the extractive sector operating as an enclave cut off from the rest of production. Hirschman (1977) sharpened the argument through the idea of linkages: backward links to local suppliers, forward links to domestic processing, and fiscal links through public revenue. Where these connections are weak, resource wealth does not spread. Nigeria fits the pattern almost exactly. Most of the machinery and expertise used in oil production is imported, and crude is exported with little domestic refining, leaving the sector largely disconnected from the wider economy (Oyejide & Adewuyi, 2011).

Portfolio theory offers a complementary logic. Building on Markowitz (1959), it treats a national economy much like an investment portfolio, where spreading activity across sectors lowers the variance of returns for any given level of growth. The reasoning behind the old warning against putting every egg in one basket is simply that a more diversified economy is less sensitive to a shock in any single market (Bauer & Deller, 1997). The present study, however, is anchored in endogenous growth theory, associated with Romer (1990, 1994), which locates the sources of long-run growth inside the economy, in human capital, knowledge, and innovation, rather than in exogenous technical change. Because investment in education and research generates spillovers and escapes the diminishing returns that constrain physical capital, sustained growth becomes possible, and public policy on education, infrastructure, and competition can lift the growth path (Aghion & Howitt, 1998). Within this framework the study reads its main macroeconomic variables, the exchange rate, inflation, interest rate, unemployment, and output, as forces that shape the accumulation and productivity of capital and labour and, through them, the pace at which Nigeria can diversify away from oil.

2.3 **Empirical Literature**

The empirical record on Nigerian diversification is large but uneven. One strand asks which sectors might carry the economy beyond oil, and the answer shifts with the sector under study. Agriculture is the most frequently nominated candidate, valued for its capacity to feed domestic industry, generate savings, and earn foreign exchange (Abba, 2018; Umeji, 2019; Muhammad et al., 2020; Adesoye et al., 2018). Others find a meaningful role for manufacturing and industrialisation (Mbaegbu, 2016; Madichie et al., 2018), for tourism and hospitality (Omodero, 2019; Awode, 2022), for solid minerals (Edeme & Nkalu, 2019; Abayomi & Olufemi, 2022), and for small and medium enterprises and ICT (Egbulonu & Ejike, 2018; Agu & Nwankwo, 2020). These findings rarely line up neatly. Omodero (2019) reports a strong positive



contribution from tourism, while Awode (2022) concludes that the sector has consistently underperformed, and Daluma and Saleh (2017) find that telecommunications and agriculture aid diversification even as manufacturing drags against it. Studies that treat the non-oil sector as a whole tend to converge on a single qualification: expanding into resource-based activity is a necessary condition for diversification but not a sufficient one, because the form that diversification takes matters as much as its scale (Obafemi, 2022; Ideh et al., 2021). Esu and Udonwa (2015) reach a similar conclusion, pointing to the non-oil real sector, industrialisation, and sustained agricultural development as the most promising routes out of oil dependence.

A second strand turns to macroeconomic and financial drivers. Nwokoye et al. (2019) find that credit from the financial sector, improved infrastructure, lower lending rates, and higher domestic investment move diversification forward, while resource dependence, exchange-rate depreciation, and the size of the oil economy hold it back. Abang and Oweng (2022) report that money supply and capital formation help, even as exchange-rate movements work against growth, an inverse exchange-rate effect that surfaces again in Owan et al. (2020). Ayobola et al. (2018) add a temporal wrinkle, finding that export diversification raises growth with a lag while depressing it in the current period, and arguing that Nigeria's constraints are more institutional than structural. On finance specifically the evidence splits cleanly: Adeola and Evans (2017) find that financial inclusion supports diversification while broader financial development shows no significant effect, and Owolabi et al. (2023), working across thirty-seven sub-Saharan economies, find financial development largely insignificant once other factors are held constant. Several studies that look directly at the diversification-growth link, including Adegbe et al. (2023) and Olatunji and Adekunle (2024), report significant positive effects, with the former tying them to tax revenue and fiscal sustainability. Methodologically, most studies rely on ARDL, error-correction and vector autoregressive models. Although these approaches are appropriate for time-series analysis, many applications assume stable relationships and therefore give limited attention to structural shifts over time.

Running alongside this work is a closely related literature on why diversification has proved so stubborn in practice. The recurring obstacles are familiar. An entrenched dependence on oil that both government and private investors find more immediately profitable than the alternatives (Adenikinju, 2020); weak infrastructure, particularly unreliable power and poor transport, which raises production costs and discourages industry (Anyahie & Areji, 2015; Okpalaoka, 2021); governance failures and corruption that distort the allocation of resources and erode investor confidence (Azoro et al., 2021); a shortage of skilled labour traceable to an education system poorly matched to industrial needs; and, more recently, insecurity across several regions that has disrupted agriculture, trade, and extraction alike (Ezeoha, 2019). These constraints help explain why the sectoral potential identified in the studies above has so rarely translated into measurable structural change.

2.4 **Research Gap**

These studies share a set of blind spots. Most isolate a single factor, whether oil rents, financial development, education, or FDI, and very few combine them within one model, even though the

resource-curse literature implies that they interact, with human capital and institutional quality deciding whether resource wealth helps or harms (Gelb, 2010; Isukul et al., 2019). Nwokoye et al. (2019) show that several determinants change both sign and magnitude between the short and the long run, precisely the behaviour that static estimators cannot capture. The record is also tilted toward the oil sector and toward sectoral output, which leaves the joint and dynamic influence of oil rents, financial development, education, and foreign direct investment on diversification largely unmeasured. This is the gap the present study sets out to fill. Given Nigeria's continued exposure to oil-price volatility and the pressing need to build a workable post-oil economy, estimating the effects of these four factors jointly and dynamically promises a clearer account of what genuinely drives diversification and what only appears to.



3.0 METHODOLOGY

This section provides the method used to analyse the data in this study.

3.1 Sources of Data and Measurement of Variables

The study utilizes annual time-series data for the period 1980–2023. Data are obtained from reputable international and national statistical sources to ensure reliability and comparability. The primary dependent variables are Export Diversification Index (used as a measure of economic diversification in the first model) and the Non-oil GDP contribution (used in the second model for robustness check). The explanatory variables include oil rents, domestic credit to the private sector, electricity consumption per capita, foreign direct investment (FDI) net inflows, total factor productivity (TFP), capital stock, and expected mean years of schooling.

Table 1: Measurement of Variables and Source of Data

Variables	Description	Source of data
Export Diversification Index (EDI)	UNCTAD index measuring the degree of export concentration. It is based on Herfindahl-Hirschman Index (0–1 scale). Values closer to 0 indicate greater diversification	UNCTAD
Non-oil GDP Contribution (NOGDP)	Share of non-oil GDP in total GDP (%)	CBN Statistical Bulletin
Oil Rents (OR)	Total oil rents as a percentage of GDP	WDI
Financial Development (FD)	Domestic credit to private sector as a percentage of GDP	WDI
Electricity Consumption (EC)	Per capita electricity consumption (kWh)	WDI
Foreign Direct Investment (FDI)	Foreign direct investment net inflows (current US\$)	WDI
Education (EDU)	Average number of years a child entering school can expect to receive	UNDP Human Development Report
Capital (K)	Physical capital stock at constant 2017 national prices (millions of US\$)	Penn World Table
Technology (TEC)	Total factor productivity (TFP) is a proxy for the technology	Penn World Table

Source: Authors' Computation

3.2 Model Specification

This study adopts the structural transformation theory (STT), which posits that economies transition from reliance on primary sectors to more diversified and productivity-driven sectors through the reallocation of resources, technological advancements, and institutional shifts (Herrendorf et al., 2014). The study examines how macroeconomic variables such as oil rents (OR), financial development (FD), capital (C), total factor productivity (TEC), electricity



consumption (EC), foreign direct investment (FDI), and education (EDU) influence Nigeria's economic diversification.

3.2.1 **First Model: Export Diversification Model (EDI)**

The first model examines the relationship between the explanatory variables and the Export Diversification Index (EDI), a key measure of economic diversification. The equation for the first model is specified as:

$$EDI_t = \alpha_0 + \alpha_1 OR_t + \alpha_2 FD_t + \alpha_3 EC_t + \alpha_4 FDI_t + \alpha_5 C_t + \alpha_6 TEC_t + \alpha_7 EDU_t + \epsilon_t \text{ ----(1)}$$

Where:

- EDI_t is the Export Diversification Index at time t .
- OR_t are oil rents as a percentage of GDP at time t .
- FD_t is domestic credit to the private sector as a percentage of GDP at time t .
- EC_t is per capita electricity consumption (kWh) at time t .
- FDI_t are foreign direct investment net inflows (current US\$) at time t .
- C_t is physical capital stock at constant 2017 national prices (millions of US\$) at time t .
- TEC_t is total factor productivity (proxy for technology) at time t .
- EDU_t are average years of schooling a child entering school can expect to receive at time t .
- ϵ_t is the error term.

3.2.2 **Second Model: Non-Oil GDP Contribution Model (Robustness Check)**

The second model focuses on the contribution of non-oil GDP as a percentage of total GDP, examining the role of key macroeconomic variables. This model serves as a robustness check to ensure the reliability of the results from the first model. The equation for the second model is:

$$Non - Oil GDP_t = \beta_0 + \beta_1 OR_t + \beta_2 FD_t + \beta_3 EC_t + \beta_4 FDI_t + \beta_5 C_t + \beta_6 TEC_t + \beta_7 EDU_t + v_t \text{ ----- (2)}$$

Where:

- $Non - Oil GDP_t$ is the share of non-oil GDP in total GDP at time t .
- The other variables are defined as previously.
- v_t is the error term.

3.3 **Estimation Technique**

This study conducts structural break analysis to identify significant breaks, then stationary tests follow. After the tests, the study conducts ARDL bound testing, and estimates short and long-run effects of the explanatory variables within the ARDL framework.

3.3.1 **Stationarity Tests**

Unit root tests are conducted to determine the order of integration of each series, as ARDL requires variables to be $I(0)$ or $I(1)$, but not $I(2)$. Two complementary stationarity tests are employed: Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP). ADF is extended version of Dickey–Fuller test through the inclusion of lagged differences of the dependent variable to account for higher-order autocorrelation. This reduces bias from serial correlation in the errors. Second, PP modifies the Dickey–Fuller test by using a non-parametric correction to the test statistic to account for serial correlation and heteroskedasticity in the error terms, without adding lagged difference terms as in ADF.





3.3.2 Structural Break Tests

To account for potential regime shifts, the Bai and Perron (2003) multiple breakpoint test is applied to detect unknown structural breaks in the time series. This approach estimates break dates by minimizing the sum of squared residuals across potential partitions of the data. The identified breakpoints are later incorporated into the ARDL models as dummy variables in the “with breaks” specification. Also, Zivot-Andrews tests for a unit root by allowing for a structural break in the data at an unknown point in the time series.

3.3.3 ARDL Bounds Testing

ARDL bound test developed by Pesaran et al. (2001) is used for testing the existence of cointegration, that is, the existence of long-run relationship among the variables in the model. This is done by testing the null hypothesis stating there is no cointegration against the alternative hypothesis simply by comparing the test F-statistic with critical value. If the F- statistic is greater than the upper bound critical value at a level of statistical significance, it can be concluded that there is cointegration in the model. When the F-statistic is below the lower boundary of critical value, it is concluded that there is no cointegration. However, an F- statistic higher than the lower bound critical value but less than the upper bound value, then the result is considered inconclusive.

The ARDL bounds test is employed to test for the presence of a long-run relationship among variables. This method is appropriate given the mixed order of integration and the small sample size. The bounds F-test is conducted for both specifications: without breaks and with breaks through the use of structural break dummies identified in Section 3.3.2. Estimate an unrestricted ARDL ($p, q_1, q_2, \dots, q_k$) in **levels** for dependent variable Y_t and regressors $x_{1t}, x_{2t}, \dots, x_{kt}$ as in equation (2)

$$Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{j=1}^k \sum_{m=0}^p \beta_{jm} X_{jt-m} + \varepsilon_t \quad (2)$$

Where: Y_t is the dependent variable; X_t is a vector of regressors; α_0 is the intercept; p, q are lag orders; and ε_t is the error term. **Bounds** test the joint null that the coefficients on the *level* (lag-0) long-run parameters are zero: $H_0: \lambda_1 = \lambda_2 = \dots = \lambda_k = 0$.

Where λ are the coefficients on the lagged levels. Rejecting H_0 (F-statistic > upper bound) implies the existence of a long-run relationship.

3.3.4 ARDL Short and Long-run Dynamics

The autoregressive distributed lag (ARDL) framework begins with an unrestricted error correction model (UECM) specified as in equation (3):

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-i} + \sum_{j=1}^k \sum_{m=0}^{q-1} \beta_{jm} \Delta X_{jt-m} + \Pi_Y Y_{t-1} + \sum_{j=1}^k \Pi_X X_{jt-1} + \mu_t \quad (3)$$

The Δ terms capture short-run dynamics (differences and their lags); the coefficients Π_Y and Π_X are the long-run level coefficients (jointly tested in the bounds test). The error correction term (ECT) is written as in equation (4):

$$ECT_{t-1} = (\Pi_Y Y_{t-1} + \sum_{j=1}^k \Pi_X X_{jt-1}) \quad (4)$$

Thus, error **correction** mechanism (ECM) can be re-specified as in equation (5):

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-i} + \sum_{j=1}^k \sum_{m=0}^{q-1} \beta_{jm} \Delta X_{jt-m} + \lambda ECT_{t-1} + \mu_t \quad (5)$$

Where $\lambda=1$ if normalization is maintained as above, or more commonly λ is estimated directly (it should be negative and significant).

The ARDL bounds-testing approach is widely used because it can estimate relationships among variables that are integrated of order zero, I(0), order one, I(1), or a combination of both, provided that none of the variables is integrated of order two, I(2). Unlike conventional cointegration procedures such as the Johansen method, which generally require the variables to be I(1), the ARDL approach is more flexible and often performs well with relatively small samples. It also allows short-run dynamics and long-run relationships to be estimated within a single framework (Pesaran et al., 2001; Nkoro & Uko, 2016).

4.0 RESULTS AND DISCUSSION

This section presents the results of the study.

4.1 Summary Statistics of the Variables

Table 2 presents the summary statistics of the variables, this includes the number of observations, mean, standard deviation, minimum and maximum values.

Table 2: Summary Statistics

Variables	Mean	Max.	Min	Std. Dev.	Skewness	Kurtosis	J-B (PV)
EDI	0.819	0.924	0.735	0.063	0.334	1.558	0.167
NOGDP	90.123	97.277	81.880	4.408	0.009	1.894	0.325
OR	11.558	28.705	1.574	6.401	0.551	2.753	0.310
FD	9.590	19.626	4.958	3.516	0.871	3.350	0.055
EC	119.736	219.235	50.481	33.971	0.600	3.956	0.115
FDI	7.727	10.128	4.942	1.696	-0.138	1.606	0.157
EDU	0.823	1.092	0.622	0.153	0.319	1.579	0.108
C	2.38E+09	8.84E+09	-7.39E+08	2.53E+09	1.186	3.356	0.005
TEC	2595093	3115441	1802466	329639.3	-0.307	2.284	0.443

Source: Authors' Computation using EViews

Table 2 shows that the average proportion of non-oil sectors to GDP is 90.12%, with a relatively small gap in terms of range (82% to 97%) and low standard deviation (4.408). This indicates that non-oil sectors dominate the GDP but oil and gas subsector still contributes significantly to the



GDP, ranging from 10 to 19% of the GDP over the years. The near-zero skewness (0.009) and kurtosis of 1.894 indicate a symmetric and platykurtic distribution. The insignificant of Jarque-Bera (J-B) test implies normality of the distribution.

The average export diversification index of 0.82 suggests dominance of a single product in the exports. This is accompanied by modest disparity, ranging from 0.735 to 0.924, and low standard deviation of 0.063. Although skewness indicates a slight rightward tail, while the low kurtosis (1.558) suggests lighter tails than a normal distribution; the J-B test shows that the observation is normally distributed. Oil Rents exhibit higher volatility (std. dev. 6.401) due to fluctuating global prices, with positive skewness (0.551) and moderate kurtosis (2.753).

Domestic credit and electricity consumption (kWh per capita) average about 10% and 120 kWh per capita within the period under study. They show positive skewness, which mean the distributions are right-skewed, with the latter showing higher peakedness (kurtosis 3.956). Expected years of Schooling is nearly symmetric (reflected by skewness of -0.138), while Total Factor Productivity (TFP) and FDI exhibit mild right-skewness. Notably, FDI has a significant J-B statistic, implying abnormality of the distribution. Capital Stock is left-skewed with a platykurtic distribution.

4.2 **Result Presentation**

Table 3: Stationarity Tests

Variables	ADF		Phillips-Perron	
	Level			
	Only Intercept	Intercept & Trend	Only Intercept	Intercept & Trend
ED	-2.528	-1.292	-2.386	-2.138
EDI	-1.527	-3.240*	-1.527	-3.266*
NOGDP	-1.744	-2.153	-3.871***	-3.884**
OR	-2.378	-3.566**	-2.011139	-3.387**
FD	-2.067	-3.021	-1.970	-3.021
EC	-1.432243	-1.190	-2.320	-3.322*
FDI	-5.053***	-9.157***	-3.879***	-7.224***
EDU	-0.950	-2.112	-0.926	-1.889
C	-0.955	-1.771	-0.654	-2.628
First Difference				
ED	7.352***	7.701***	-8.668***	-13.052***
EDI	-7.661***	(-7.589***)	-9.141***	-9.556***
NOGDP	-7.774***	-7.800***	-----	-----
OR	-5.911***	-----	-12.642***	-----
FD	-7.646***	-7.675***	-7.926***	-8.288***
EC	-11.047***	-11.011***	-11.258***	-11.473***
FDI	-----	-----	-----	-----
EDU	-4.917***	-4.903***	-4.905***	-4.892***
C	-3.925***	-3.858***	-3.775***	-3.704***

Source: Author's Computation using EViews. *** p<0.01, ** p<0.05, * p<0.1.

Note: ED means Economic Diversification



In Table 3, the ADF test indicates that export diversification index (Exp. Div.), domestic credit, and total factor productivity (TFP) are only stationary after first differencing. These imply that they are integrated of order one, $I(1)$. The PP test confirms the ADF results, with most variables showing stationarity at first difference, indicating robustness of the stationarity test. This finding is consistent with the ADF and PP results, which also show that the variables are integrated of order one, $I(1)$, after differencing.

Table 4: ARDL Bound Testing Results for Export Diversification Models

	I(0)	I(1)
1%	3.599	5.23
5%	2.597	3.907
10%	2.196	3.37
F-Statistics (Without Break)	26.314***	
F-Statistics (With Break)	7.820	

The bound test results in Table 4 shows strong evidence of cointegration for Nigeria's export diversification model, with the F-statistic of both specifications significantly exceeding the upper critical bounds at all significance levels. This confirms the existence of stable long-run relationships between export diversification and its determinants, even when accounting for structural breaks. While the relationship remains statistically significant in both specifications, the substantially lower F-statistic in the break model suggests structural shifts have meaningfully altered the strength of this long-run equilibrium over time.

Table 5: Export Diversification Index in Nigeria

Product Dominance	Without Breaks		With Breaks	
	Short Run	Long Run	Short Run	Long Run
(Product Dominance) _{t-1}	-1.491*** (0.142)		0.180* (0.083)	
OR/OR	0.005*** (0.0002)	0.007* (0.002)	0.0007 (0.0004)	-0.0004 (0.001)
(OR) _{t-1}	-0.005*** (0.0002)		0.001** (0.0004)	
(OR) _{t-2}	-0.002*** (0.0002)			
FD/FD	0.008*** (0.0003)	0.007* (0.002)	0.004*** (0.001)	0.0004 (0.001)
(FD) _{t-1}	-0.007*** (0.0003)			
EC/EC	0.0003*** (3.46E-05)	0.001* (0.0002)	0.0004*** (0.0001)	0.0006*** (0.0002)
(EC) _{t-1}	-0.0006** (4.12E-05)		-0.0002** (0.0001)	
ln(FDI)/ln(FDI)	0.004*** (0.0004)	-0.025** (0.005)	0.0007 (0.001)	-0.009*** (0.003)



(ln(FDI)) _{t-1}	0.031*** (0.001)		0.011*** (0.002)	
(ln(FDI)) _{t-2}	0.010*** (0.001)			
ln(C)/ln(C)	2.452*** (0.067)	0.991* (0.275)	1.730*** (0.196)	0.337* (0.163)
(ln(C)) _{t-1}	-0.421** (0.067)			
(ln(C)) _{t-2}	-1.308*** (0.077)			
EDU/EDU	-0.119*** (0.004)	-0.069** (0.011)	-0.095*** (0.011)	-0.044*** (0.008)
(EDU) _{t-1}	0.065*** (0.004)			
TEC/TEC	0.791*** (0.024)	-0.184* (0.052)	0.366*** (0.068)	-0.249*** (0.041)
(ln(TEC)) _{t-1}	-0.059 (0.045)		0.127 (0.088)	
(ln(TEC)) _{t-2}	0.104** (0.025)			
Break/Break			-0.006 (0.004)	-0.014** (0.006)
ECT _{t-1}	-1.491*** (0.043)		-1.705*** (0.136)	
Constant		-12.371*** (3.902)		-3.297 (2.341)
Observations		34	34	
Adj. R-squared		0.993	0.908	
B-G Serial		0.103	0.108	
B-G Het.		0.7874	0.643	
Ramsey RESET		0.073*	0.514	
Normality		0.379	0.367	
VIF		14.09	12.94	
Log-likelihood		161.36	117.60	

Source: Author's Computation using EViews.
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5 presents short- and long-run determinants of export diversification in Nigeria. In the table, oil rents have varying contemporaneous effects on export diversification index. While the level changes in the oil rents significantly reduce the dominance of few products in the export basket; the first and second lagged changes in the oil rents have significantly increase the dominance of a product. However, oil rents' effects show consistent and positive effects when breaks are controlled as only the lagged changes in the rents have positive and significant in the specification with breaks. In the long run, oil rents appear to improve the dominance of fewer products in the export basket by 0.007 points but the variable is negative and not significant in

specification with breaks. In the same token, domestic credit has contemporaneous effects as its level changes negatively and significantly affect the diversification while its first lagged changes are negative and significant. However, the specification with breaks shows that the level changes in domestic credit are positive and significant. In the long run, domestic credit is consistently positive.

Electricity consumption is observed to have similar pattern of relationship with export diversification as domestic credit as well. It raises a product's dominance in the export bundle by 0.0004 and 0.0006 points in both specifications respectively. In Table 5, FDI shows a paradoxical pattern with positive contemporaneous effects but negative long-run impacts, indicating that while FDI may boost dominance of a product in the export bundle initially, it tends to diversify the bundle over time as it curtails the dominance of a product in the bundle. Again, initially capital stock has reducing contemporaneous effect on a product dominance in the export bundle but it contemporaneously increases the dominance. However, the short-run effects become positive in the specification with breaks. The effects remain positively significant in the long run in both specifications at least at 10%.

Increased expected years of schooling immediately initially enhance the product dominance but later reduces the dominance. The variable continues to improve the product dominance in the export bundle even in the long run. Finally, technology improves a product dominance in the short run but it reduces the dominance in the long run. All the error correction terms are negatively significant, affirming the long-run relationship. Overall, the models have passed most of the diagnostic tests such as serial correlation, heteroscedasticity and normality tests but fail to pass Ramsey RESET and multicollinearity tests.

Table 6: ARDL Bound Testing Results for Non-Oil GDP Contribution Models

	I(0)	I(1)
1%	3.383	4.832
5%	2.504	3.723
10%	2.131	3.223
F-Statistics (Without Break)	5.815***	
F-Statistics (With Break)	5.579**	

Source: Author's Computation using EViews. *** $p < 0.01$

The ARDL bound test results show a strong long-run cointegrating relationship between non-oil GDP and its determinants, as evidenced by F-statistics (5.815 without break and 5.579 with break) exceeding the upper I(1) critical values at all significance levels. This strong evidence of cointegration persists even when accounting for structural breaks, though with a slightly lower F-statistic in the break model, which suggests these events may have weakened the long-run equilibrium relationship.

Table 7: ARDL Results on Determinants of Non-Oil GDP Proportion in Nigeria (Robustness check)

Non-Oil GDP (OGDP) _{t-1}	Without Breaks		With Breaks	
	Short Run	Long Run	Short Run	Long Run
(OGDP) _{t-1}	0.477*** (0.108)		0.456*** (0.106)	
OR/OR	-0.293*** (0.061)	-0.105 (0.131)	-0.270*** (0.055)	-0.204* (0.110)
(OR) _{t-1}	0.258*** (0.066)		0.319*** (0.066)	
(OR) _{t-2}	-0.096** (0.045)			
FD/FD	0.388*** (0.121)	0.702*** (0.207)	0.388*** (0.117)	0.675*** (0.197)
EC/EC		0.032 (0.022)		0.031 (0.021)
ln(FDI)/ln(FDI)	-0.361* (0.189)	-2.477*** (0.500)	-0.394** (0.182)	-2.070*** (0.429)
(ln(FDI)) _{t-1}	1.355*** (0.274)		1.133*** (0.256)	
(ln(FDI)) _{t-2}	0.931*** (0.240)		0.705*** (0.224)	
ln(C)/ln(C)		-81.227*** (23.500)		-78.081*** (22.243)
EDU/EDU		3.565** (1.404)		3.403** (1.328)
TEC/TEC	14.847 (8.744)	29.133*** (7.662)	1.213 (8.065)	22.817*** (6.358)
(ln(TEC)) _{t-1}	-6.166 (9.835)		-3.666 (9.610)	
(ln(TEC)) _{t-2}	-30.485*** (7.590)		7.408*** (-3.521)	
Break/Break				-0.663 (0.546)
ECT _{t-1}	-0.979*** (0.115)		-1.045*** (0.116)	
Constant		1333.161*** (340.823)		1277.952*** (322.467)
Observations		41		41
Adj. R-squared		0.835		0.837
B-G Serial		0.2609		0.415
B-G Het.		0.6264		0.135
Ramsey RESET		0.518		0.275
Normality		0.027**		0.058*
VIF		7.85		7.04
Log-likelihood		-61.971		-62.324

Source: Author's Computation using EViews.
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1



Table 7 present short- and long-run determinants of non-oil GDP proportion in Nigeria. The short-run results reveal oil rents have varying contemporaneous effects on non-oil GDP contribution across models with and without breaks. For instance, the level change in the rents have significant and negative effects at 1% but the first lagged changes raise the non-oil GDP contribution at 10% significance level. In the long run however, oil rents reduce non-oil GDP contribution by 0.11 and 0.20 points in the models without and with breaks respectively. The variable is only significant at 10% in the model with breaks. Similarly, FDI show similar pattern as oil rents, having different contemporaneous effects, as its level changes negatively affect non-oil GDP but the first lagged changes in FDI turnout to be positively significant across all the two specifications in the short run. In the long run, FDI appears to discourage the diversification as it lowers the contribution by 2.1-2.5 points in the respective specifications. Interestingly, domestic credit has consistently and significantly (at 1%) increased non-oil GDP contribution by 0.39 points in the short runs of both models.

Again, domestic credit remains positively significant in the long run with even larger coefficient of about 0.70 and 0.68 points across the models. This points to the importance of access to finance for private sector to drive economic diversification in Nigeria. While the second lagged changes in technology are negative and significant (at 1%) in the specification without breaks; the lagged changes are positive and significant (at 1%) in the model with breaks. This means structural breaks distort the effects of technology. In the long run, however, technology seems to be consistent and positively significant across all the specifications, for it raises the contribution by 29.1 and 22.8 points respectively. The error correction terms indicate rapid adjustment to long-run equilibrium, as disturbances annually reduce by 98 and 105% respectively. In the long run, capital stock shows unexpectedly negative and significant effects as it leads to reduction in the non-oil contribution by 81.2 and 78.1 points across the specifications respectively. On the contrary, expected years of schooling significantly (at 5%) boosts non-oil contribution by 3.6 and 3.4 points in the respective specifications.

Table 7 depicts that both specifications have strong explanatory power reflected by adjusted R^2 of about 84% and that the specifications pass key diagnostic tests for serial and heteroscedasticity. The Ramsey RESET test shows no omitted variable bias while though normality tests show some skewness or abnormality in the distribution. Variance inflation factors show no serious multicollinearity problem as the values are all below the critical threshold of 10.

4.3 **Discussion of Findings**

The preceding analysis of non-oil GDP contribution model without breaks and that of export diversification with breaks reveal that several key findings about the determinants of economic diversification in Nigeria. First, oil rents and FDI inflows initially appear to support economic diversification (as measured by non-oil GDP contribution) through their lagged effects, but this relationship reverses over time, ultimately exerting negative impacts on diversification in both the short and long run. Second, domestic credit demonstrates consistently positive effects on non-oil GDP contribution, with its beneficial influence growing stronger as we move from short-run to long-run analysis. Third, while technology shows a negative short-run effect on diversification, this transforms into a positive long-run impact. Finally, the results highlight a



divergence between capital formation, which significantly reduces economic diversification, and education (expected years of schooling) that consistently enhances it.

The negative impacts of oil rents in both the short and long run, signal a structural dependence or crowding-out effect where continued reliance on oil revenue may hinder broader economic diversification efforts. This is in line with concerns about the "resource curse," where resource wealth may discourage diversification by favoring extractive industries at the expense of others. This finding resonates with that of Matallah (2020). Similarly, the negative impact of inward FDI may reflect the likelihood that majority of FDI flows to oil and gas subsector in Nigeria. Adams (2009) posit that FDI in resource-rich economies often targets extractive sectors, exacerbating dependence. This aligns with the finding of Jolo, Ari and Koç (2022). Auty (2001) and Sachs and Warner (2001), also stressed the problem of "resource curse" and how FDI into extractive sectors often fails to stimulate broader economic development.

The short and long-run positive impacts of domestic credit highlights the importance of a functioning financial sector that provides credit to non-oil businesses and industries, thereby facilitate investment, production, and growth that promote diversification away from oil reliance. The finding aligns with that of Shawtari et al. (2024) but contradicts that of Jolo, Ari and Koç (2022) that observe negative effects.

The fact that technology's impact exhibits a short-run negative effect on economic diversification; this might have suggested the transitional adjustment costs or the lag in effective technology adoption in non-oil sectors. Nevertheless, this effect switches to a positive impact in the long run, which reveals that technological advancement is ultimately crucial for sustained diversification by enhancing productivity, innovation, and competitiveness. In another perspective, the transformation of technology's impact from negative in the short run to positive in the long run reflects a learning curve or adaptation period required for technological adoption to yield productivity gains, as proposed by Romer's (1990) endogenous growth theory. This finding is in line with Owolabi et al. (2023), which establish that fixed-line telephone, and ICT imports significantly reduced economic diversification in Nigeria

The negative effect of capital formation might also reflect the concentration of investments in oil-related infrastructure or capital-intensive sectors that do not promote broad-based economic activity. On the other hand, the long-run positive impact of expected years of schooling highlights that education fosters human capital development, equipping the workforce to participate in diverse economic sectors, thereby underpinning broader diversification.

Robustness checks further validate these patterns while revealing additional insights. The analysis confirms that oil rents and FDI inflows tend to reinforce product concentration in exports, undermining diversification efforts. Technology's dual role is also confirmed, with its initial negative effect on diversification giving way to positive long-term impacts. When examining export diversification specifically, the results show technology initially increases product dominance before ultimately reducing it. Education's positive role is reaffirmed, as it reduces product dominance in both time horizons. As in the former model, capital formation also discourages the export product diversification. In contrast to non-oil GDP contribution model, domestic credit and electricity consumption show negative effects on export diversification



(contrasting with their positive role in the non-oil GDP model). Again, FDI is also observed to be promoting export product diversification in the long run.

5.0 SUMMARY AND CONCLUSION

This study set out to identify the main drivers of economic diversification in Nigeria, measured by non-oil GDP contribution, and the results reveal a clear tension in the country's growth model. Oil rents and foreign direct investment raise non-oil GDP contribution at first, through their lagged effects, but this relationship reverses over time, producing negative effects on economic diversification in both the short and long-run. Rather than seeding a broader economy, oil earnings and the investment they attract appear to crowd it out, a pattern consistent with the resource curse and with the view that Nigeria's heavy reliance on oil works against the diversification it is meant to support.

The financial and human capital channels are more encouraging. Domestic credit has a positive effect on non-oil GDP contribution that strengthens from the short run to the long run, which marks access to finance as one of the more reliable means of expanding activity in the non-oil sector. Education, measured through expected years of schooling, is positive throughout and supports diversification through human capital development. Technology presents a dual effect: its short-run impact is negative, a likely reflection of transitional costs or adoption lags, yet it becomes positive and significant in the long run as productivity and innovation gains accumulate.

Capital formation is the one result that runs counter to expectation. Instead of supporting diversification it has a negative effect, which may reflect the misallocation of capital towards oil-linked or non-inclusive infrastructure rather than the inclusive, productivity-raising assets a broader economy requires. Set against the consistent support from education, the contrast suggests that the problem lies less in the volume of investment than in its allocation.

Wholistically, the findings indicate that economic diversification in Nigeria depends on the structure and nature of its key drivers rather than their presence alone. Oil rents and FDI may help in the short term, but absent redirection into productive non-oil sectors they remain structurally inhibitive over the long term. A functioning financial system sustains the shift, as does steady investment in skills; technology also matters, though only once the early adoption costs are absorbed. Moving away from oil dependence is necessary, but it is not sufficient on its own. The greater challenge is ensuring that finance, investment, and innovation reach the sectors capable of carrying the economy once oil no longer does.

These findings translate into several policy directions. The most immediate is to steer oil revenues and incoming FDI towards manufacturing, agro-processing, and services rather than further extractive capacity, supported where appropriate by targeted incentives such as tax holidays. Because domestic credit is among the few drivers that help consistently, widening SME access to finance in the non-oil economy, through targeted credit facilities and stronger financial inclusion, warrants a high place among priorities. The weak return on capital formation is reason to tie public and private investment, infrastructure included, to value-chain development in non-oil sectors rather than to projects that deepen reliance on oil. Realising the long-run gains from technology will require deliberate support for ICT adoption and digital



infrastructure across agriculture, industry, and services, while the steady return to education strengthens the case for vocational and technical training matched to the skills a diversified economy requires. Beneath all of this, structural reforms that reduce the economy's reliance on oil, such as revising energy pricing and easing the cost of doing business, would allow the other measures to take effect.

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