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AGRICULTURAL AND MANUFACTURING SECTOR OUTPUTS AND ECONOMIC GROWTH IN NIGERIA: A QUANTILE REGRESSION APPROACH

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ABSTRACT: *Nigeria's economic development has been persistently hindered by its dependence on crude oil exports, which has exposed the economy to global oil price volatility, macroeconomic instability, high unemployment, and weak industrial growth. This study investigates the contributions of the agricultural and manufacturing sectors to gross domestic product (GDP) and growth in Nigeria, using annual time-series data from 1981 to 2023. Employing a quantile regression approach, the study captures the heterogeneous effects of sectoral outputs across different levels of gross domestic product (GDP), offering insights beyond conventional mean-based methods. The findings reveal that agricultural sector output significantly enhances GDP at the 1% level, underscoring its role in supporting economic diversification. Similarly, manufacturing output exerts a positive and significant influence at the 5% level, affirming its importance in driving structural transformation. In contrast, interest rates exert a negative and significant effect on GDP, indicating that high borrowing costs dampen investment and consumption. Quantile results further show that agricultural output becomes growth-enhancing at the median and upper-middle quantiles, with diminishing effects at the highest quantile. Manufacturing output demonstrates stronger and more significant effects at higher quantiles, suggesting its increasing relevance in advanced stages of economic development. Interest rates remain negatively associated with growth across all quantiles, with the strongest adverse effect observed at the median quantile. The Wald test confirms symmetric relationships across income quantiles. Based on these findings, the study recommends that policymakers prioritize investment incentives, infrastructure development, and credit accessibility for the agricultural and manufacturing sectors.*

KEYWORDS: Economic diversification, manufacturing sector, Agricultural sectors, Quantile regression, Economic growth, Nigeria.

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INTRODUCTION

Nigeria, endowed with vast natural resources, particularly crude oil, has for decades struggled to translate its oil wealth into sustainable and inclusive economic development. The country's heavy reliance on oil exports has exposed it to external shocks, especially the volatility of global oil prices, leading to recurring macroeconomic instability, revenue shortfalls, and slow structural transformation. These vulnerabilities have reinforced the urgency of economic diversification as a strategic priority to stabilize the economy and foster long-term growth. Economic diversification, broadly defined as expanding productive activities and income sources beyond oil, is widely recognized as essential for building resilience, generating employment, boosting exports, and ensuring inclusive and sustainable development (IMF, 2014; Olayemi, 2020; Fasanya & Olayiwola, 2020).

Among the non-oil sectors, agriculture and manufacturing stand out for their potential to drive broad-based economic activity, attract investment, and stimulate inclusive development. Manufacturing is a recognized pillar of modern economies because of its role in value addition, job creation, and foreign exchange earnings. In Nigeria, however, the sector suffers from persistent structural weaknesses such as inadequate infrastructure, unreliable power supply, high production costs, and limited access to credit (Oluwatobi & Olubiyi, 2018; Adebayo & Omotayo, 2019). These weaknesses are compounded by decades of policy neglect due to the dominance of oil, which diverted attention and investment away from industrial development. Yet, the manufacturing sector holds considerable potential to process local raw materials, reduce import dependence, expand exports, and anchor a diversified industrial base.

Historically, manufacturing played a central role in Nigeria's post-independence import-substitution strategy. However, the 1970s oil boom redirected state priorities, triggering Dutch Disease effects, fostering rent-seeking and eroding competitiveness in local industries (Ajakaiye & Fakiyesi, 2009; Iyoha & Oriakhi, 2002). More recent initiatives, such as the National Industrial Revolution Plan (NIRP), credit support through the Bank of Industry, and targeted infrastructure investments, have sought to revive the sector (Federal Ministry of Industry, Trade and Investment, 2014; Adegbite & Ayadi, 2021; Oyelaran-Oyeyinka & Olojede, 2020). Nevertheless, policy inconsistency, weak coordination, and infrastructure deficits continue to undermine performance, leaving manufacturing's contribution to GDP at just 8.4%, far below the 25–35% typical of diversified economies (NBS, 2023; UNIDO, 2022).

Agriculture, once the backbone of Nigeria's economy before the oil era, also holds significant potential for economic transformation. It remains the largest employer of labor, especially in rural areas, and provides critical raw materials for manufacturing. Before oil discovery, agricultural exports such as cocoa, palm oil, and cotton were major foreign exchange earners. However, oil-led neglect eroded agricultural productivity, increased food imports, and deepened food insecurity (Akinlo, 2016; Adebayo & Omotayo, 2019).

Despite these setbacks, agriculture remains relatively more stable than oil and offers opportunities for inclusive growth through agro-processing and value-chain development. Government interventions such as the Anchor Borrowers' Programme and the National Agricultural Land Development Authority (NALDA) have aimed to enhance productivity by improving financing, inputs, and technology access (Okunmadewa & Adebayo, 2020; Aliyu & Sulaimon, 2021). Yet, outdated techniques, poor infrastructure, and limited access to finance, particularly for smallholder farmers, continue to impede performance.

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The consequences of weak performance in both agriculture and manufacturing are evident in Nigeria's fragile economic base. Oil accounts for over 85% of foreign exchange earnings and nearly 50% of government revenues (CBN, 2022; World Bank, 2023). This dependence has left the economy highly vulnerable, as demonstrated during the oil price crashes of 2016 and 2020, which plunged Nigeria into recession (IMF, 2022).

The lack of diversification has contributed to high youth unemployment (over 40%), widespread poverty (40.1%), and persistent trade deficits (NBS, 2022; World Bank, 2022). Agricultural productivity remains low, with mechanization levels at 1.5 hp/ha, below the global average of 2.5 hp/ha, while post-harvest losses reach 40% (FAO, 2021; Ogunniyi et al., 2020). Manufacturing competitiveness is equally constrained by poor electricity supply, inadequate financing, and weak institutional frameworks (Akinlo & Adejumo, 2019).

Although successive policy frameworks such as the Agricultural Transformation Agenda (ATA) and NIRP were designed to strengthen these sectors, their impact has been limited by weak implementation, inadequate funding, and poor coordination (Oni & Akinbobola, 2017). As a result, Nigeria continues to face inflationary pressures, exchange rate instability, and widening inequality (Olaleye & Adeleke, 2021). These realities underscore the urgent need to examine the contributions of agriculture and manufacturing to economic growth and diversification in a rigorous, empirical manner.

While several studies have examined the role of non-oil sectors in Nigeria's economy, most rely on mean-based econometric techniques that obscure heterogeneity across different stages of economic growth. Few have explored how the contributions of agriculture and manufacturing vary across income levels, leaving an incomplete picture of sectoral dynamics in the diversification process. This gap is critical because sectoral impacts may differ at low, middle, and high levels of GDP, requiring tailored policy responses.

This study addresses the gap by employing quantile regression to analyze the heterogeneous impacts of agricultural and manufacturing outputs on economic growth in Nigeria over the period 1981–2023. Unlike traditional approaches, quantile regression provides a more nuanced understanding of how these sectors contribute across the income distribution. Specifically, the study examines whether agricultural and manufacturing outputs significantly influence GDP growth, whether their impacts vary across different growth quantiles, and how interest rates moderate the diversification–growth relationship.

By doing so, the study extends the empirical evidence on economic diversification in three ways: it focuses on two pivotal sectors, agriculture and manufacturing, within a long historical span; it applies a methodological approach that captures dynamics beyond average effects; and it provides policy-relevant recommendations for designing sector-specific strategies that align with Nigeria's broader diversification agenda. The remainder of the article is structured as follows: the next section reviews related literature, followed by methodology and data. Results and discussion are presented thereafter, and the final section concludes with policy implications, limitations of the study, and areas for further studies.

Theoretical Framework

The theoretical underpinning of this study on Nigeria's economic diversification through agriculture and manufacturing is anchored on core economic development theory: Structural change theory. Structural change theory, as advanced by economists such as Sir Arthur Lewis

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and Ragnar Nurkse, 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 (McMillan & Rodrik, 2011). 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 (Oni & Akinbobola, 2017; Olaleye & Adeleke, 2021).

Empirical Reviews

Empirical studies on economic diversification in Nigeria have approached the subject from different sectoral and methodological perspectives, producing a body of evidence that underscores both the opportunities and persistent challenges of reducing oil dependence. Akinmoladun (2015) conducted a policy-oriented assessment of agriculture's potential for diversification, emphasizing its role in inclusive growth but offering only conceptual insights without empirical validation. Similarly, Oluwatayo (2018) developed a conceptual framework linking agriculture and manufacturing, stressing the importance of coordinated strategies but lacking the methodological rigor required for practical application. While these works highlight critical policy directions, their descriptive nature limits their ability to inform actionable reforms.

More empirically grounded studies have employed econometric approaches to examine specific sectoral contributions. Ajayi and Raji (2016) used structural econometric modeling and found that manufacturing output exerts a significant positive impact on economic growth, reinforcing the case for industrial policies, though the study underexplored governance constraints such as policy inconsistency and bureaucratic inefficiency. Adewuyi and Adeoye (2017) focused on cocoa exports, demonstrating that agricultural exports significantly drive GDP growth, yet their narrow commodity-specific scope reduces generalizability across the wider agricultural sector. Ogunleye and Adeniran (2019) broadened the agricultural perspective by showing that diversification within the sector significantly enhances growth and reduces oil dependence, though the study did not sufficiently address emerging sustainability and technological concerns.

Recent contributions emphasize structural and policy linkages. Obasi and Akinwumi (2020) assessed the role of industrial policy in manufacturing growth, confirming the positive impact of targeted policies while noting institutional weaknesses that undermine policy effectiveness. Aremu and Salami (2021) further advanced this discourse by examining the combined contributions of agriculture and manufacturing, finding that coordinated interventions yield stronger and more inclusive growth outcomes than isolated efforts. However, their analysis did not incorporate regional or social disaggregation, thereby limiting its relevance for socially sensitive policy design.

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Newer studies have adopted sectoral and institutional perspectives with more sophisticated econometric techniques. Eze and Olayemi (2022) demonstrated that agro-industrialization contributes significantly to long-term GDP growth and employment generation, although short-run effects are hampered by infrastructure and policy volatility. Nwachukwu and Ajibola (2022) highlighted the long-run benefits of industrial policy on manufacturing output, tempered by bureaucratic inefficiencies in implementation. Okonkwo and Udeh (2022) confirmed the positive impact of non-oil exports, especially processed agricultural products, on GDP, while identifying market concentration and certification challenges as constraints.

Ibrahim and Oduola (2023) showed that technological innovation significantly improves manufacturing competitiveness, though uneven diffusion and weak intellectual property frameworks slow broader sectoral transformation. Usman and Bello (2023) emphasized the role of agricultural finance in rural development and diversification but pointed to administrative bottlenecks in credit delivery. Chukwu and Hassan (2023) added an institutional dimension, demonstrating that governance quality, particularly regulatory effectiveness and corruption control, positively influences manufacturing performance when supported by trade openness and infrastructure.

Taken together, these studies suggest a consensus that both agriculture and manufacturing play critical roles in Nigeria's diversification agenda. Evidence consistently shows positive sectoral impacts on economic growth, with agriculture providing immediate stabilizing effects and manufacturing offering long-run structural transformation. However, recurring gaps emerge across the literature. Many studies underplay cross-sectoral linkages, with only limited attempts to analyze agriculture and manufacturing as complementary drivers of diversification. Institutional and governance constraints, while noted, remain insufficiently integrated into quantitative models, despite their evident influence on outcomes. Furthermore, issues of sustainability, climate change adaptation, and social inclusiveness are often sidelined, creating space for future research to bridge these shortcomings and provide more holistic guidance for Nigeria's diversification strategy.

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.

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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.

Model Specification

The study was embarked upon to explore and establish the effect of manufacturing sector and agricultural sector on the economic development of Nigeria. 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 Bassett (1978). The quantile regression is more robust and most appropriately applicable when the conditions of linear regression are not met or when the error terms 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 to defeat the shortcomings of the standard OLS and provide 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, and $\beta_1(\tau),\beta_2(\tau),\beta_3(\tau)$ = 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 that captures those factors that might influence the model but are not included in the model. We proceed to specify the Quantle regression equation as a linear function of the covariates; for the ith quantiles, we specify thus:

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

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

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

The disparity of ϕ 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 ϕ may vary over quantiles (giving different values of ϕ). In the case where $y = x_0\beta + \mu_i$ (with μ*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 functions at different quantiles (ϕ= 0.1,0.25,0.5,0.75,0.9), and determine whether there exists 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 that could have arisen owing to spurious results emanating from non-stationary data used for regression. The interest rate is included in the model to serve as a 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

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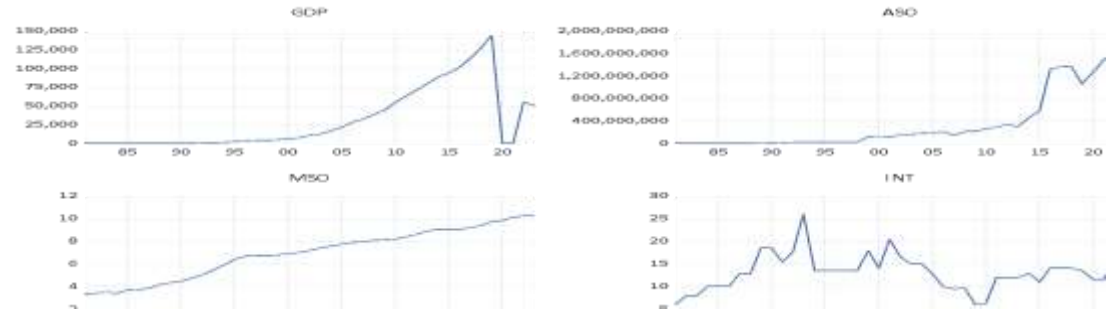
MSO	0.985992	-3.506692*	1% -3.610453 5% -2.938987* 10% -2.607932	*I*(1)	0.0130	Reject H_0
ASO	2.202384	-4.645880*	1% -3.610453 5% -2.938987* 10% -2.607932	*I*(1)	0.0006	Reject H_0
INT	-3.260569*	N/A	1% -3.596616 5% -2.933158* 10% --2.604867	*I*(0)	0.0233	Reject H_0

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

From Table 1 above, the Augmented Dickey-Fuller unit root test reveals 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 orders of integration. We further establish the appropriateness of the quantile for determining location asymmetries in market capitalization, all shares index, values of shares traded, 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 rates. Although there is volatility in the series, it reverses 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

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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.

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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

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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 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 of 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, and 0.9 quantiles;

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thus, we conclude that there is a 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,

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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 quantile regression for analysis of data that spanned from 1981 to 2023. The findings from the study based on the quantile regression results:

i. 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.

ii. 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.

iii. According to the result of the quantile process, 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).

iv. 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.

v. 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, and interest rate) and economic growth is symmetric or linear across income quantiles.

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

1. 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

2. 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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