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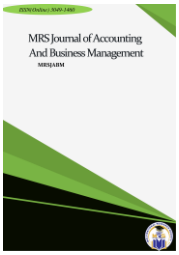

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ADVANCING ECONOMIC GROWTH IN NIGERIA THROUGH SECTORAL DIVERSIFICATION: THE IMPACT OF MANUFACTURING AND AGRICULTURE

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Abstract: Nigeria's economic development has long been constrained by its overdependence on crude oil exports, resulting in persistent macroeconomic instability, high unemployment, sluggish industrial growth, and vulnerability to global oil price fluctuations. This study examines the role of the agricultural and manufacturing sectors in promoting economic diversification and development in Nigeria, using annual time series data from 1981 to 2023. The quantile regression approach is employed to evaluate the differential impacts of sectoral outputs on economic performance across various GDP levels, offering deeper insights beyond mean-based estimations. The results indicate that Agricultural sector output (ASO) has a positive and statistically significant impact on GDP at the 1% level, indicating that growth in agriculture supports overall economic development and diversification in Nigeria. Manufacturing sector output (MSO) also shows a positive and significant relationship with GDP at the 5% level, highlighting the important role of manufacturing in driving economic growth and structural transformation. Interest rates (INT) have a negative and statistically significant effect on GDP, suggesting that higher borrowing costs discourage investment and consumption, thereby hindering economic growth. The quantile process indicates that the impact of agricultural output (ASO) varies across income quantiles: it is insignificant at lower quantiles (0.10 and 0.25), but becomes positive and significant at the median (0.50) and upper-middle quantile (0.75), with a diminishing effect at the highest quantile (0.90). Interest rates (INT) consistently show a negative effect across all quantiles, but are only statistically significant at the median quantile (0.50), implying the strongest adverse impact on economic growth occurs around the middle income levels. Manufacturing output (MSO) positively influences GDP across all quantiles, though insignificant at the lowest quantiles (0.10 and 0.25). Its effect is significant and strongest at higher quantiles (0.75 and 0.90), indicating manufacturing becomes more crucial for economic growth in more advanced income segments. The Wald test for symmetry indicates no evidence of asymmetry in the relationships. The study recommends that Government should prioritize agro-processing and digital innovation sectors through targeted incentives, as this showed significant growth in gross domestic product over the years under review.

Keywords: *Economic diversification, manufacturing and agricultural sectors.*

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Introduction

Nigeria, endowed with vast natural resources especially crude oil has struggled for decades to convert its oil wealth into sustainable and inclusive economic development. The country's heavy dependence on oil exports has rendered its economy vulnerable to external shocks, particularly the volatility of global oil prices, leading to recurrent macroeconomic instability, revenue shortfalls, and slow progress in structural transformation. In response, economic diversification has become a critical strategic priority to stabilize the economy and foster inclusive growth. Economic diversification refers to expanding the variety of productive activities and income sources, especially in non-oil sectors like agriculture, manufacturing, services, and technology (IMF, 2014; Olayemi, 2020). It helps build economic resilience by reducing reliance on oil, creating jobs, boosting exports, and ensuring long-term sustainability (Fasanya & Olayiwola, 2020; Omoju, 2016). Manufacturing and agriculture stand out among the non-oil sectors due to their potential to stimulate broad-based economic activity, attract investments, and foster inclusive development.

Manufacturing, as a pillar of modern economic development, is vital for value addition, job creation, and foreign exchange earnings. However, in Nigeria, the sector suffers from numerous structural weaknesses such as inadequate infrastructure, poor access to credit, high production costs, unreliable power supply, and a shortage of skilled labor. Compounding these problems is Nigeria's overdependence on oil, which has

historically led to policy neglect and underinvestment in manufacturing (Oluwatobi & Olubiyi, 2018; Adebayo & Omotayo, 2019). Nevertheless, the sector has the capacity to process local raw materials, reduce imports, enhance exports, and support a diversified industrial base. Historically, Nigeria's manufacturing sector thrived under import substitution strategies post-independence but declined following the 1970s oil boom, which redirected government priorities towards oil exports (Ajakaiye & Fakiyesi, 2009; Iyoha & Oriakhi, 2002). The influx of oil revenue contributed to rent-seeking and Dutch Disease, making local manufacturing uncompetitive. More recently, the government has launched initiatives like the National Industrial Revolution Plan (NIRP), improved financing via the Bank of Industry, and invested in infrastructure to revive the sector (Federal Ministry of Industry, Trade and Investment, 2014; Adegbite & Ayadi, 2021; Oyelaran-Oyeyinka & Olojede, 2020; Ekpo, 2017). Despite these efforts, barriers such as policy inconsistency, poor coordination, and weak infrastructure persist.

Similarly, the agricultural sector once the backbone of Nigeria's economy before the oil boom has significant potential for economic transformation. Agriculture provides employment to a large share of the population, particularly in rural areas, and contributes raw materials to manufacturing. Prior to oil discovery, agricultural exports such as cocoa, palm oil, and cotton were major foreign exchange earners. However, oil-led neglect has resulted in low productivity, poor investment, and an increasing reliance on food imports (Adebayo & Omotayo, 2019; Akinlo, 2016). This has exacerbated food insecurity, trade imbalances, and economic instability. Agricultural diversification and agro-processing offer promising avenues for inclusive growth. The sector is relatively stable compared to oil, and its development can meet rising domestic and export demand. Initiatives like the Anchor Borrowers' Program and NALDA aim to improve productivity by providing financing, modern inputs, and access to technology (Okunmadewa & Adebayo, 2020; Aliyu & Sulaimon, 2021). However, challenges such as poor infrastructure, outdated techniques, and limited access to finance for smallholder farmers continue to inhibit growth. Nigeria's economy remains over-reliant on crude oil, which accounts for over 85% of foreign exchange and nearly 50% of government revenues (CBN, 2022; World Bank, 2023). This has created a fragile economic base, evident in recurrent recessions during oil price crashes in 2016 and 2020 (IMF, 2022). As a result, manufacturing and agriculture have been neglected, with agriculture employing 35% of the workforce but contributing only 23.7% to GDP, and manufacturing contributing just 8.4% far below the 25–35% seen in diversified economies (NBS, 2023; UNIDO, 2022).

These sectoral underperformances contribute to Nigeria's high unemployment (over 40% youth unemployment), poverty (40.1% poverty rate), and trade deficits. Manufacturing remains uncompetitive due to poor power supply, inadequate finance, and inconsistent policies (Akinlo & Adejumo, 2019), while agriculture suffers from low mechanization, high post-harvest losses, and weak infrastructure (FAO, 2021; Ogunniyi et al., 2020). Policy initiatives like NIRP and ATA have not yielded expected results due to poor implementation, funding gaps, and coordination issues (Oni & Akinbobola, 2017).

Nigeria's lack of economic diversification has led to severe socio-economic challenges, visible in high unemployment and poverty levels. Youth unemployment exceeds 40% (NBS, 2022), and over 82 million people 40.1% of the population live below the poverty line (World Bank, 2022). The economy suffers a persistent trade deficit due to its dependence on imports for both consumer and industrial goods, while exporting mainly unprocessed raw materials. Once a central part of the post-independence industrial strategy, the manufacturing sector has deteriorated due to inadequate infrastructure, unreliable electricity, poor access to affordable financing, and weak institutional frameworks (Akinlo & Adejumo, 2019). This has rendered local industries uncompetitive, reinforcing Nigeria's import dependence and stalling domestic value chain development.

The agricultural sector, despite employing millions, faces significant structural limitations. Mechanization levels remain low at under 1.5 hp/ha well below the global average of 2.5 hp/ha while post-harvest losses reach 40% due to outdated farming methods and poor infrastructure, including rural roads, irrigation, and storage facilities (FAO, 2021; Ogunniyi et al., 2020). Although programs like the National Industrial Revolution Plan (NIRP) and Agricultural Transformation Agenda (ATA) were introduced to address these issues, results have been limited by weak implementation, inadequate funding, and poor coordination (Oni & Akinbobola, 2017). This continued underperformance of manufacturing and agriculture has deepened structural imbalances, resulting in inflation, exchange rate instability, and widening inequality (Olaleye & Adeleke, 2021). To address these challenges, there is an urgent need to examine the barriers to growth in these sectors and develop policy frameworks that can drive Nigeria toward a more resilient, inclusive, and diversified economy. Following the introduction, section two is review of similar studies, methodology and data issues are explained in section three. Section four provides data analysis and discussion of results. Section five concludes and proffers policy recommendations.

Theoretical Framework

The theoretical underpinning of this study on Nigeria's economic diversification through agriculture and manufacturing is anchored on two core economic development theories: **Structural Change Theory Structural Change Theory** posits that economic development is driven by a reallocation of resources from low-productivity sectors (such as traditional agriculture) to high-productivity sectors (such as manufacturing and modern services). This theory provides a foundation for understanding the imperative of shifting Nigeria's economic base from oil dependence to more diverse sectors like agriculture and manufacturing. It suggests that for sustainable development, Nigeria must undergo structural transformation by investing in sectors that enhance productivity, employment, and value addition. The theory provides a robust lens through which the study examines the roles of agriculture and manufacturing in Nigeria's diversification strategy. It also highlights the importance of policy interventions that support structural transformation, enhance productivity, and promote sustainable economic growth across multiple sectors.

The Structural Change Theory

The Structural Change Theory, as advanced by economists such as Sir Arthur Lewis and Ragnar Nurkse, offers a vital framework for understanding economic transformation in developing nations like Nigeria. Central to the theory is the idea that long-term development stems from reallocating resources particularly labor and capital from low-productivity sectors such as agriculture to higher-productivity sectors like manufacturing and industry. In Nigeria, where agriculture employs a significant portion of the population but remains underdeveloped, this theory

highlights the importance of moving surplus agricultural labor into a more productive and value-adding manufacturing sector. Nigeria's historical overdependence on oil has led to economic vulnerabilities, especially during oil price shocks. The Structural Change Theory therefore advocates a shift toward sectors capable of sustaining long-term growth, such as agro-processing and industrial manufacturing, which not only enhance productivity but also diversify the economy's revenue base (McMillan & Rodrik, 2011).

This theoretical lens emphasizes that agriculture and manufacturing must be seen as interconnected components of a unified development strategy. The agricultural sector provides raw materials that can feed into a robust manufacturing base, particularly in agro-processing. For transformation to occur, however, Nigeria must invest in infrastructure, innovation, market access, and education key enablers of both agricultural efficiency and industrial productivity (FAO, 2021; Ogunniyi et al., 2020). Policy efforts must also foster a business environment conducive to SME development in manufacturing, as these enterprises can absorb labor, increase wages, and stimulate broader economic activity. The Structural Change Theory underscores that effective structural transformation depends not just on sectoral development but also on facilitating labor mobility, particularly through education and vocational training that prepares the workforce for industrial demands. In doing so, Nigeria can reduce its over-reliance on oil, generate employment, alleviate poverty, and build a more resilient and inclusive economy (Oni & Akinbobola, 2017; Olaleye & Adeleke, 2021).

Empirical Reviews

Akinmoladun (2015) conducted a policy-focused study centered on Nigeria's agricultural development potential and the broader prospects for economic diversification. The period under review spanned the early 2010s, a time marked by renewed interest in non-oil sectors. The research design was largely descriptive and conceptual, relying on secondary sources, policy documents, and theoretical insights without the use of empirical data or econometric modeling. The variables of interest included agricultural productivity, policy interventions, and diversification outcomes, though these were discussed without quantitative measurement or hypothesis testing. The technique of data analysis involved narrative synthesis and qualitative evaluation of policy initiatives. Key findings highlighted agriculture's potential to serve as a foundation for diversification and inclusive growth. However, the study's lack of empirical depth and region-specific analysis limited its ability to assess the effectiveness of proposed strategies. It did not account for implementation challenges across Nigeria's varied agro-ecological zones, nor did it engage with critical structural issues such as access to finance, technological adoption, and regional disparities in infrastructure and institutional capacity.

Ajayi and Raji (2016) applied a structural econometric modeling approach to examine the influence of manufacturing on Nigeria's economic growth. Covering a period of several decades leading up to the mid-2010s, the study adopted a quantitative research design using time-series data drawn from national macroeconomic indicators. The key variables investigated included manufacturing output, gross domestic product (GDP), industrial policy interventions, and labor force metrics. The technique of data analysis involved the use of econometric tools such as vector autoregression (VAR) models and cointegration tests to explore both short- and long-term relationships among variables. The study found that manufacturing had a statistically significant and positive impact on economic growth, reinforcing the importance of well-targeted industrial policies in achieving structural transformation. However, while the findings supported policy-driven diversification, the study did not evaluate the historical performance of past industrial strategies nor assess the government's institutional capacity to implement reforms. As a result, it overlooked governance-related constraints such as bureaucratic inefficiencies, policy inconsistency, and weak enforcement mechanisms that could undermine the success of industrialization efforts.

Adewuyi and Adeoye (2017) concentrated their study on the cocoa industry as a case within the broader agricultural export landscape in Nigeria. The period of analysis covered recent decades during which cocoa exports had fluctuating but notable influence on foreign exchange earnings. Employing a sector-specific research design, the study utilized econometric techniques such as regression analysis to quantify the contribution of cocoa exports to Nigeria's economic growth. The primary variables included cocoa export volumes, agricultural GDP, and total GDP. The technique of data analysis involved time-series econometrics, likely including unit root tests and cointegration analysis to establish long-run relationships. The findings revealed a significant positive impact of cocoa exports on economic growth, reinforcing the sector's importance in Nigeria's diversification strategy. However, the narrow scope of the study limited its generalizability to the entire agricultural sector. It did not examine value chain development, domestic processing capacities, or the extent to which the cocoa industry could be integrated with other agricultural sectors to enhance value retention and employment generation.

Oluwatayo (2018) addressed the dual role of agriculture and manufacturing in Nigeria's economic diversification efforts by proposing an integrative conceptual framework. The area of study spanned both sectors with a focus on policy and strategic linkages. The research design was qualitative and conceptual, relying on literature synthesis without incorporating empirical validation. Key variables discussed included sectoral output, diversification indices, and policy instruments, though these were treated descriptively rather than quantitatively. The study did not employ any formal econometric or statistical techniques, and the analysis was based on narrative reasoning. The key findings emphasized the necessity of coordination between agriculture and manufacturing to drive structural transformation. However, the lack of methodological rigor weakened the practical applicability of the framework. Critical constraints such as limited access to finance, poor investment climate, infrastructural gaps, and the underutilization of private sector potential were mentioned but not explored in depth, thereby reducing the effectiveness of the recommendations.

Ogunleye and Adeniran (2019) carried out an empirical study assessing the relationship between agricultural diversification and economic growth in Nigeria using either time-series or panel data methodologies. The research focused on the post-oil boom era, especially recent decades characterized by policy shifts towards non-oil sectors. The design was quantitative, and the variables investigated included indices of agricultural diversification, GDP growth, and oil dependency ratios. The technique of data analysis involved econometric procedures such as multiple regression analysis, cointegration tests, and possibly Granger causality to determine both the strength and direction of

relationships. The study found that increasing agricultural diversification significantly contributed to reducing oil dependence and enhancing economic stability. However, the research did not sufficiently address emerging concerns such as the role of technological innovation in agriculture, sustainable farming practices, or strategies for climate change adaptation. These omissions limit the study's relevance in addressing contemporary agricultural challenges and planning for long-term resilience in the sector.

Obasi and Akinwumi (2020) focused their research on the role of industrial policy in promoting economic growth in Nigeria, with particular attention to the manufacturing sector. The study spanned a period marked by renewed government interest in industrialization and policy reform. Adopting a mixed research design, it combined qualitative policy analysis with quantitative econometric techniques to assess the effectiveness of industrial policy instruments. The variables investigated included industrial policy measures, manufacturing output, and GDP growth. The data analysis involved regression models and policy document reviews to evaluate the link between policy interventions and manufacturing performance. The findings confirmed that well-designed industrial policies could significantly enhance economic diversification and promote sustained growth. However, the study fell short in examining the root causes of the underperformance of earlier policies. It did not critically address structural impediments such as institutional weaknesses, corruption, and the regulatory environment, which are often decisive in determining policy outcomes. As a result, while affirming the importance of industrial policy, the research offered limited guidance for future policy reforms aimed at overcoming these deep-rooted challenges.

Aremu and Salami (2021) undertook an empirical investigation of the dual roles of agriculture and manufacturing in Nigeria's diversification agenda. Covering a contemporary period characterized by declining oil revenues and heightened policy interest in non-oil sectors, the study utilized a comprehensive quantitative design. It employed disaggregated sectoral data to assess the individual and combined contributions of agriculture and manufacturing to economic growth. Key variables included sectoral output levels, GDP growth, public investment, and employment indicators. Using econometric techniques such as vector autoregression (VAR) models and panel data regression, the study found that coordinated policy interventions targeting both sectors were more effective in fostering inclusive and sustained economic growth than isolated efforts. The findings highlighted the potential synergy between agriculture and manufacturing when supported by integrated strategies. Nonetheless, the study lacked regional disaggregation and failed to account for critical social dimensions such as gender disparities, youth participation, and differential access to resources, which can significantly influence the success and inclusiveness of sectoral policies. This limited the study's ability to inform region-specific or socially sensitive policy recommendations.

Eze and Olayemi (2022) analyzed the impact of agro-industrialization on Nigeria's economic diversification using quarterly time-series data from 1999 to 2020. The study adopted an autoregressive distributed lag (ARDL) model to evaluate both short-run and long-run relationships. Key variables included agro-industrial output, GDP, employment levels, and capital investment in agro-processing. Findings indicated that agro-industrial development significantly contributes to GDP growth and employment generation in the long run. However, short-run fluctuations were influenced by infrastructural gaps and policy inconsistencies, suggesting the need for sustained government investment and regulatory stability.

Nwachukwu and Ajibola (2022) conducted an empirical study assessing the relationship between industrial policy effectiveness and manufacturing performance in Nigeria from 1985 to 2020. The research employed a vector error correction model (VECM) using time-series data. It examined variables such as industrial policy indices, manufacturing output, public investment, and capacity utilization. The study found that while industrial policies positively affect manufacturing output in the long run, policy implementation lags and bureaucratic inefficiencies dilute their immediate impact. The authors recommended stronger policy monitoring and private-sector participation in policy design.

Okonkwo and Udeh (2022) explored the effect of non-oil exports, particularly processed agricultural products, on Nigeria's GDP between 1990 and 2021. The study applied multiple regression analysis and cointegration tests. Key variables included non-oil export volume, real GDP, and investment in the export sector. The findings confirmed a positive and statistically significant long-run relationship between non-oil exports and GDP, reinforcing the argument for value addition and industrial upgrading of agricultural exports. Nonetheless, issues such as export market concentration and quality certification were identified as persistent challenges.

Recently, Ibrahim and Oduola (2023) examined the role of technological innovation in enhancing manufacturing competitiveness in Nigeria. The research covered the period from 2000 to 2022 and employed a panel regression analysis using firm-level data across major industrial zones. Variables investigated included R&D expenditure, manufacturing output, labor productivity, and technology adoption rates. Results demonstrated that technological innovation has a substantial positive impact on productivity and output levels in manufacturing firms. However, the study noted that innovation diffusion is uneven, primarily due to unequal access to finance, weak intellectual property frameworks, and limited public-private collaboration in R&D.

Also, Usman and Bello (2023) carried out a sectoral analysis of agricultural financing and its effect on diversification and rural development in Nigeria using data from 1995 to 2021. The study used a generalized method of moments (GMM) estimation technique to address endogeneity issues. The variables included agricultural credit volume, rural GDP, employment in agriculture, and non-oil export growth. The findings highlighted that increased access to agricultural finance significantly boosts rural economic activities and supports diversification. Nonetheless, the effectiveness of financing mechanisms was found to be hampered by administrative bottlenecks and poor loan recovery systems. In the same year **Chukwu and Hassan (2023)** investigated the institutional determinants of data approach, specifically the system GMM estimator, to assess the impact of institutional quality indicators such as regulatory effectiveness, corruption control, and government stability. The dependent variable was manufacturing sector value-added. The results showed that improved institutional quality has a robust and positive effect on manufacturing performance, particularly when supported by trade openness and infrastructure investment. The study recommended institutional reforms as a precondition for successful industrial expansion.

Research Gap

A key research gap arises from the lack of studies that explore the relationship between the manufacturing and agricultural sectors and economic diversification using more advanced techniques like quantile regression. Quantile regression, which estimates the conditional median and other quantiles of the dependent variable, allows for a more nuanced understanding of how these sectors influence economic growth at different points of the distribution of economic outcomes. Unlike traditional OLS, which focuses on the mean of the distribution, quantile regression can capture the varying effects across the entire distribution of the dependent variable, offering insights into how agricultural and manufacturing activities might differently impact regions or economic sectors that experience varying levels of economic development or industrialization. Quantile regression can be particularly useful for identifying how agricultural and manufacturing sectors contribute to the economic diversification process across different economic conditions. Furthermore, previous studies have primarily focused on the linear effects of agricultural exports and manufacturing on economic growth.

Methodology

Research Design

This study adopts a quantitative research design. Quantitative research allows for objective measurement and statistical analysis of the relationships among variables. It is suitable for examining macroeconomic trends and drawing generalizable conclusions from numerical data over time. Specifically, this study uses time series econometric analysis to explore the asymmetric effects of manufacturing sector output and agricultural sector output on economic development in Nigeria.

3.2 Model Specification

The study was embarked to explore and establish the effect of manufacturing sector and agricultural sector on economic development of. It also inquires about the dynamic distributional asymmetries in the distributions of the series in the model in the sample period. We relied on the quantile regression as was used by Koenker and Basset (1978). The quantile regression is more robust and most appropriately applicable when the conditions of linear regression are not met or when the error term are not normally distributed in a series. Its benefit is not in the robustness but in the ability of the technique to estimate impacts at various points or quantiles of the conditional outcome distribution. Thus, the Quantile regression equips us to confirm if the effects of capital market are asymmetric over the quantiles of economic growth in Nigeria. This is to enable us defeat the short coming of the standard OLS and provide a more robust and reliable estimates. The standard specification of the relationships is as follows:

Let $Q_y(\tau| X)$ denote the conditional quantile function of the dependent variable y given the vector of covariates X, at quantile $\tau \in (0,1)$

$$QGDP(\tau| MSO, ASA, INT) = \beta_0(\tau) + \beta_1(\tau)MSO + \beta_2(\tau)ASO + \beta_3(\tau)INT + \mu_t \quad (1)$$

Where MSO: Manufacturing Sector Output, ASO: Agricultural Sector Output, INT: Interest Rate (control variable), $\beta_0(\tau)$: Intercept term at quantile, $\beta_1(\tau),\beta_2(\tau),\beta_3(\tau)$ = Quantile-specific slope coefficients. The variables are as presented in equation 3.2 above while, B_1 to B_3 are coefficients to be evaluated. Moreover, u_t is the error term which captures those factors that might influence the model but are not included in the model. We proceed to specify the Quantle regression equation as linear function of the covariates, for the ith quantiles, we specify thus:

$$Y_i = X_i^{!}\beta_\phi + \mu_\phi + Q_\phi(Y_i / X_i) = X_i^{!}\beta_\phi \phi \in (0,1) \quad (2)$$

Here, *iy* are the dependent variables (gross domestic product) and x_i denotes the independent (manufacturing output, agricultural output, and interest rate). Quant□ (yi|xi) indicate the quantile of yi, conditional on the independent vectors of xi. The error term is unspecified. It is only implicit that □□□□ fulfils the quantile constraint Quant□□(□□□□□xi)□□□□□The □*th* regression quantile (0<□<1) of y gives solution to minimization of the absolute sum of deviations of residuals thus:

$$\min \frac{1}{n}\left\{ \sum_{i:y_i \le x_i^{!}\beta} \phi \,|\, y_i - x_i^{!}\beta \,| + \sum_{i:y_i \le x_i^{!}\beta} (1-\phi) \,|\, y_i - x_i^{!}\beta \,| \right\} \quad (3)$$

The disparity of □□traces the whole distribution of test scores and we can estimate the effects of manufacturing output, agricultural output, and interest rate on GDP at any given percentile. The important characteristic of this technique is that the marginal impacts of the covariates, known by □ may vary over quantiles (giving different values of □). In the case where $y = x_0\beta + \mu_i$ (with □*i*□assumed homoscedastic), the marginal impacts at all quantile does not vary. Deviation in the estimated group effects through the quantiles of the conditional distribution scores may be showing evidence of heterogenous effects. Consequently, we estimate the functions at different quantiles (□= 0.1,0.25,0.5,0.75,0.9), and determine whether there exist homogeneity in the impact of manufacturing output, agricultural output, and interest rate by evaluating the equality of the coefficients in the quantiles. In addition, the quantile asymmetric impacts of manufacturing output, agricultural output, and interest rate on gross domestic product are established through the Wald test which asymptotically tracks a Chi-square distribution.

Justification for Methodology

Quantile regression is preferred over OLS because it does not assume homoscedastic errors or normally distributed residuals. This makes it particularly suitable for macroeconomic time series data, which are often characterized by heteroskedasticity and non-normality. Moreover, it allows the researcher to explore the non-linear and asymmetric relationships between sectors of the economy and economic development across different levels of GDP.

Data Analysis and Results Discussion

Unit Root Test

Gross domestic product (GDP), interest rate, (INT), manufacturing sector output (MSO) and agricultural sector output

(ASO) variables in table 4.1 are tested for stationarity so as to avert inconsistencies which could have arisen owing to spurious results emanating from non-stationary data used for regression interest rate is included in the model to serve as control variable.

Table 1: Augmented Dickey Fuller Unit Root Test

ADF statistics						
Variables	**Level**	**1st Difference**	**Critical Values**	**Order of Integration**	**P-Value**	**Decision**
GDP	-5.546077*	N/A	1% -3.646342 5% -2.954021* 10% -2.615817	*I*(0)	0.0001	Reject H_0
MSO	0.985992	-3.506692*	1% -3.610453 5% -2.938987* 10% -2.607932	*I*(1)	0.0130	Reject H_0
ASO	2.202384	-4.645880*	1% -3.610453 5% -2.938987* 10% -2.607932	*I*(1)	0.0006	Reject H_0
INT	-3.260569*	N/A	1% -3.596616 5% -2.933158* 10% --2.604867	*I*(0)	0.0233	Reject H_0

*Author's computation (*shows the variable is stationary at 5% level of significant*

From table 1 above, the Augmented Dickey Fuller unit root test reveal that GDP and INT were stationary at level while MSO and ASO were stationary after their first differences. This implies that there is a mixture of order of integration. We further establish the appropriateness of the quantile for determining location asymmetries in market capitalization, all shares index, values of shares traded, and equity stock and the dependent variables as shown in the figures and tables below.

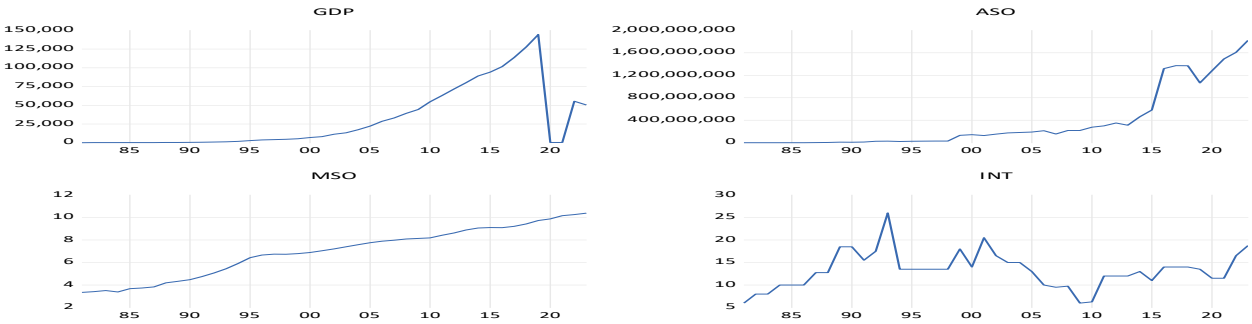

Figure 1: mean reversion graph

From the figure below, we can observe that there is mean reversion especially in agricultural output and interest rate. Although there is volatility in the series but it reverse back to its mean. Thus the series is a stationary series. From the graph above, we can deduce evidence of fluctuation or volatility in the model where small (large) changes are followed by large (small) changes. Further we prove more using table 2 and 3

Table 2: Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	5.640813	Prob. F(2,24)	0.0098
Obs*R-squared	12.47061	Prob. Chi-Square(2)	0.0020

Table 3; Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.038327	Prob. F(12,26)	0.0086
Obs*R-squared	22.76559	Prob. Chi-Square(12)	0.0298
Scaled explained SS	5.661518	Prob. Chi-Square(12)	0.9322

The results from both the Breusch-Godfrey Serial Correlation LM Test and the Breusch-Pagan-Godfrey Heteroskedasticity Test indicate significant violations of key OLS assumptions. Specifically, the Breusch-Godfrey test shows p-values of 0.0098 (F-statistic) and 0.0020 (Chi-square), both below 0.05, leading to the rejection of the null hypothesis of no serial correlation. This suggests that the model's residuals are serially correlated, violating the OLS requirement of independently distributed errors and pointing to potential model misspecification or omitted variables. Similarly, the heteroskedasticity test reveals p-values of 0.0086 (F-statistic) and 0.0298 (Obs*R-squared), also below 0.05, indicating the likely presence of heteroskedasticity, even though the Scaled Explained SS statistic (p = 0.9322) does not. With two out of three indicators confirming non-constant error

variance, it's safer to conclude that heteroskedasticity exists. These issues imply that OLS estimators may be inefficient and produce biased standard errors, compromising statistical inference. Therefore, Quantile Regression, which is robust to these violations, is more appropriate for the analysis.

The Quantile Regression Results

Table 4: quantile regression result (GDP and ASO, MSO, INT)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ASO	6.02E-05	1.88E-05	3.206977	0.0027
INT	-1665.130	756.1666	-2.202068	0.0336
MSO	5276.708	2023.062	2.608278	0.0128
C	-2595.382	12569.38	-0.206485	0.8375
Pseudo R-squared	0.371985	Mean dependent var		30194.29
Adjusted R-squared	0.323676	S.D. dependent var		40458.80
S.E. of regression	34610.02	Objective		387571.3
Quantile dependent var	6897.480	Restr. objective		617137.2
Sparsity	38775.13	Quasi-LR statistic		47.36353
Prob(Quasi-LR stat)	0.000000			

The quantile regression result in table 4 provides insights into the impact of key variables on economic development in Nigeria, using GDP as the proxy. The coefficient for agricultural sector output (ASO) is positive and statistically significant at the 1% level, indicating that increased output in the agricultural sector contributes positively to economic development. This suggests that diversification through agriculture supports growth in GDP.

Manufacturing sector output (MSO) also shows a positive and significant relationship with GDP at the 5% level, implying that improvements in manufacturing activities play an important role in driving economic development. This reinforces the idea that economic diversification particularly through manufacturing has a substantial influence on GDP performance. Conversely, the interest rate (INT) has a negative and statistically significant effect on GDP. This means that higher interest rates are associated with lower economic growth, potentially due to the discouraging effect high borrowing costs have on investment and consumption. The constant term (C) is not statistically significant, indicating that it does not independently explain variations in GDP. The adjusted R-squared value of 0.32 implies that approximately 32% of the variability in GDP is explained by the model, which is moderately strong for macroeconomic data. The highly significant Quasi-LR statistic (p-value = 0.0000) further supports the overall robustness of the model.

Table 5: Quantile Process Coefficients Result (GDP and MSO, ASO, INT)

	Quantile	Coefficient	Std. Error	t-Statistic	Prob.
ASO	0.100	-6.18E-06	2.73E-05	-0.226689	0.8218
	0.250	2.30E-05	2.05E-05	1.126287	0.2669
	0.500	6.02E-05	1.88E-05	3.206977	0.0027
	0.750	5.30E-05	2.19E-05	2.415340	0.0205
	0.900	8.15E-05	5.90E-05	1.380951	0.1752
INT	0.100	-170.8160	1487.384	-0.114843	0.9092
	0.250	-245.2481	1351.003	-0.181530	0.8569
	0.500	-1665.130	756.1666	-2.202068	0.0336
	0.750	-1183.826	835.6509	-1.416651	0.1645
	0.900	-939.0197	931.9416	-1.007595	0.3199
MSO	0.100	1532.437	4894.181	0.313114	0.7559
	0.250	1585.252	4255.284	0.372537	0.7115
	0.500	5276.708	2023.062	2.608278	0.0128
	0.750	10324.36	2876.206	3.589575	0.0009
	0.900	9851.973	4649.312	2.119017	0.0405

The quantile process results offer a deeper understanding of how the effects of agricultural output (ASO), manufacturing output (MSO), and interest rate (INT) on economic development (GDP) vary across different levels of the income distribution in Nigeria.

For agricultural output (ASO), the coefficient is insignificant at the lower quantiles (0.10 and 0.25), suggesting that its impact on GDP is weak among the lowest levels of economic development. However, at the median (0.50) and upper-middle quantile (0.75), ASO becomes positive and statistically significant, indicating that agricultural output contributes more to economic development as the economy grows. By the 0.90 quantile, the coefficient remains positive but is statistically insignificant, showing a diminishing influence at the highest levels of GDP. The interest rate (INT) shows a consistently negative effect across all quantiles, though it is only statistically significant at the 0.50 quantile. This implies that interest rates most strongly hinder economic growth around the median income level, while their effect is less pronounced at both the lower and upper ends of the distribution. Manufacturing sector output (MSO) demonstrates a positive relationship with GDP across all quantiles. While this effect is insignificant at the lower quantiles (0.10 and 0.25), it

becomes significant from the 0.50 quantile upwards. The strongest effects appear at the 0.75 and 0.90 quantiles, suggesting that as the economy advances, manufacturing becomes a more critical driver of economic development. Overall, these results emphasize the increasing importance of manufacturing output in stimulating higher levels of economic growth in Nigeria, particularly among more developed income segments.

Slope Equality Test

To test the quantile regression coefficients, we applied Wald test as shown in the table 6 below for the model:

Table 6: summary of Slope Equality Test for the model

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Wald Test	20.32160	6	0.0024

From the table 6 above, according to the Wald test, the Chi-square value of slope equality tests is 20.32160 and is statistically significant. We therefore reject the slope equality hypothesis at 5% level. This implies that slope equality varies across the quantile level for the model.

Symmetric Quantiles Test

To confirm the presence asymmetry in the model, we employed Wald test as shown in the table below

Table 7: summary of Symmetric Test for the model

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Wald Test	5.534715	4	0.2367

According to the Wald test, the chi-square statistic value of the symmetric quantile tests is 5.534715 and is statistically insignificant. Hence there is no evidence of asymmetry since the pvalue in the model is statistically insignificant across 0.1,0.25,0.5,0.75,0.9 quantiles, thus, we conclude that there is symmetric or linear relationship between independent variables and the dependent variables (economic growth) in Nigeria.

Discussion of Results

The quantile regression results presented in Table 4 provide a nuanced and layered understanding of how agricultural output, manufacturing output, and interest rates influence economic development in Nigeria, with GDP serving as the proxy for development. The findings reveal that agricultural sector output (ASO) has a positive and statistically significant effect on GDP at the 1% level, underscoring the critical role of agriculture in driving economic expansion. This outcome reaffirms the importance of investing in agricultural productivity as a catalyst for macroeconomic growth. Such a positive relationship aligns with the assertions of Ijaiya and Akanbi (2019), who emphasize that in developing economies like Nigeria, agriculture remains a vital engine for inclusive growth and diversification. Given Nigeria's heavy dependence on oil exports and its vulnerability to volatile oil price shocks, these findings support the urgent policy imperative to diversify the economic base by revitalizing agriculture, which can contribute to stabilizing growth and enhancing food security.

However, some scholars offer a more critical perspective. For example, Olawale and Adeyemi (2020) argue that while agriculture is crucial, its impact on GDP growth in Nigeria is often constrained by structural issues such as inadequate infrastructure, limited access to modern technology, and poor value chains. They caution that without addressing these underlying challenges, the positive effects of agricultural output may be overstated or unsustainable in the long run. This suggests that policymakers must pair investment in agriculture with institutional reforms and infrastructure development to fully harness the sector's growth potential.

Turning to the manufacturing sector, the results indicate that manufacturing output (MSO) has a statistically significant positive effect on GDP at the 5% level, reaffirming the sector's pivotal role in Nigeria's economic development. This finding corroborates the arguments of Ajakaiye and Akpan (2019), who contend that industrialization via manufacturing is essential for Nigeria's long-term structural transformation. The demonstrated strength of the manufacturing sector highlights its potential to foster value addition, generate employment, and diversify export earnings all of which are critical for reducing Nigeria's dependence on oil revenues and promoting sustainable economic growth. Similar findings by Eze and Okeke (2021) support the view that a competitive manufacturing sector can stimulate innovation and productivity spillovers, thereby creating a virtuous cycle of development.

Nonetheless, there are contrary views that call for cautious optimism. Scholars such as Nwankwo et al. (2022) note that manufacturing growth in Nigeria is often hampered by inconsistent power supply, inadequate funding, and policy instability, which diminish the sector's ability to contribute effectively to GDP growth. This underlines the need for an enabling environment that not only boosts manufacturing output but also ensures that growth is sustained and inclusive.

The interest rate variable presents a contrasting picture by showing a negative and statistically significant impact on GDP, suggesting that high interest rates hinder economic development. This inverse relationship likely arises from the restrictive nature of elevated borrowing costs, which dampen private sector investment and reduce aggregate demand. High interest rates can discourage both consumers and businesses from accessing credit, thereby limiting productive investments. This finding resonates with the study by Uchenna and Ugochukwu (2021), who highlight that unfavorable monetary conditions, particularly high lending rates,

pose significant barriers to private sector-led growth in Nigeria. However, it is worth noting that some scholars argue that moderately high interest rates may be necessary to control inflation and stabilize the macroeconomic environment (Ojo, 2018). This suggests a delicate policy balancing act where monetary authorities must weigh the trade-offs between inflation control and growth-friendly credit availability.

From a policy perspective, these results collectively underscore the importance of sectoral diversification with specific attention to agricultural and manufacturing sectors as a pathway to sustainable economic development in Nigeria. The evidence strongly supports the narrative that structural transformation driven by revitalizing agriculture and manufacturing is crucial for fostering inclusive growth and reducing vulnerability to oil market shocks. Policymakers are thus urged to formulate integrated strategies that prioritize investments in these sectors, alongside reforms to improve infrastructure, access to technology, and ease of doing business.

Conclusion and Recommendations

The focus of the study was to analyze the role of manufacturing and agricultural sectors in economic diversification and development of the Nigerian economy. The study adopted the quantile regression for analysis of data which spanned from 1981 to 2023. The findings findings from the study based on the quantile regression results:

- Agricultural sector output (ASO) has a positive and statistically significant impact on GDP at the 1% level, indicating that growth in agriculture supports overall economic development and diversification in Nigeria.
- Manufacturing sector output (MSO) also shows a positive and significant relationship with GDP at the 5% level, highlighting the important role of manufacturing in driving economic growth and structural transformation.
- According to the result of the quantile process, impact of agricultural output (ASO) varies across income quantiles: it is insignificant at lower quantiles (0.10 and 0.25), but becomes positive and significant at the median (0.50) and upper-middle quantile (0.75), with a diminishing effect at the highest quantile (0.90).
- Manufacturing output (MSO) positively influences GDP across all quantiles, though insignificant at the lowest quantiles (0.10 and 0.25). Its effect is significant and strongest at higher quantiles (0.75 and 0.90), indicating manufacturing becomes more crucial for economic growth in more advanced income segments.
- The Wald test for symmetry yields an insignificant Chi-square value of 5.534715, indicating no evidence of asymmetry in the relationships. Thus, the link between the independent variables (agriculture, manufacturing, interest rate) and economic growth is symmetric or linear across income quantiles.

In the light of the findings and analysis of this research, the researcher recommends that:

- Government should prioritize agro-processing and digital innovation sectors through targeted incentives, as these showed significant growth in gross domestic product over the years under review
- There is a need to develop and integrate agricultural value chains with local manufacturing industries (e.g., agro-processing), creating synergy that can drive job creation, exports, and industrialization across the country.

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